

Nov. 9, 1937.

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2,098,333

TREATMENT OF TEXTILE MATERIAL

Original Filed Oct. 28, 1931 2 Sheets-Sheet 1

Fig. 1.

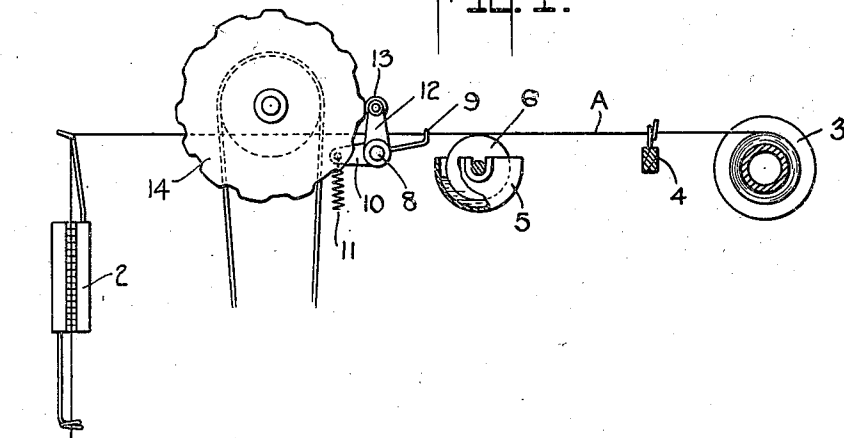
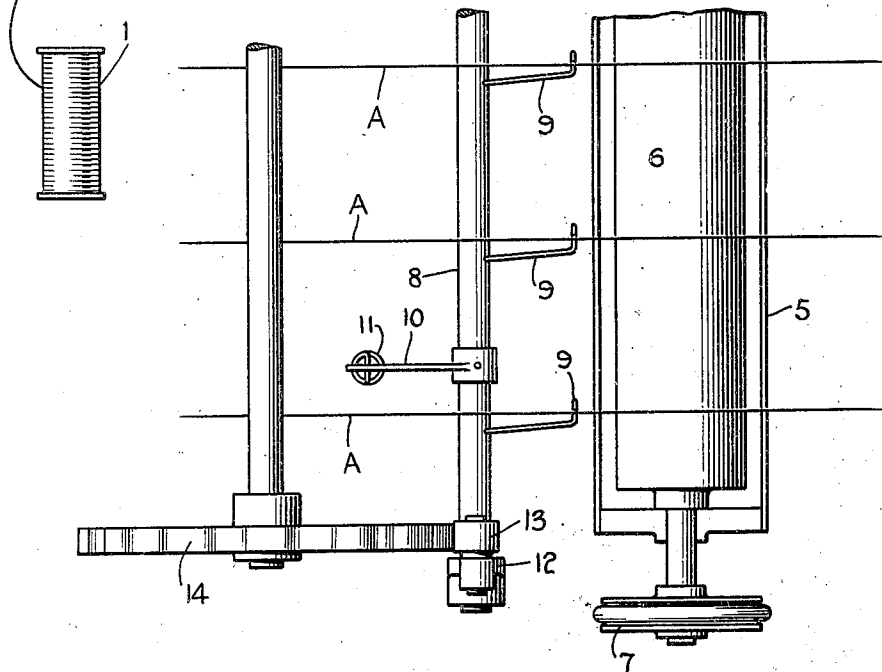


Fig. 2.



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Fig. 3.

