

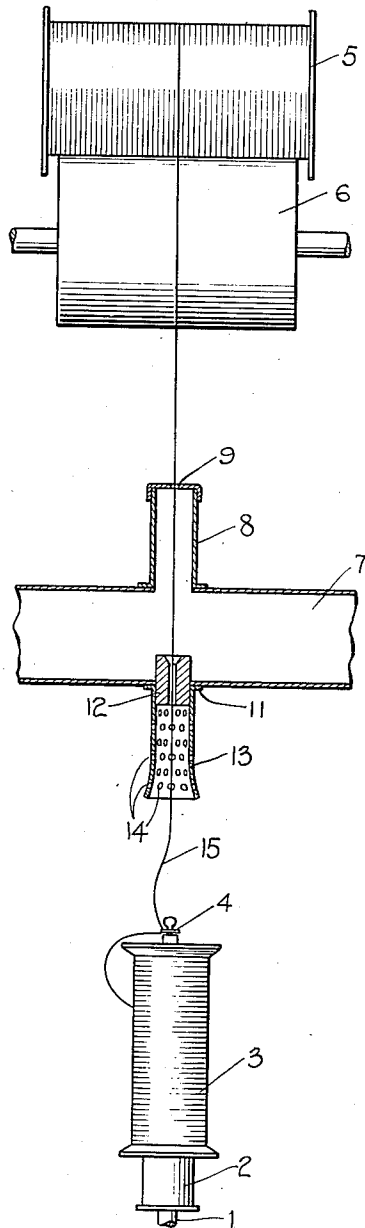
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TREATMENT OF TEXTILE MATERIAL

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TREATMENT OF TEXTILE MATERIAL

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This invention relates to the preparation of crepe fabrics and more particularly to the imparting of crepe twist in yarns containing an organic derivative of cellulose.

5 An object of the invention is the economic and expeditious production of crepe yarns containing organic derivatives of cellulose. Another ob-
ject of my invention is the construction of a de-
vice for efficiently aiding in forming a crepe
10 yarn, containing an organic derivative of cellu-
lose, that has high and uniform creping prop-
erties. Other objects of the invention will ap-
pear from the following detailed description and
drawing.

15 In the drawing there is shown one section of
a yarn creping device, falling within the scope
of this invention. In the drawing the frame,
guides and driving mechanism have been omitted
as the same may be of any suitable type.

20 When imparting a high degree of twist, say
from 40 to 100 or more turns per inch, to yarn
containing an organic derivative of cellulose for
the purpose of producing a thread that woven
into a fabric is adapted to crepe, I have found
25 that the condition of yarn at the time of im-
parting the twist is a major factor in producing
uniformity of the whole area of the fabric pro-
duced therefrom. One major cause for varia-
tions in creping properties of the twisted thread
30 is due to unevenness with which different yarns
or lengths of yarn compact or mat together when
the twist is inserted therein. I have found that
this unevenness is due at least in part to the
uneven moisture regain in the yarn at the time
35 the twist is inserted and also to the uneven re-
sistance or affinity of the yarn to the action of
steam employed to set the yarn. In twisting yarn
to crepe threads in accordance with this inven-
tion, there is produced a thread of uniform com-
40 pactness and a thread that has received a uni-
form setting of the twist by the action of steam.

By employing this invention, the yarn is not
only prepared in such a manner as to have a
uniform affinity for the setting action of a steam
45 treatment, but the steam treatment is made uni-
form as to length of treatment, temperature and
moisture content. The combination of these ad-
vantages allows for the use of yarns of a wider
range of ages than heretofore to form a single
50 piece of fabric. To obtain a uniform piece of
crepe fabric, by prior methods, it was necessary
to carefully select the yarn to be twisted accord-
ing to its age and other properties, as these
properties effected the type of twist that the same
55 would take due to differences in affinity or re-

sistance to the action of steam. However, by
employing this invention, the yarns are caused
to have a more uniform affinity to the action of
the steam setting treatment, and said treatment
is made also more uniform allowing for a greater
5 range in variations in the starting material.

