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H. DREYFUS

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TEXTILE YARN AND FABRIC AND THE PRODUCTION THEREOF

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FIG. 1

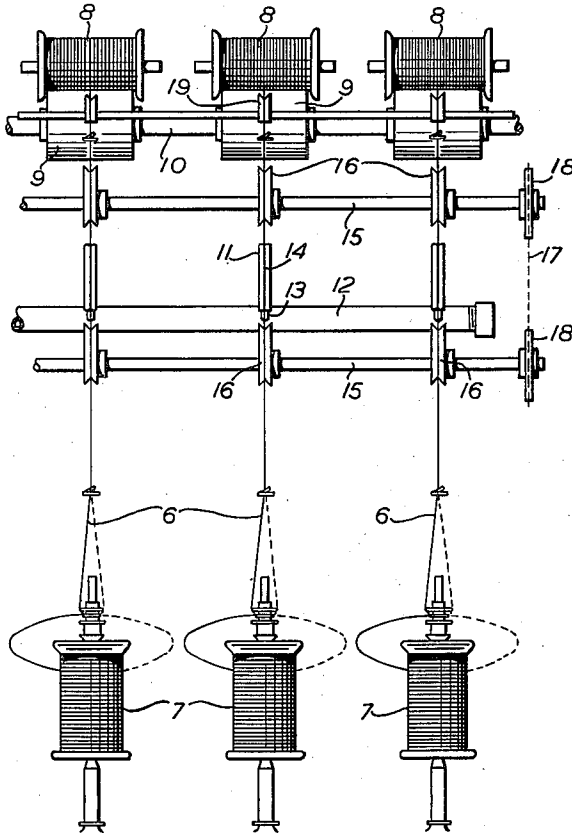


FIG. 2

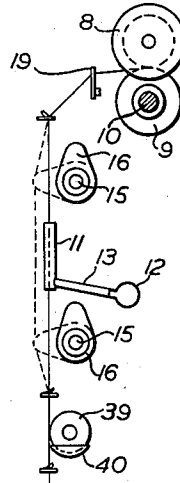


FIG. 4

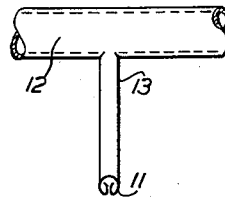


FIG. 3

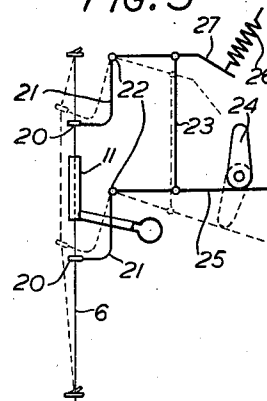
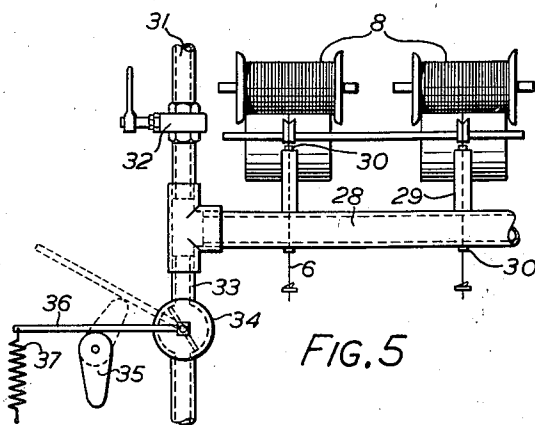


FIG. 5



Inventor:
Henry Dreyfus
by
Geltzer and Blumenthal
Attorneys

UNITED STATES PATENT OFFICE

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TEXTILE YARN AND FABRIC AND THE PRODUCTION THEREOF

Henry Dreyfus, London, England

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12 Claims. (Cl. 117—2)

This invention relates to the production of textile materials, and particularly to the production of crêpe yarns and fabrics, and has for its object the production of such materials giving enhanced crêpe effects. The invention is especially concerned with the treatment of yarns made of or containing cellulose acetate or other cellulose derivative filaments, and with the steam twisting of such yarns as described in British Patents Nos. 437,019, 438,590 and 440,653.