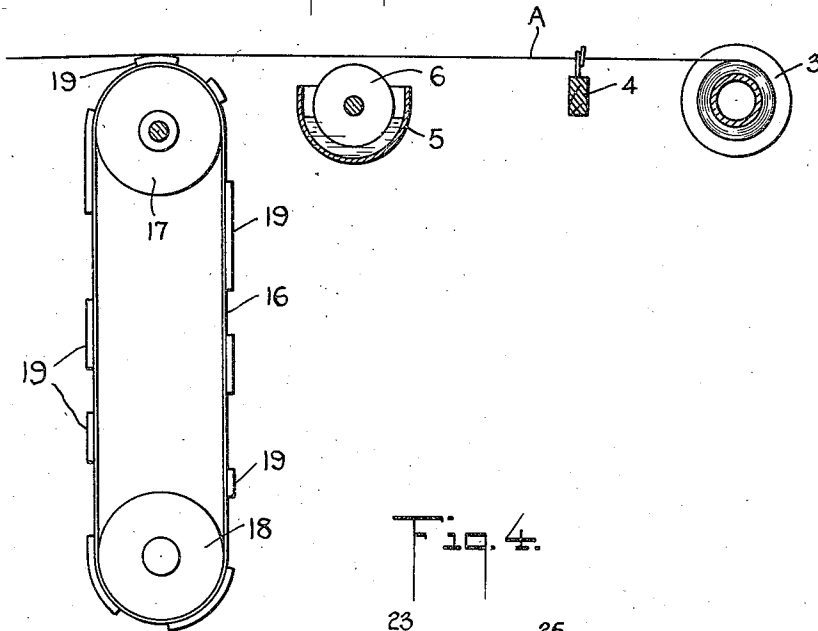


Fig. 4.

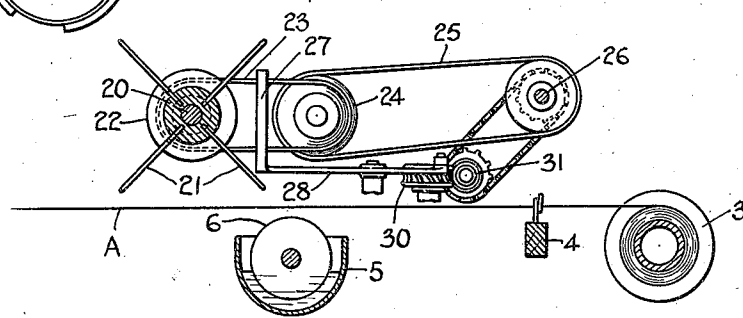
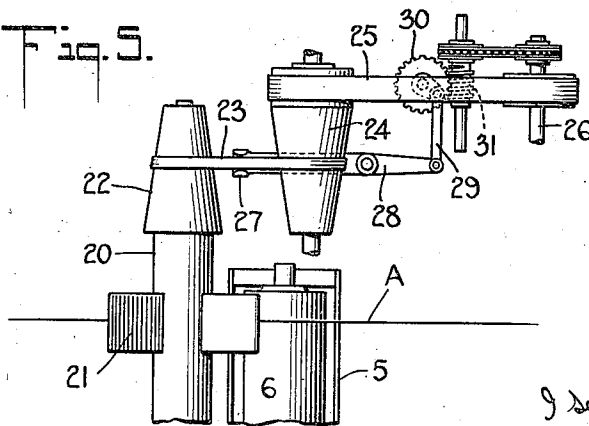


Fig. 5.



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TREATMENT OF TEXTILE MATERIAL

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Original application October 28, 1931, Serial No. 571,582. Divided and this application April 25, 1935, Serial No. 18,158

5 Claims. (Cl. 8—19)

This invention relates to the treatment of textile materials and relates more particularly to the local application to yarns of organic derivatives of cellulose of a substance adapted to modify the same. This invention also relates to the mechanism of applying to yarns of organic derivatives of cellulose a substance adapted to modify the same.

This application is a division of our pending application S. No. 571,582, filed October 28, 1931, patented May 14, 1935, Patent Number 2,000,935.

An object of our invention is to prepare yarns or other textile materials having a modifying substance applied thereto at irregularly spaced intervals. Other objects of our invention will appear in the following detailed description.

It has been previously proposed to apply dyestuffs to yarn at regularly spaced intervals and such yarn has been employed for making fabrics having variegated effects. However, since both the length of the color streaks and their intervening spaces were regular in the prior practice, when hose is knit from such yarn, a spiral effect is produced, and when a fabric is woven from such yarn a "wood-grain" effect results. We have found that this is due to the fact that in the case of knitting hose, for instance, the streaks and intervals, which never can be exact multiples or factors of the circumference of the hose, cannot continue to form the same pattern throughout the knitting operation, and thus the pattern may start being broken up, that is giving a so-called "heather" effect and then work into a series of spiral lines running around the hose, which then cease to spiral and run walewise a short distance down the hose and then the spiral may reverse itself producing a "wood-grain" effect if a long length of hose is knitted.