In accordance with my invention, I crepe twist
yarns containing an organic derivative of cellu-
lose while treating the same with steam for the
purpose of setting the twist in the yarn, making
10 the yarn more compact and otherwise enhancing
its creping properties. Prior to the treatment
with steam, however, I subject the yarn to a
treatment with moisture or a mixture of steam
and air for the purpose of conditioning the yarn
15 such that upon entering the steam treatment
zone the yarn will be in the proper condition to
receive same. Further, in accordance with my
invention, I construct a crepe thread twisting de-
vice, in which the thread is passed through a
20 steam chamber, and connect to the thread en-
trance side of the steam chamber a funnel adapt-
ed to direct steam escaping therefrom along the
course of the thread until the temperature of said
steam has been reduced sufficiently low to con-
25 vert it to a mist, thereby wetting the yarn, and/or
until the steam has no further effect on the
thread. Reference may be had to the drawing
for a device falling within the scope of this in-
vention.

This invention is applicable to the crepe twist-
ing into crepe threads and yarns of yarns con-
taining a thermoplastic derivative of cellulose.
Any suitable thermoplastic derivative of cellu-
lose may be employed, such as the organic acid
35 esters of cellulose and cellulose ethers. Ex-
amples of the organic acid esters of cellulose
are cellulose acetate, cellulose formate, cellulose
propionate and cellulose butyrate, while exam-
ples of cellulose ethers are ethyl cellulose, methyl
40 cellulose and benzyl cellulose.

The yarns to be crepe twisted may be made
wholly of organic derivatives of cellulose or they
may contain filaments of other materials. The
filaments of organic derivatives of cellulose may
45 contain plasticizers or, more preferably, they
may be coated with a coating in the nature of
a lubricant that also may contain plasticizers,
softening agents or swelling agents. The fila-
ments or yarns of organic derivatives of cellu-
lose, with or without plasticizers and lubricants,
50 may be crepe twisted together with filaments or
fibres of other materials, such as silk, cotton,
regenerated cellulose formed by either the viscose
or cuprammonium process or other similar fibres.
55

The organic derivatives of cellulose may be present in the yarn as substantially continuous filaments, short lengths of staple fibre and/or imitation spun yarn which consists of yarns formed of relatively long discontinuous lengths of filaments twisted together.

The yarns may be twisted to crepe yarns on any suitable type of apparatus. Thus, the twisting may be performed by an upward twisting device employing suitable flyers, for example, Figure 8, Figure 4 or other types of flyers. Further, the yarns may be crepe twisted by a downward method of spinning employing ring and travellers, cap spinning devices or other types of twisting mechanisms. Whether employing the upward method of twisting or the downward method of twisting, it is preferable to pass the yarn through a steam chamber while imparting the twist to the yarn or immediately before or immediately after imparting the major part of the twist. Therefore, the position of the steam chamber with reference to the supply package and take-up package will depend somewhat upon the type of twisting device employed.

The steam that may be employed in the steam chamber through which the yarn or thread is to pass for the purpose of setting the twist in said yarn or making the same pliable for the purpose of inserting the twist may be of any suitable temperature and pressure. The steam may also be wet or relatively dry steam. It is preferable, however, to employ a slightly wet steam, the temperature of which may be around 100° C. or slightly over, applied at convenient pressures, for instance, from 0.5 to 1. or more centimeters of water. Although wet steam under pressure is preferred, relatively dry steam may be employed and either the wet or relatively dry steam may be applied at atmospheric or sub-atmospheric pressures.