According to the invention, steam is applied intermittently to at least part of the yarn receiving twist in a crêpe-twisting operation so as to produce crêpe-twisted yarn that has had part of its twist inserted in the presence of steam.

As indicated in the specifications above referred to, the effectiveness of the steam twisting appears to depend upon the presence of moisture during the twisting. For the purpose of the present invention, therefore, the intermittently applied steam may itself be moist, e. g. the steam may be partially condensed in the vicinity of the yarn, or the yarn itself may be moistened prior to the application of the steam, in which case dry steam may be intermittently applied. Thus, for example, the yarn may be passed through a steam chamber conveniently having the construction described in British Patent No. 440,653, steam being admitted to the chamber through a valve-controlled opening that is opened and closed at intervals by means of cam or other suitable gear operating with the desired frequency, having regard to the rate of travel of the thread being twisted. Prior to reaching the steaming chamber, the yarn may be caused to pass in contact with a moistening device or otherwise receive moisture.

A further way of carrying out the invention consists in intermittently moistening the yarn prior to subjecting it to a dry steam treatment, the effectiveness of the treatment thus being largely confined to the moistened portions of the yarn.

While the invention may be employed in the manufacture of crêpe yarns in general it is particularly applicable to the manufacture of crêpe yarn of cellulose acetate or other organic derivative of cellulose in that the steamed portions of the yarn have high crimping power imparted thereto. It is found that the filaments in the steamed portions of the yarn are extremely closely packed, a feature to which the good crêping power of the steamed portions of the yarn may be attributed.

For example, the filaments in the steamed por-

tions of the yarn may be so closely packed that the apparent specific gravity of the steamed portions as determined from the diameter and denier is more than 85%, e. g. 85 to 90% of the actual specific gravity of the filaments, and that distortion of the cross-section of at least some of the filaments in the steamed portions of the yarn has occurred during the process of twisting. The filaments of the yarn, however, are not stuck together and can be separated upon untwisting.

Moreover, the steamed portions of the yarn are smooth and cylindrical, as opposed to the rough feel and helical form of the unsteamed portions of the yarn or of a cellulose acetate yarn or a viscose yarn which has been crêpe twisted in the ordinary way. Further, in comparison with these latter yarns the smooth, cylindrical, steamed portions of the yarn treated according to the invention exhibit much less tendency to snarl or kink.

The crêpe effect in fabrics made of or containing yarn treated according to the invention may be varied by varying the lengths of the portions subjected to the moist steam treatment and the ratio between these lengths and the remaining portions of the yarn. The intermittent treatment may be regular or irregular in character as desired.

The intermittent steam treatment may be used in conjunction with intermittent twisting, for example in conjunction with means for confining the different degrees of twist to particular lengths of the yarn. When the intermittent steaming and the intermittent twisting are used in conjunction, the two treatments may be of different frequency so that the resultant effect is a combination of the two separate differential effects applied to the yarn.

By way of example some forms of apparatus for carrying out the invention will now be described in greater detail with reference to the accompanying drawing in which

Figure 1 is a front elevation of apparatus for twisting and intermittently steaming yarn;

Figure 2 is an end elevation of part of Figure 1;

Figure 3 is a somewhat diagrammatic end elevation of a modification of Figure 1;

Figure 4 is a plan view of a detail of Figures 1, 2, and 3; and

Figure 5 is a front elevation of a form of apparatus for performing the same function as the apparatus illustrated in Figure 1.

Referring to Figure 1, yarn 6 is highly twisted by being drawn upwardly over the heads of ro-

tating twisting bobbins 7 and wound on packages 8 each of which is driven by a friction drum 9 mounted on a shaft 10.

Disposed in the path of each yarn 6 between the drums 9 and the twisting bobbins 7 is a tubular chamber 11 which is supplied with moist steam from a header 12 through a connecting pipe 13. The steam may be moistened by passing through a water container (not shown) before being admitted into the header 12. Each chamber 11 is open at its ends and is slotted lengthwise at 14 for a purpose hereinafter to be described. On entering the chamber 11 some condensation of the steam occurs and the steam is substantially saturated on being applied to the yarn 6.