We have found that if the dyeing or modifying substance is applied to the yarn or other textile material in streaks of irregular length and spaced at intervals of irregular length, a fabric woven or knitted therefrom presents a uniformly scattered or broken up effect and not having any definite effect or pattern as in the case when the modifying substance is applied at regular intervals.

In accordance with our invention, we apply to textile materials intermittently and at irregularly spaced intervals while they are in transit, a substance adapted to modify their properties.

This invention is applicable to the treatment of yarns made of a multiplicity of fine filaments. It may also be applied to the treatment of artificial bristles or straw. Single ends of yarn may

be treated by this invention separately; or we may treat, in accordance with this invention, an association of yarns which may be twisted or braided together or wound parallel without twist, which may or may not be previously dyed or delustered or otherwise treated by known processes to obtain a multiplicity of effects. Furthermore, warps may be treated similarly during their winding to obtain the many different effects.

While this invention is of particular importance in connection with the treatment of yarn containing cellulose acetate, other yarns may be treated. Such yarns as may be made of organic derivatives of cellulose such as organic esters of cellulose or cellulose ethers. Examples of organic esters of cellulose are cellulose formate, cellulose propionate and cellulose butyrate; while examples of cellulose ethers are ethyl cellulose, methyl cellulose and benzyl cellulose. Other yarns such as cotton, wool, silk or reconstituted cellulose may likewise be treated by this invention, as may be mixed yarns containing filaments of organic derivatives of cellulose and fibers of cotton, wool, silk or reconstituted cellulose.

As stated the modifying agent is applied to the yarn or textile material at irregularly spaced intervals, the length of the streaks and the intervening spaces being each preferably different. We prefer to adjust the operation of the application of the modified streaks and their intervening spaces so that each mechanical cycle embracing a complete range of variations does not approximate or equal the width of the fabric that is to be woven or the length of yarn in one course of knitted fabric or hose material fabricated from such yarn.

The modifying agent may be applied intermittently to the yarn while it is in transit from a package such as a bobbin, cone, and the like to another package. Likewise the modifying agent may be applied to the yarn while it is in transit from the spinning cabinet in which it is formed to a winding device or to a device that both winds and twists the same.

The modifying agent as applied may be one that changes the color of the textile material, changes its dyeing properties, or changes other of its physical or chemical properties. By way of example the following modifying substances are enumerated.

The modifying substance may be in the form of a paste or solution of a dyestuff dissolved in water or a suitable organic solvent such as benzene, alcohol, etc. If desired a plurality of different colors may be applied by different fur-

nishing devices to the yarn while it is in transit.

In the case of textile materials containing cellulose acetate or other organic esters of cellulose, the modifying substance may comprise a saponifying agent which may be aqueous alcoholic or other solution of sodium hydroxide, potassium hydroxide, sodium or potassium carbonate, sodium silicate or trisodium phosphate; e. g. 2 to 10% of sodium hydroxide in a mixture of equal parts of ethyl or methyl alcohol and water. This saponifying agent saponifies at least part of the cellulose acetate to form regenerated cellulose and when the yarn so treated is subjected to a dyeing bath containing direct cotton dyes the saponified portions become dyed while the untreated or unsaponified portions remain undyed.

If desired, in the case of treatment of materials containing cellulose acetate or other organic esters of cellulose, the modifying substance may comprise a liquid containing both a saponifying agent and dyestuff having an affinity for cotton, cellulose or saponified cellulose, as is more fully described in our application S. No. 535,860, filed May 8, 1931.