When a yarn is crepe twisted as it passes through a steam chamber, there is usually an escape of steam at the thread entrance port of the steam chamber. The steam escaping through said port, if the atmosphere is substantially at rest, travels for some distance along the length of the yarn and at the same time becomes mixed with the atmosphere. At other times, if there is a movement of the air surrounding the machine, this little jet of steam is blown away from the yarn. Under these conditions, the yarn does not receive a uniform treatment as at one time the yarn is sufficiently moistened to reach its maximum moisture regain and, therefore, be readily susceptible to the setting action of the steam bath, while at other times the yarn enters the steam bath containing comparatively little regained moisture. This results in a very non-uniform yarn. Further, in accordance with my invention, I protect the yarn at the entrance side of the steam bath such as to control the small jet of steam escaping at that point and mix the same with air in such a manner that the yarn at all times receives the same amount of steam treatment. It is preferable to have this wet steam, a mixture of air and steam or water vapor in atomized form, in contact with the yarn for a period substantially equal to that period which the yarn is contacted with the steam. Further, it is preferable to so arrange the device that any escaping steam from the entrance port is held in contact with the yarn or thread until said steam has been reduced in temperature to a point where it no longer has any substantial effect on the setting properties of the yarn.

As an aid in describing the invention, the same will be described with reference to the drawing wherein there is shown a device also forming a part of this invention. In the drawing, the frame construction, driving mechanism, guides etc. have been omitted for the purpose of simplifying the description. The device shown is a section of an upward spinning device although the invention is equally applicable to downward spinning devices. Any number of similar sections may be combined to form a bank of twisting devices mounted on one frame. The device as shown may comprise a rotating supply package support 1 having a pulley 2 mounted thereon for contact with the driving means. The driving means may be a belt, chain, individual electric motor or other means commonly employed in the art. The supply package 3 may be provided to supply the yarn being twisted, which supply package is adapted to be held raised and rotated by the support 1. As an aid in imparting twist to the yarn any suitable device, such as a floating ring device 4, may be provided. The yarn may pass through suitable guides to direct same onto a take-up package 5. The take-up package may be supported and rotated by a roll 6 covered with a suitable friction material adapted to cause the take-up package 5 to rotate therewith.

Interposed between the supply package and the take-up package is a steam chamber 7. This steam chamber may consist of a rectangular chamber or a pipe running lengthwise of the machine. The steam chamber is provided with an opening through which the yarn to be treated enters the chamber and a second opening in registry with the first opening through which the steam treated yarn leaves the chamber. Similar pairs of registering openings are provided for each of the supply packages mounted on the machine. Attached to the steam chamber 7 may be a nipple 8 adapted to lengthen the period of treatment during which the yarn is exposed to the action of the steam in the steam chamber. The nipple 8 may be of any suitable length, it being preferred to have the distance of travel of the yarn in the steam from about 1 to 3 inches in length. A suitable port 9 may be provided at the end of the nipple as an exit for the yarn.

A suitable port 11 may be provided for the entrance of the yarn into the steam chamber. A polished metal or porcelain guide 12 may be provided for directing the yarn into the steam chamber. Attached to the guide 12 or to the steam chamber 7, substantially concentric with the entrance port into the steam chamber, there may be a funnel or trapping member 13. This funnel is adapted to direct the steam escaping from the chamber 7 down along the yarn for a distance sufficient to allow the steam to be cooled below an effective temperature.

The funnel 13 or trapping member may contain along its sides a plurality of openings 14 to allow for the admittance of air into the funnel for the purpose of cooling and condensing the steam. If desired, in place of the perforations 14 distributed throughout the body of the funnel 13 there may be provided one opening, preferably near the guide 12 through which compressed air may be forced into the funnel. Any other suitable means may be employed for mixing the escaping steam with air while holding the steam in contact with the yarn until cooled to a temperature at which it has no effect on the creping properties of the yarn.

In operation of the device the supply package 75

3 containing yarn 15 to be twisted to a crepe thread is placed on a rotating mechanism 2. The thread is then carried through a flyer 4 for aiding in the twisting, through a suitable guide and then through the funnel into the steam chamber for setting the crepe. From the steam chamber the yarn may be taken through another guide (not shown) adapted to reciprocate horizontally for directing the yarn onto the take-up package 5. The steam chamber 7 is supplied with steam under suitable temperature and pressure. As the yarn is carried upward by the take-up package, there is a constant jet of steam being emitted through the guide 12. This steam is emitted into the funnel 13 where it becomes mixed with air to form atomized water vapor or a mixture of air and steam while being forced downward to the opening of the funnel. While the steam is travelling from the guide 12 to the opening of the funnel, sufficient air will be mixed with steam to cool the same to a temperature below that having any effect on the crepe properties of the yarn. The steam may be caused to be condensed right on or in the yarn.