Shafts 15 disposed respectively between the steam chambers 11 and the drums 9 and the steam chambers and the twisting bobbins 7 each carry a grooved yarn-guiding cam 16 directly in line with the path of the yarn, but normally out of contact with the yarn. The cams are set in similar positions on the two shafts 15 which are rotated in synchronism by chain and sprocket gearing 17, 18.

On rotation of the shafts 15 the cams 16 engage the travelling yarns and push each yarn laterally out of the corresponding steam chamber 11 through the slot 14 and away from the vicinity of the steam, the diverting of the path of the yarns being shown in dotted lines in Figure 2. The longitudinal movement of the yarns and the twisting thereof continue during the engagement of the yarns with the cams 16, and in this manner a predetermined length of each yarn is allowed to pass the corresponding steam chamber 11 without being steamed.

The continued rotation of the cams 16 now allows the yarns to return to their normal direct path through the steam chambers 11 for the steaming of a further length of the yarns, after which the cycle of operations is repeated. The diverting of the path of the yarns is insufficient substantially to affect the regularity of the twist inserted in the yarns. The yarns are traversed to and fro along the winding packages by guides 19 which are reciprocated by cam or like means (not shown).

Figure 3 illustrates a more positive form of yarn controlling mechanism. The yarn 6 is engaged at each end of the steam chamber 11 by guides 20 which are secured to curved arms 21 pivoted about points 22. The arms 21 are connected by a freely pivoted link 23, the whole arrangement being oscillated about the pivots 22 by a rotating cam 24 which bears against an extension 25 of the lower arm 21. The extent of the movement of the arms 21 is indicated in dotted lines, the yarn 6 being pushed laterally out of the steam chamber 11 from the vicinity of the steam in accordance with the position of the cam 24. A tension spring 26 secured at one end to an extension 27 of the upper arm 21 and at the other end to a fixed part of the twisting machine ensures the return of the guides 20 to their normal position.

Figure 5 illustrates another form of apparatus by which the yarns 6 are steamed at intervals. Each yarn 6 in passing upwardly from its twisting bobbin to the package 8 is guided through a steam header 28 and tube 29, the header and tube being closed except for small yarn guiding apertures 30.

Moist steam is admitted into the header 28 at a constant rate from a supply pipe 31 controlled

by a valve 32, the yarns 6 thus passing through steam between the guides 30. The steam is sucked from the header 28 at intervals, however, through a suction pipe 33 in connection with a powerful suction vessel (not shown), the intermittent application of the suction being controlled by a valve 34 of the "butterfly" type which is opened and closed at the desired intervals by a cam 35 bearing on the lever 36 of the valve. The lever 36 is returned to the closed position of the valve by a tension spring 37 in connection with the lever.

The power of the suction is such that on opening of the valve 34 not only is the whole of the steam in the header 28 sucked away substantially immediately (cold air entering the header through the guiding apertures 30) but the whole of the steam from the supply pipe 31 also is sucked directly across the end of the header through the pipe 33 without contacting with the yarns.

The yarns 6 may be moistened prior to being steamed by contacting with a roller 39 (Figure 2) which dips into a water trough 40. The roller 39 may be grooved or felt-covered and may rotate freely under the influence of the travelling yarns or may be driven by chain or like means (not shown). While the moistening roller 39 is shown only in connection with apparatus employing steam chambers 11, it will be understood that it could also be employed in the apparatus shown in Figure 5 or in any steaming apparatus, and especially so when dry steam is used to set the twist in the yarns. If desired, the yarns can be moistened intermittently along their length as, for example, by causing the yarns to contact intermittently with the moistening roller or by moving the roller or other liquid-applying device into and out of contact with the yarns at intervals.