Yarn previously dyed may have a modifying agent intermittently applied thereto, which agent contains a discharge or stripping agent, so that the treated portion has the color removed therefrom. If desired color discharges may be used for this purpose. In the case of treatment of yarn containing cellulose acetate or other organic derivatives of cellulose, a modifying substance containing the discharge agent may also contain a swelling agent for the derivatives of cellulose such as ethyl alcohol, phenol, lactate acetate, pyridine, etc.

The modifying agent supplied intermittently may be in the form of a reserve or resist. Mechanical reserves such as waxes may be employed or chemical reserves may likewise be employed. Melted waxes, e. g. a mixture of refined ground nut oil and hardened whale oil, are very suitable as mechanical resists. After application of the reserves or resists, the yarn may be dyed leaving the reserved portions uncolored.

The modifying agent applied intermittently may comprise a loading or weighting agent, examples of which are the materials described in British Patent Nos. 258,874 and 260,290 and U. S. Patent 1,761,707 of June 3, 1930, 1,821,464 of Sept. 1, 1931 and 1,817,741 of August 4, 1931. After application of the loading or weighting material, it is desirable to allow the yarn to stand for some time before applying a fixing material and for this purpose the yarn may be reeled onto a swift, the hanks thus formed being allowed to stand before the subsequent fixing and washing operations. In a similar manner, mordants may be applied intermittently to the yarn to modify the ability to take up mordant dyes.

The modifying substance may be a delustering or relustering agent in order to impart intermittent differential deluster to the textile material.

Sizes or finishes may be intermittently applied as the modifying agent to the textile materials to impart stiffness or softness at intervals to the yarn to produce irregularity in the stitch shape of the knitted goods, or irregularity in the ability to take twist in highly twisted crepe yarn and thus enhance the crepe effect of crepe fabrics and yet obtain a uniformly scattered variation of effect.

By our invention there is produced yarn from

which fabrics may be formed, which fabrics have a uniformly scattered multi-color or other effect without the appearance of change in pattern with the development of "wood-grain" or like effects.

While any suitable device may be employed for applying the modifying substance at irregular intervals, by way of example, but without being limited thereto, a few preferred forms are shown in the annexed drawings wherein:

Fig. 1 is a side elevation of one form of device for carrying out this invention.

Fig. 2 is an enlarged plan view of the device shown in Fig. 1.

Fig. 3 is a side elevation of another form of device for carrying out this invention.

Fig. 4 is a side elevation of a third modification; and

Fig. 5 is a plan view of the modification shown in Fig. 4.

Referring to the drawings, the yarns A are drawn from the supply of bobbins 1 and the tension device 2 to the take-up bobbin 3 to which it is fed by guides on the traverse bar 4. The trough 5 containing the bath of dye, saponifying agent, or other modifying agent as above described is provided, and a rotating pick-up or furnishing roller 6 is mounted therein to supply the modifying agent to the yarns when they are pressed into contact therewith. The roller 6 is driven by a belt engaging its pulley 7.

Referring to Figs. 1 and 2, a rocker shaft 8 having guides 9 for the yarn A is provided near the furnishing roller 6. This rocker shaft 8 has secured thereto an outwardly extending arm 10 which is pressed downwardly by the spring 11. An upwardly extending arm 12 is secured to the rocker shaft 8 and this carries a roller 13 which presses against the periphery of the rotating cam 14. It will be noted that the periphery of the cam 14 has depressions and projections which are irregular in size and spacing.

In the operation of the device in Figs. 1 and 2, the yarns A are drawn from the bobbins 1 to the winding bobbins 3. The guides 9 on the rocker shaft 8 raise or lower the yarns A out of and into contact with the roller 6 furnishing the modifying liquid from the trough 5. As the roller 13 bears against a depression on the cam 14, the guides 9 raise the yarns A out of contact with the furnishing roller 6, while when the roller 13 bears against a projection on the cam 14, the guides 9 lower the yarns A into contact with the furnishing roller 6.

By way of example, it is pointed out that if the yarns are being wound at the rate of 100 meters per minute, the cam 14 may be cut in such a manner and rotated at such a speed that the following alternations of length of streak of applied dye saponifying or other modifying agent and spaced intervals results; the length being given in centimeters.