In employing downward twisting devices similar arrangements may be made. However, the funnel 13 would then be put on the upper side of the steam chamber 7 such that the yarn would travel through the same prior to the passage through the steam chamber and be contacted with the water vapor to raise its moisture content and otherwise alter its affinity for the steam treatment.

It is understood that the foregoing detailed description and drawing are given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

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

1. In a method of imparting a high twist to yarns containing a thermoplastic derivative of cellulose, by twisting the yarn while steaming the same, the step of contacting yarn prior to steaming with a mixture of steam and air.

2. In a method of imparting a high twist to yarns containing an organic derivative of cellulose, by twisting the yarn while steaming the same, the step of contacting yarn prior to steaming with a mixture of steam and air.

3. In a method of imparting a high twist to yarns containing cellulose acetate, by twisting the yarn while steaming the same, the step of contacting yarn prior to steaming with a mixture of steam and air.

4. In a method of imparting a high twist to yarns containing an organic derivative of cellulose, by twisting the yarn while steaming the same, the step of contacting yarn prior to steaming with condensed steam in atomized form.

5. In a method of imparting a high twist to yarns containing cellulose acetate, by twisting the yarn while steaming the same, the step of contacting yarn prior to steaming with condensed steam in atomized form.

6. In a method of imparting a high twist to yarns containing an organic derivative of cellulose, by twisting the yarn while steaming the same, the step of contacting the yarn prior to

steaming with a mixture of steam and air for a period of time substantially equal to the period the yarn is steamed.

7. In a method of imparting a high twist to yarns containing cellulose acetate, by twisting the yarn while steaming the same, the step of contacting the yarn prior to steaming with a mixture of steam and air for a period of time substantially equal to the period the yarn is steamed.

8. In a method of imparting a high twist to yarns containing an organic derivative of cellulose, by twisting the yarn while subjecting the same to the action of dry steam, the step of contacting the yarn prior to steaming with a mixture of steam and air.

9. In a method of imparting a high twist to yarns containing cellulose acetate, by twisting the yarn while subjecting the same to the action of high steam, the step of contacting the yarn prior to steaming with a mixture of steam and air.

10. In a method of imparting a high twist to yarn containing an organic derivative of cellulose, by twisting the yarn while subjecting the same to the action of wet steam, the step of contacting the yarn prior to steaming with a mixture of wet steam and air.

11. In a method of imparting a high twist to yarn containing cellulose acetate, by twisting the yarn while subjecting the same to the action of wet steam, the step of contacting the yarn prior to steaming with a mixture of wet steam and air.

12. A device for imparting twist to yarns, comprising a rotatable support for a package, a take-up device, a chamber adapted to contain steam and having an aperture for entrance of the yarn and through which steam can escape from the chamber, and, at the aperture, a trapping member adapted to direct escaping steam along the yarn approaching the aperture.

13. A device for imparting twist to yarns, comprising a rotatable support for a package, a take-up device, a chamber adapted to contain steam and having an aperture for entrance of the yarn and through which steam can escape from the chamber, and, at the aperture, a trapping member adapted to surround steam escaping through the aperture and direct the same along the yarn approaching the aperture.

14. A device for imparting twist to yarns, comprising a rotatable support for a package, a take-up device, a chamber adapted to contain steam and having an aperture for entrance of the yarn and through which steam can escape from the chamber and, at the aperture, a flared trapping member adapted to surround steam escaping through the aperture and direct the same along the yarn approaching the aperture.

15. A device for imparting twist to yarns, comprising a rotatable support for a package, a take-up device, a chamber adapted to contain steam and having an aperture for entrance of the yarn and through which steam can escape from the chamber, and, at the aperture, a perforated funnel adapted to surround steam escaping from the aperture and direct the same along the yarn approaching the aperture while mixing the steam with air drawn in through the perforations in said funnel.

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