It will be understood that the frequency of the steamed and unsteamed portions of the yarns and/or the extent of the lengths of the steamed and unsteamed portions of the yarns can simply be varied to modify the crêping properties of the yarns. Thus, for example, in the apparatus illustrated in Figures 1 to 3 the rate of rotation of the cam 16 or 24 may be varied or the cams may be replaced by cams having a different profile. Similarly, with regard to the apparatus illustrated in Figure 5, the rate of operation of the suction valve 34 can be varied and, if desired, the operating cam 35 can be replaced by one having a different profile to give slower or quicker operation of the suction valve. In any of the forms of apparatus illustrated the frequency of the steamed and unsteamed portions of the yarns may be varied by varying the rate of travel of the yarns through the steaming devices.

What I claim and desire to secure by Letters Patent is:—

1. Process for the production of crêpe yarn, comprising steaming a yarn at intervals along its length under conditions such that moisture is present and, concomitantly with such steaming, crêpe-twisting the yarn so that the parts being steamed are at the same time being twisted.

2. Process for the production of crêpe yarn, comprising steaming at intervals along its length a yarn of cellulose acetate or other organic derivative of cellulose, under conditions such that moisture is present, and, concomitantly with such steaming, crêpe-twisting the yarn so that the parts being steamed are at the same time being twisted.

3. Process for the production of crêpe yarn, comprising moistening a yarn, steaming the yarn at intervals along its length and concomitantly with such steaming, crêpe-twisting the yarn so that the parts being steamed are at the same time being twisted.

4. Process for the production of crêpe yarn, comprising drawing a yarn over an end of a supply package, applying steam to the yarn at intervals along its length, under conditions such that moisture is present, and rotating the supply package to crêpe-twist the yarn so that the parts being steamed are at the same time being twisted.

5. Process for the production of crêpe yarn, comprising drawing over an end of a supply package a yarn containing filaments of cellulose acetate or other organic derivative of cellulose, applying steam to the yarn at intervals along its length, under conditions such that moisture is present, and rotating the supply package to crêpe-twist the yarn so that the parts being steamed are at the same time being twisted.

6. Process for the production of crêpe yarn, comprising moistening a running yarn, passing the yarn through steam, removing the steam from the vicinity of the yarn at intervals, and crêpe-twisting the yarn so that the parts being steamed are at the same time being twisted.

7. Process for the production of crêpe yarn, comprising moistening a running yarn, passing the yarn through steam, moving the yarn from the vicinity of the steam at intervals, and crêpe-twisting the yarn so that the parts being steamed are at the same time being twisted.

8. Apparatus for the production of crêpe yarn, comprising means for applying steam to a yarn at intervals along its length, and means for crêpe-twisting the yarn so as to insert twist in the

steamed parts thereof while they are being steamed.

9. Apparatus for the production of crêpe yarn, comprising a steam chamber adapted to apply steam to a yarn at intervals along its length, and a twisting spindle adapted to crêpe-twist the yarn so that twist is inserted in the steamed parts thereof while they are being steamed.

10. Apparatus for the production of crêpe yarn, comprising means for crêpe-twisting the yarn, means for winding the yarn so twisted, a steam chamber disposed in the path of the yarn between the twisting means and the winding means and adapted to apply steam to the running yarn while it is receiving twist, and cam means adapted to divert the path of the yarn from the vicinity of the steam chamber at intervals.

11. Apparatus for the production of crêpe yarn, comprising means for crêpe-twisting the yarn, means for winding the yarn so twisted, a steam chamber disposed in the path of the yarn between the twisting means and the winding means and adapted to apply steam to the running yarn while it is receiving twist, means for supplying the chamber with steam, and suction means for removing steam from the chamber at intervals during the passage of the yarn through the chamber.

12. Apparatus for the production of crêpe yarn, comprising means for crêpe-twisting the yarn, means for moistening the yarn, means for winding the yarn, a steam chamber disposed in the path of the yarn between the twisting means and the winding means and adapted to apply steam to the running yarn while it is receiving twist, and cam means adapted to divert the path of the yarn from the vicinity of the steam chamber at intervals.

HENRY DREYFUS.