4 5 6 5 6 4 6 4 5 5 4 6 4 6 5 6 5 6
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

This particular combination of streaks and intervals is particularly suitable for yarns to be used for the knitting of men's hose where the course in the fabric comprises a length of yarn approximating one meter. By the use of this particular combination a thoroughly broken up modified effect may be obtained.

Referring to Fig. 3, which shows another form of device for obtaining an intermittent application of modifying liquid there is provided an end-

less chain or belt 16 which is caused to rotate around the rollers 17 and 18. Upon this chain or belt 16 there are mounted projecting pieces 19 of different lengths and spaced at intervals of different lengths. When under the yarn A, the projections 19 raise the yarn A out of contact with the furnishing roller 6, and when a part of the chain 16 having no projection is under the yarn A the yarn comes in contact with roller 6 and the modifying liquid in the trough 5 is applied thereto.

Referring to Figs. 4 and 5, a rotating paddle 20 having arms 21 adapted to press the yarn A against the furnishing roller 6 is provided. This paddle is rotated by the conical pulley 22 which is engaged by the endless belt 23, driven by the oppositely disposed conical pulley 24. The pulley 24 is driven by a belt 25 that engages a pulley on the rotating shaft 26. In order to change the rate of speed of rotation of the paddle 20, the driving belt 23 is shifted back and forth by means of a shifter 27. This shifter 27 is actuated by a lever 28 which in turn is reciprocated by the arm 29 driven by a crank on the gear wheel 30 which is engaged by the worm gear 31.

The above description and drawings have been given merely by way of illustration and many modifications may be made therein without departing from the spirit of our invention. For example, the driving means that operate the liquid applying mechanisms shown in Figs. 1, 2 and 3 may be similar to that driving means shown in Figs. 4 and 5. In such an arrangement the device as shown in Figs. 1, 2 and 3 although applying a design which repeats due to the shape of the liquid applying mechanism when driven by a driving device as shown in Figs. 4 and 5 will apply a treating liquid to the yarn in a non-repeating pattern.

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

Having described our invention, what we desire to secure by Letters Patent is:

1. In apparatus for applying a liquid to yarn while it is in transit, the combination of a source of supply for the yarn, means for winding up said yarn, a source of supply for the liquid to be applied and means including a variable drive for

causing the yarn to contact with the source of supply of liquid at continuously varying intervals.

2. In apparatus for applying a liquid to yarn while it is in transit, the combination of a source of supply for the yarn, means for winding up said yarn, a source of supply for the liquid to be applied, a moving endless chain under said yarn, projections of differing lengths on said chain, means for driving said chain at varying speeds, and a liquid furnishing device under said yarn and near said chain whereby the yarn is brought into intermittent contact with said furnishing device at continuously varying intervals.

3. In apparatus for applying a liquid to yarn while it is in transit, a combination of the source of supply for the yarn, means for winding up said yarn, a source of supply for the liquid to be applied, a paddle having a projecting arm attached to depress said yarn, a liquid furnishing device under said yarn and means for rotating the paddle at varying speeds so as to contact the yarn with the source of supply of the liquid at continuously varying intervals.

4. In apparatus for applying a liquid to yarn while it is in transit, a combination of the source of supply for the yarn, means for winding up said yarn a source of supply for the liquid to be applied, a paddle having a projecting arm attached to depress said yarn, a liquid furnishing device under said yarn and means for rotating the paddle at varying speeds including oppositely disposed cone pulleys so as to contact the yarn with the source of supply of the liquid at continuously varying intervals.

5. In apparatus for applying a liquid to yarn while it is in transit, a combination of the source of supply for the yarn, means for winding up said yarn, a source of supply for the liquid to be applied, a paddle having a projecting arm attached to depress said yarn, a liquid furnishing device under said yarn and means for rotating the paddle at varying speeds including oppositely disposed cone pulleys, a belt driving one cone pulley from the other and means for altering the position of the belt on the cone pulleys so as to contact the yarn with the source of supply of the liquid at continuously varying intervals.

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