

March 15, 1938.

H. DREYFUS

2,111,209

TREATMENT OF TEXTILE YARNS

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FIG. 1

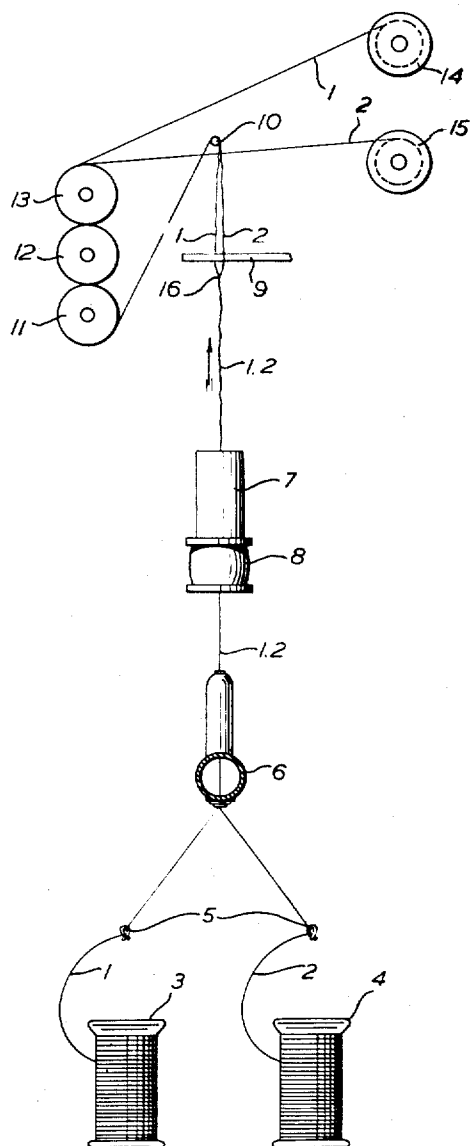
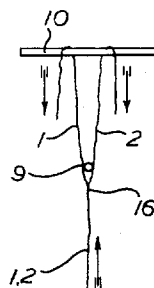


FIG. 2



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2,111,209

TREATMENT OF TEXTILE YARNS

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Application June 3, 1936, Serial No. 83,273
In Great Britain June 22, 1935

10 Claims. (Cl. 117—2)

This invention relates to the treatment of textile yarns so as to impart a crimp to the constituent filaments or fibres of the yarns and to cause them to resemble naturally crimped fibres such as cotton or wool. The invention is applicable alike to the treatment of yarns containing continuous filaments such as cellulosic, cellulose derivative and natural silk filaments as to yarns containing short or relatively short fibres whether such fibres have a continuous filament basis or are of natural occurrence, as for example straight wool fibres.

According to the invention, a plurality of yarns to the constituent filaments or fibres of which crimp is to be imparted are twisted together, the twist being set in the plurality of yarns while they are travelling, and the twist being subsequently removed from the yarns so as to enable the individual yarns to be separately collected.

As compared with the treatment of a single yarn the invention has the advantage that a lower twist suffices to impart a satisfactory crimp to the individual filaments or fibres, and such lower twist is not only more readily applied but also enables the operation of twisting a plurality of yarns to be carried out at a higher linear rate. In addition, there is the evident advantage arising from dealing with a plurality of yarns simultaneously in a single twist-imparting device.

For the sake of simplicity the invention will be described hereafter with reference to the twisting together of two yarns, though a greater number may be employed.

By way of example one mode of carrying out the invention will now be described in greater detail with reference to the accompanying drawing in which

Figure 1 is a diagrammatic side elevation showing the course pursued by the two yarns in undergoing the process of the present invention and Figure 2 is a detail of Figure 1 in front elevation.

In the operation illustrated in the drawing two yarns 1, 2 are drawn from two separate bobbins 3, 4 and are drawn through guides 5 to a device 6 by means of which steam or other setting agent is applied to them. From the device 6 the two yarns 1, 2 pass together to a false twisting device driven by means of a wharf 8 by means of which device false twist is inserted in the yarns, so that they are temporarily twisted together. The false twist so inserted moves back to the device 6, so that, when steam is applied to the yarns, the twist is actually going into them.

