

UNITED STATES PATENT OFFICE

2,348,552

TEXTILE FIBER AND METHOD OF
PRODUCINGJulius G. Little, Wilmington, Del., assignor to
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a corporation of DelawareNo Drawing. Application March 27, 1941,
Serial No. 385,468

12 Claims. (Cl. 117-168)

This invention relates to an improved method of sizing textile fibers prior to the weaving operation and to the sized fiber obtained.

Heretofore it has been customary to apply a sizing composition to textile yarns and fibers for the purpose of providing more efficient working of the yarns or fibers in the subsequent weaving operation. The sizing compositions which have been used for this purpose have been starches, gums, gelatin, sulfonated oils, tallows and mineral oils. Thus, for example, before weaving of cotton yarn a size composed of starch, gums and softeners is usually applied to improve the weaving properties. The starch serves to strengthen the fibers, the gum binds the fibers together and the softener provides lubrication. In sizing rayon yarns a size composition containing gelatin together with sulfonated oils or mineral oil is most generally used. After the weaving operation the size is removed from the woven fabric by a desizing procedure.

The difficulty encountered with use of starch sizes is the difficulty of removal from the fabric. Use is usually made of starch enzymes, such as diastacemalt, for this purpose. Such a process is not readily applicable to rayon fibers, and for this reason starch is not generally used in rayon sizes. Starch sizes also give fibers which shed appreciably. Gelatin is not very satisfactory as a sizing material because of its non-uniformity and because it requires long soaking treatments for removal. With gums the desizing of the fabric after weaving usually requires quite drastic treatment, such as caustic boiling under pressure. Use of sulfonated oils is not desirable because of the tendency of such materials to become rancid on aging. Sulfonated oils usually provide too much softening effect and too little lubrication. Mineral oil provides desirable lubricating and softening characteristics but is subject to the disadvantage that it impregnates the fibers unevenly and that its removal from the fibers after weaving is non-uniform and usually results in oil spots on the fabric.

It is the object of this invention to provide an improved method of sizing both natural and synthetic fibers prior to the weaving thereof.

It is a further object to provide a sized textile fiber containing an improved sizing composition.

Other objects of the invention will appear hereinafter.

The above objects are accomplished in accordance with this invention by sizing textile fibers before weaving with a size composition

containing mineral oil and a glycol ester of a rosin having a melting point (Hercules drop method) within the range of about 25° C. to about 70° C., and more preferably within the range of about 35° C. to about 70° C. The rosin esters useful in the process of the invention may be either completely esterified or may be only partially esterified. Esters having acid numbers up to about 100 are utilizable.

I have found, in accordance with this invention, that when mineral oil is combined with a glycol ester of rosin of the above type in a sizing composition that the mineral oil no longer suffers from the disadvantages which have severely restricted its use in yarn sizing. I have found also that the glycol ester of a rosin cooperates with the mineral oil to give a composition which sizes the yarn uniformly and which is removable from the woven fabric with great ease. Such rosin esters are soft and flexible and embody desirable adhesive characteristics, thus being ideally suited for yarn sizing. The glycol ester of rosin thus makes it possible to obtain the desirable advantages of mineral oil without the disadvantages which have severely limited or prevented its use.

I have also found that in using the mixture of mineral oil and a glycol ester of a rosin with starch in sizing compositions, in accordance with this invention, an improvement in fiber strength with a smaller amount of size in the fiber is obtained in comparison with the usual starch sized fibers. Furthermore such sized fibers exhibit a distinct improvement over the starch sized fibers in the amount of shedding. More complete removal of the size from the fiber as compared with the starch sized fiber is another distinct advantage.

The yarns sized in accordance with the process of this invention show generally improved strength, high pliability without stiffness, and improved lubricity together with improved elongation and elasticity.

In carrying out the method in accordance with this invention, natural or synthetic fibers, such as yarns, threads, filaments, etc., are treated with a composition containing mineral oil and a glycol ester of a rosin melting within the range of about 25° C. to about 70° C. (Hercules drop method) and preferably within the range of about 35° C. to about 70° C. The composition may be applied as an aqueous emulsion, as an organic solvent solution, as an aqueous dispersion of an organic solvent solution or as the mineral oil solution of the glycol ester of the

rosin. The composition may also contain any other sizing materials, such as, for example, starches, gums, softeners, etc.

The glycol ester of a rosin may be used with mineral oil in various proportions in the sizing compositions depending on the type of sizing desired and the particular fiber being treated. The amount of glycol ester of a rosin and mineral oil used with other sizing agents will depend entirely on the particular effect desired. With the larger proportions of the rosin ester and mineral oil the advantages of the invention will be more pronounced.

The rosin used in the production of the rosin esters utilized in this invention may be either wood rosin or gum rosin, such as American or French gum rosin. It may also be hydrogenated forms of such rosins. The acids derived from the rosins such as, for example, abietic, pimaric, sapinic, etc., may likewise be used in place of the rosins themselves.

In esterifying the rosin with glycols to produce the rosin esters utilizable in the method of this invention, any of the usual aliphatic glycols may be employed, as for example, ethylene glycol, propylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, hexaethylene glycol, nonaethylene glycol, decamethylene glycol, butylene glycol, dipropylene glycol, etc., or mixtures thereof.

The glycol esters of rosin may be prepared by procedures well known in the art. The diethylene glycol ester of rosin may be prepared, for example, by heating together approximately equivalent proportions of rosin and diethylene glycol in accordance with the process of U. S. Patent 1,779,710 to George M. Norman. Any other suitable procedure may be followed for preparing the diethylene glycol ester of rosin. Esters may be prepared with other glycols by any of the well-known methods.

