Patented July 5, 1938 2,122,593

UNITED STATES PATENT OFFICE

2,122,593

TREATMENT OF TEXTILE FIBERS

Henry A. Stafford, Ridley Park, Pa.

No Drawing. Application March 5, 1935, Serial No. 9,421

3 Claims. (Cl. 19—66)

The object of the present invention is to effect a material saving and economy in the preparation of textile fibers, such as raw silk, without detracting from their adaptability for knitting, weaving, or braiding, and with some improvement in their adaptability for shading or dyeing.

Another object of the invention is to provide a composition or compounded oil useful in the accomplishment of the purpose recited by the method which is subject-matter of the present invention.

Another object of my invention is to provide three ways in which textile fibers treated with my novel compounded oil may be used:

(1) They may be treated with my novel compounded oil in the soaking treatment, which treatment may be followed by the manufacture of fabric without the use of water heretofore employed immediately before the fabric manufacturing step.

(2) The soaking treatment may be followed by a treatment with water immediately before the fabric manufacturing step as now practised.

(3) The soaking treatment may be followed by a further treatment with my novel compounded oil immediately before the fabric manufacturing step.

Other objects of the invention will appear from the following description at the end of which the invention will be claimed.

Generally stated, the invention consists in treating raw silk, for the purpose of softening it, and, if desired, of moistening it, with a colloidal dispersion or true solution of compounded oil, instead of with an emulsion of oil and water.

Generally stated, the invention also comprises a compounded oil preferably mineral, although vegetable or animal oils are within the invention, of which the viscosity is from 40 to 300 seconds Saybolt universal viscosity, @ 100° F., and which may or may not contain water limited in quantity to avoid the formation of an emulsion or milky fluid.

The invention also comprises the improvements to be presently described and finally claimed.

An example selected from many modifications which my invention may take is given below. Such example of compounded oil adapted for use without water or with water limited in amount to avoid emulsification, and of the character of a colloidal dispersion or true solution is:—

	Per cent
Mineral oil, 40 to 300 seconds Saybolt universal viscosity @ 100° F.	70.0
Petroleum soap including an alkaline salt of sulphonic or naphthenic acid or a combination of both	18.0
Butyl carbitol	10
Higher fatty alcohol	2.0

To this compounded oil may be added, for example, up to 50% of water. The proportions given are by volume.

The hydrogen ion concentration (pH) of any of the compounded oils according to my invention may conveniently be controlled between 7 and 10.5 pH.

Higher fatty alcohol is a solvent having a boiling point under 400° C.

Other examples of compounded oil will be given but for the sake of description the invention will be described in connection with substantially the compounded oil recited.

The unopened skeins of silk are treated or immersed in the colloidal dispersion or solution of the ingredients above named for a comparatively short period of time, for example, a half hour. The result is that the silk absorbs the compounded oil without materially changing the proportions of the ingredients or the physical characteristics of the compounded oil which is not absorbed. The gum on the silk is softened and the fiber is lubricated. If it is desired to moisten the silk fiber with water, water in limited quantity is included in the compounded oil and is absorbed by the silk without materially changing the water content of the oil or the physical characteristics of the rest of the compounded oil. By proportioning the quantity of water in the compounded oil, it is possible to get into the fiber by absorption any required quantity of water and oil.

For the sake of further description, it may be said that the compounded oil with or without water is absorbed by the fiber and is present in the fiber, and is of approximately the same constitution as it was in the bath or initial supply. The viscosity of the compounded oil ensures pene-

tration into the fiber. The viscosity is also important in the extracting operation, such as the whizzing operation or the vacuum operation, because the excess of compounded oil is thrown out or drawn out of the fiber at that operation and not at subsequent steps in the manufacture or treatment. From the above it follows that the compounded oil extracted out of the fiber as well as of the initial bath or supply is capable of re-use and there is no waste of oil. The quantity of lubricant, as well as the quantity of water put into the fiber, is definite and uniform because the compounded oil goes into the fiber without material change of proportion of its ingredients. Therefore, sufficient compounded oil can be extracted to leave any desired amount in the fiber. This is important and is in sharp contrast with the practice usually employed at the present time of using a water emulsion which causes the quantity and proportion of its ingredients which go into the fiber to be uncertain and variable. By using a colloidal dispersion or solution as distinguished from an emulsion, the fiber does not contain an excess of water and does not require to be dried, whereby a substantial economy is effected. Because the quantity of lubricant and the quantity of water, if water is employed with the lubricant, in the fiber is definite and uniform and can be controlled in the extracting operation, it is possible to perform both the soaking and the extracting operations in one receptacle, which is not done at the present time.