Since the twist imparted by the device 7 is only

a false twist, the two yarns 1, 2 emerging from the device 7 are not twisted together, but since they have been twisted together and the distortions involved in the twist then imparted have been set in them, they are closely associated together. The two yarns are separated by being passed one on each side of a guide or separating rod 9 after which they are led over a guide 10 and down to a series of rollers 11, 12, 13. The rollers 11, 12, 13 provide a positive drawing action which draws the two threads from the bobbins 3, 4 through the devices 6, 7 and round the guides 9, 10. From the last roller 13 the two threads proceed separately to two separate take-up devices 14, 15 by means of which the yarns are collected.

Figure 2 shows the threads 1, 2 coming together towards the separating rod 9 and parting from one another at the point 16. As is clear in this figure, the two threads proceed separately from the rod 9 over the guide 10 and have no tendency to come together again or become tangled with each other.

The advantages arising from the twisting together of two yarns for the purposes of the present invention will be evident from the following results. In twisting a single yarn, satisfactory crimping can be obtained by imparting say 60 turns per inch. When two yarns of the same character as the single yarn are employed, however, the twist necessary is only 45 turns per inch so that the production is not only doubled by the fact that two yarns are used, but further increased by one third on account of the fact that the lower twist enables the yarns to be run one third faster through the twisting device. The total increase of production is therefore, in this case, 167%.

In spite of the fact that the yarns are intimately twisted to each other by the imparting of some 30, 40, or 50 turns per inch say of twist, and in spite of the imparted crimp changing the initially smooth yarns into rougher, bulky yarns, the two yarns can be readily separated from each other after the twist has been removed, and thus led to separate take-up devices. It is of advantage, however, to avoid using yarns initially containing too little twist, and if desired a small amount of twist, say 2-5 turns or so per inch, may be added to facilitate the later separation of the yarns. After the treatment each yarn possesses a handle and springy character comparable with that of yarn made from naturally crimped fibres, and fabrics made therefrom are characterized by enhanced luminosity, handling properties and covering power.

For the purpose of setting twist in the yarn, any convenient setting medium may be employed. Thus, the twisted yarn may be passed through a chamber to which a gaseous setting medium is supplied, e. g. steam, hot air, or, especially where the yarns contain organic derivatives of cellulose, solvent vapours. Or a liquid setting medium may be employed, e. g. a solvent or softener for the material of the filaments, such as dilute acetone for yarns of cellulose acetate or other cellulose derivative yarns. Again, heat may be employed where the yarns consist of thermoplastic materials. Alternatively, setting may be effected by wetting the yarn prior to its reaching the twisting device and drying the yarn, preferably while the twist is being inserted, in such a manner that the steam or other vapour thus generated serves to set the twist in the yarn. Drying may conveniently be accomplished by heating the twisting device internally or externally or both by means such as a steam jacket or an electric heating element. The drying may be further assisted by ballooning of the yarn proceeding to the twist inserting device.

In order to ensure that the amount of twist inserted in the two yarns is completely removed so as to permit the separation of the yarns after crimping, the untwisting of the yarns should preferably be carried out as part of the twisting step, as by applying a twist by means of a false twisting device, which ensures the automatic removal of the same amount of twist. The false twisting device may be arranged so that a length of the yarn containing the temporary twist is exposed to the setting medium, but preferably the setting medium is applied to the travelling yarns over a part of their length which is actually receiving the twist, it having been found that the effect of the setting medium is considerably enhanced by its application in this manner to a part of the yarn which is subjected to the tension accompanying the twisting operation. An important result of setting the twist in this way is that the applied crimp is substantially permanent in character.

The degree of twist to be imparted depends upon the size of bundle formed by the yarns intended for simultaneous treatment, a bundle of greater count or denier in general needing a lesser twist. The count or denier of the yarns, as well as the count or denier of their constituent filaments or fibres, are chosen in accordance with the type of crimp desired in the filaments or fibres. Thus, to simulate wool fibres, filaments or fibres having a similar size and cross-section to natural wool fibres should be used.