The mineral oil useful in the compositions may be, for example, the refined type of viscous oil heretofore used in the textile industry. Its viscosity may be varied to suit the characteristics desired in any particular size composition. The relative proportions of mineral oil and glycol ester of rosin utilized in the process of this invention may be varied within a range of about 25 to about 95% of mineral oil in the mineral oil-rosin ester combination and preferably within the range of about 40% to about 60% of mineral oil.

It may be desirable in some cases to include a metallic drier in the sizing compositions, such as, for example, cobalt naphthenate, cobalt linoleate, etc., since with inclusion of driers a yarn of greater tensile strength may be obtained.

To illustrate the sizing of textile fibers in accordance with this invention the following examples are cited:

EXAMPLE I

A diethylene glycol ester of wood rosin having an acid number of 10 and melting point (drop) of 45° C. was dissolved in viscous refined mineral oil to give a 50% solution. This solution was then emulsified in water by use of triethanolamine oleate as emulsifying agent to give an emulsion containing 50% by weight of the mineral oil and rosin ester combination. Fourteen pounds by weight of this emulsion were mixed with 80 pounds of 60 fluidity corn starch and the mixture heated to a boil with agitation to gelatinize the starch. Water was then added to bring the total volume to 100 gallons. Cotton

warp yarn was treated with the above emulsion according to usual sizing procedure. The sized yarn showed increased tensile strength and elongation over typical starch and gum sized yarn.

EXAMPLE II

Cotton warp yarn was sized with sizing compositions formulated as in Example I above with the exception that the glycol ester of rosin used in each case was a diethylene glycol ester as shown in Table I below:

Table I

		Acid number	Melting point
1	Diethylene glycol ester of rosin.....	82	60
2	do.....	63	57

In each case the sized cotton yarn showed increased tensile strength and elongation in comparison with yarns sized with the usual starch and gum sizes.

EXAMPLE III

Twenty pounds of the 50% emulsion of mineral oil and diethylene glycol ester of rosin described in Example I above were combined with 40 lbs. of 60 fluidity corn starch as in Example I and diluted with water to 100 gallons. Cotton thread was then treated with this sizing composition according to the usual sizing procedure. The sized yarn showed excellent tensile strength and gloss.

EXAMPLE IV

A solution of 50 parts by weight of the diethylene glycol ester of wood rosin in 50 parts by weight of mineral oil was emulsified in water to give a 4% by weight emulsion using triethanolamine oleate as the emulsifying agent. This sizing composition was then used to impregnate 200 denier 75 filament semi-dull viscose rayon yarn for the pebble control of crepe in the rayon fabric. The sized yarn showed improved tensile strength and lubricity and the size was easily removable from the woven fabric.

EXAMPLE V

Forty pounds of the 50% emulsion of mineral oil and diethylene glycol ester of rosin used in Example I above were mixed with 60 lbs. of gelatin and diluted with water to 100 gallons. Acetate rayon warp yarn was then sized with the above composition. The resulting yarn was characterized by a uniform sizing. The size was easily removable from the woven fabric.

EXAMPLE VI

Fourteen pounds of a 50% by weight aqueous emulsion containing 3 parts of mineral oil to 1 part of the diethylene glycol ester of wood rosin were mixed with 80 pounds of 60 fluidity corn starch and diluted to 100 gallons. The sizing composition was then used to impregnate 18/1 cotton yarn. The sized yarn showed excellent tensile strength and lubricity.

As illustrated in the above examples, my improved sizing composition provides a means of sizing textile fibers to give sized fibers possessing distinct improvement over fibers sized by the usual sizing compositions. Thus, the fibers sized in accordance with this invention show improved strength and lubricity, high pliability without stiffness and excellent elasticity. Furthermore the size is readily removable from the woven fabric.

It will be understood that the details and examples hereinbefore set forth are for purposes of illustration only and that the invention as herein broadly described and claimed is in no way limited thereby.

This application forms a continuation-in-part of my application, Serial No. 320,563, filed February 24, 1940, entitled "Textile fiber and method of producing."

What I claim and desire to protect by Letters Patent is:

1. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and a glycol ester of a rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

2. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and a glycol ester of wood rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

3. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and a glycol ester of hydrogenated rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

4. The method of sizing textile fibers prior to weaving which comprises treating the fiber with an aqueous emulsion comprising a solution of a glycol ester of a rosin in mineral oil, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

5. A textile fiber sized with a composition comprising mineral oil and a glycol ester of a rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

6. A textile fiber sized with a composition com-

prising mineral oil and a glycol ester of wood rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

7. A textile fiber sized with a composition comprising mineral oil and a glycol ester of hydrogenated rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

8. A textile fiber sized with a composition comprising mineral oil and the diethylene glycol ester of a rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

9. A textile fiber sized with a composition comprising mineral oil, starch and a glycol ester of wood rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

10. A textile fiber sized with a composition comprising mineral oil, gelatin and a glycol ester of wood rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

11. A textile fiber sized with a composition comprising mineral oil, a metallic drier and a glycol ester of a rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 25 to about 95% mineral oil and about 75 to 5% of the said rosin ester.

12. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and a glycol ester of a rosin, said ester having a melting point within the range of about 25° C. to about 70° C., the proportion of mineral oil to the said ester being from about 40 to about 60% mineral oil and about 60 to 40% of the said rosin ester.

JULIUS G. LITTLE.

CERTIFICATE OF CORRECTION.

Patent No. 2,348,552.

May 9, 1944.

JULIUS G. LITTLE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 33, for the word "wearing" read --weaving--; 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 13th day of June, A. D. 1944.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)