The skeins are treated by my invention without opening them up and endangering breakage which would incur waste. The skeins are then wound onto bobbins and may be thereafter utilized and treated in the usual way. The compounded oil described is sufficiently hygroscopic to take up any water that may be necessary during the knitting operation.

The silk by this method is in condition to be knitted by some manufacturers without further treatment by water or oil.

Also, by varying the composition of the compounded oil, it can be substituted for water in the conditioning attachments on the knitting machine, thereby eliminating the possibility of rusting of the machine parts.

In hosiery manufacture, the described compounded oil washes out during the boiling-off operation along with the gum, and the soaps function to disperse dye and therefore, being present along with the gum, facilitate dyeing. In fact, they also facilitate tinting the thread prior to the knitting operation.

In another example of the compounded oil, use is made of sulphonated vegetable oil, as olive or castor, or of animal oil, such as oleic. The viscosity is as above recited. An alkaline salt of sulphonic or naphthenic acid, or a combination of both, is employed and, as a stabilizer, butyl cellosolve or butyl carbitol may be employed and, except as stated, the formula and proportions are as above given.

As another example of the compounded oil is:—

	Per cent
Mineral oil of the viscosity stated	74
Petroleum soap	25
Butyl carbitol or cellosolve	1

The last-named ingredient is not in all cases necessary and water is not employed.

By the present invention, vegetable oil or mineral oil may be employed but the former does not keep well and the latter is much more stable. Of course, in each case, these oils are used in a colloidal dispersion or true solution that can be re-used.

As stated, the viscosity of the oil is from 40 to 300 seconds Saybolt universal viscosity, @ 100° F., and the viscosity is controlled by the character and quantity of the soap, the composition of the soap, and the solvents butyl carbitol and cellosolve. It may be remarked that three factors must be kept in mind in preparing the composition of the compounded oil. The viscosity must be such that the excess oil is removed in the extracting operation and not in spinning. In respect to hygroscopic character, it should be sufficient to take up the necessary water on the silk at knitting. The compounded oil should be capable of being readily removed in the ordinary boiling-off process.

In general, it may be said that the hygroscopic property may be adjusted by the use of solvents of not less than 75° F., boiling point, and capable of washing out with weak soap solutions. In some cases, thread treated by the present invention regains stretch better than threads as now prepared, which, of course, is an advantage.

At present, textile fibers, after soaking, are run through a bath of water immediately before they enter into the fabric-shaping operation, such as the knitting, weaving, or braiding step. This is particularly true of certain hosiery manufacturing processes. By the use of the compounded oil of my invention, it is, in some cases, possible to dispense with the step of passing the fibers through the water bath and, instead, to manufacture the fabric directly from the fiber, drawing the fiber directly from the cone. Due to its hydroscopicity, the use of my novel compounded oil also improves the fiber when the fiber is passed through a water bath, as the water may be readily absorbed by the fiber. Another use of my novel compounded oil is to pass fibers, which have been treated with my novel compounded oil in the soaking treatment, through a bath of my novel compounded oil directly before the fabric manufacturing operation. The oil absorbed by the fibers in their passage through the bath puts the fibers in suitable condition for the fabric-making operation.

The present invention being chemical in its nature, the scope of equivalents appropriate to such cases is reserved.

I claim:

1. The process of treating raw silk for full-fashioned hosiery, which process comprises, applying to the silk, compounded oil of the viscosity of from 40 to 300 seconds Saybolt universal viscosity at 100° F. and of the character of a true solution and insufficient in amount to cover the silk, removing the excess compounded oil by extracting the excess from the silk, subjecting the silk to the throwing operation which forms threads on cones, and subsequently forming the threads into full-fashioned hosiery directly from the cone without passing the threads through a moistening device.

2. The process of treating raw silk for knit fabric, which process comprises, applying to the silk, compounded oil of the viscosity of from 40 to 300 seconds Saybolt universal viscosity at 100° F. and of the character of a true solution and insufficient in amount to cover the silk, removing the excess compounded oil by extracting the excess from the silk, subjecting the silk to the throwing operation which forms threads on

cones, passing the threads through a moistening bath, and forming the threads into fabric directly from the cone after their passage through the moistening device.

3. The process of treating raw silk for knit fabric, which process comprises, applying to the silk, compounded oil of the viscosity of from 40 to 300 seconds Saybolt universal viscosity at 100° F. and of the character of a true solution and insufficient in amount to cover the silk, removing the excess compounded oil by extracting the excess from the silk, subjecting the silk to a throwing operation which form threads on cones, passing the threads through an oiling device, and forming the threads into knit fabric directly after their passage through the oiling device.

HENRY A. STAFFORD.