After setting of the twist and the untwisting of the two yarns, the separated yarns may be wound or reeled into packages prior to use. It is advantageous to provide for slack winding of the newly treated yarns in order to avoid subjecting them to tension which might destroy or diminish the crimp applied to their filaments or fibres.

While an important application of the invention is the conversion of yarns having smooth components directly into yarns having crimped components, and particularly the transformation of smooth continuous filament yarns into crimped continuous filament yarns of a voluminous nature, the invention may also be employed for the production from smooth continuous filaments of crimped staple fibres or yarns containing crimped staple fibres. Thus, after the crimping step above described the yarns may be severed by a guillotine or other form of cutting device into

lengths suitable for spinning into yarns, e. g. of 1-2½ inches in length suitable for the production of yarn having characteristics similar to those of cotton yarn, or of 2½-12 inches or more in length suitable for the production of yarn having worsted yarn characteristics, the subsequent treatment in each case corresponding to that accorded to cotton and wool fibres respectively. Where the treated yarns are to be used for such a purpose it is advantageous that little or no twist is contained in the yarns initially so as to facilitate the later separation of the cut filaments into separate fibres. The crimp in the fibres facilitates the spinning of the fibres into yarn.

Again, the crimped yarns after separation may be directly converted into fibrous yarns, for example as described in U. S. Patents Nos. 2,077,076 and 2,077,079. In such a case the yarns may contain an amount of twist that facilitates their separation from each other while not yet so high as to interfere with the conversion of filaments into fibres.

The process according to the invention may be applied to any type of yarn, for example yarn of cellulose acetate or other organic derivative of cellulose, e. g. other cellulose esters, such as cellulose formate, propionate and butyrate, and cellulose ethers, such as ethyl and benzyl cellulose, yarn of reconstituted cellulose such as viscose, nitrocellulose and cuprammonium artificial silk and natural silk. It may likewise be applied to yarns consisting of a mixture of filaments or fibres of two or more of the above types. Further, a crimped yarn may be doubled with any type of yarn of a similar or dissimilar nature whether as regards material or type of constituent filaments or fibres. Again, two or more crimped yarns may be doubled together for the purpose of increasing the denier or count of the yarn and improving the regularity of the yarn, or for any other purpose such as the production of yarn containing filaments or fibres having different dyeing properties. Thus, for example, two or more crimped yarns of cellulose acetate may be doubled together or one or more of such cellulose acetate yarns may be doubled with yarns, filaments or fibres of natural silk, reconstituted cellulose silk, cotton or wool, or with any two or more of such yarns.

The filaments or fibres contained in the basic yarn may be of a lustrous character or they may be pigmented and of subdued lustre or even delustrated as by subjecting cellulose acetate or other cellulose derivative yarn to hot aqueous liquors or liquors containing thiocyanates or solvents for the cellulose derivative so as to resemble more closely the finer qualities of natural staple fibres. Or again, filaments or yarns of subdued or reduced lustre may be mixed or doubled with lustrous filaments or yarns either before or after the crimping operation. Hollow filaments or fibres may also be used, and likewise yarns containing filaments or fibres of different deniers.

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

1. Process for the production of crimped filaments and fibres, said process comprising associating a plurality of yarns containing the filaments or fibres to be crimped, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

2. Process for the production of crimped filaments and fibres, said process comprising associating two yarns containing the filaments or fibres to be crimped, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

3. Process for the production of crimped filaments and fibres of an organic derivative of cellulose, said process comprising associating a plurality of yarns containing an organic derivative of cellulose, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist from the travelling yarns, removing the twist, separating the yarns from each other and separately collecting the crimped yarns.

4. Process for the production of crimped filaments of cellulose acetate, said process comprising associating a plurality of yarns containing the cellulose acetate filaments, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

5. Process for the production of crimped filaments and fibres, said process comprising associating a plurality of yarns containing the filaments or fibres to be crimped, twisting said yarns together, applying steam to the associated and twisted yarns while they are travelling so as to set in them the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

6. Process for the production of crimped filaments of cellulose acetate, said process comprising associating a plurality of yarns containing the cellulose acetate filaments, twisting said yarns together, setting in the yarns, while they

are travelling and at a point where they are actually receiving the twist, the crimp imparted by the twist, removing the twist, separating the yarns from each other and separately collecting the crimped yarns.

7. Process for the production of crimped filaments and fibres, said process comprising imparting a low degree of twist to each of a plurality of yarns containing the filaments or fibres to be crimped, associating the said yarns together with a high degree of doubling twist, setting in the yarns while they are travelling the crimp imparted by said doubling twist, removing the doubling twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

8. Process for the production of crimped filaments and fibres, said process comprising, as a continuous operation, associating together a plurality of yarns, temporarily twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, untwisting the yarns, separating the yarns and separately collecting them.

9. Process for the production of crimped filaments and fibres, said process comprising as a continuous operation, associating together a plurality of yarns, temporarily twisting said yarns together by imparting a false twist to the associated yarns, setting in the yarns while they are travelling the crimp imparted by the twist, separating the yarns, and separately collecting them.

10. Apparatus for the production of crimped filaments and fibres, said apparatus comprising means for supplying a plurality of separate yarns, means for associating said yarns, means for imparting a temporary twist to the associated yarns, means for separating the yarns from one another, and a plurality of means for separately collecting the said yarns.

HENRY DREYFUS.

CERTIFICATE OF CORRECTION.

Patent No. 2,111,209.

March 15, 1938.

HENRY DREYFUS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, lines 16 and 17, claim 3, strike out the words "from the traveling yarns" and insert the same after "twist" and before the comma in line 17, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of May, A. D. 1938.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

2. Process for the production of crimped filaments and fibres, said process comprising associating two yarns containing the filaments or fibres to be crimped, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

3. Process for the production of crimped filaments and fibres of an organic derivative of cellulose, said process comprising associating a plurality of yarns containing an organic derivative of cellulose, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist from the travelling yarns, removing the twist, separating the yarns from each other and separately collecting the crimped yarns.

4. Process for the production of crimped filaments of cellulose acetate, said process comprising associating a plurality of yarns containing the cellulose acetate filaments, twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

5. Process for the production of crimped filaments and fibres, said process comprising associating a plurality of yarns containing the filaments or fibres to be crimped, twisting said yarns together, applying steam to the associated and twisted yarns while they are travelling so as to set in them the crimp imparted by the twist, removing the twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

6. Process for the production of crimped filaments of cellulose acetate, said process comprising associating a plurality of yarns containing the cellulose acetate filaments, twisting said yarns together, setting in the yarns, while they

are travelling and at a point where they are actually receiving the twist, the crimp imparted by the twist, removing the twist, separating the yarns from each other and separately collecting the crimped yarns.

7. Process for the production of crimped filaments and fibres, said process comprising imparting a low degree of twist to each of a plurality of yarns containing the filaments or fibres to be crimped, associating the said yarns together with a high degree of doubling twist, setting in the yarns while they are travelling the crimp imparted by said doubling twist, removing the doubling twist from the travelling yarns, separating the yarns from each other and separately collecting the crimped yarns.

8. Process for the production of crimped filaments and fibres, said process comprising, as a continuous operation, associating together a plurality of yarns, temporarily twisting said yarns together, setting in the yarns while they are travelling the crimp imparted by the twist, untwisting the yarns, separating the yarns and separately collecting them.

9. Process for the production of crimped filaments and fibres, said process comprising as a continuous operation, associating together a plurality of yarns, temporarily twisting said yarns together by imparting a false twist to the associated yarns, setting in the yarns while they are travelling the crimp imparted by the twist, separating the yarns, and separately collecting them.

10. Apparatus for the production of crimped filaments and fibres, said apparatus comprising means for supplying a plurality of separate yarns, means for associating said yarns, means for imparting a temporary twist to the associated yarns, means for separating the yarns from one another, and a plurality of means for separately collecting the said yarns.

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