Patented Oct. 12, 1943 2,331,840

# UNITED STATES PATENT OFFICE

2,331,840

## TEXTILE FIBER AND METHOD OF PRODUCING

Julius G. Little, Wilmington, Del., assignor to Hercules Powder Company, Wilmington, Del., a corporation of Delaware

No Drawing. Application October 12, 1940, Serial No. 360,917

13 Claims. (Cl. 117—143)

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. Various sizing compositions have been used in this manner including starches, gums, sulfonated oils, tallows and mineral oils. After the weaving operation the size is removed from the woven fabric by a desizing procedure.

Of the known sizing materials for this purpose mineral oil is particularly desirable because of its excellent lubricating and softening characteristics. However, use of mineral oil is subject to two principal disadvantages which seriously limit its field of application. Thus, mineral oil exhibits the undesirable tendency of impregnating the fibers unevenly. Also, its removal from the fibers after weaving is non-uniform and as a result oil spots appear on the fabric. Mineral oil also has a tendency to produce excessive lubricity and, therefore, a decrease in breaking strength of the sized fiber. In many instances the feel of fabric woven from yarn sized with mineral oil is not very satisfactory. No satisfactory means of utilizing the desirable features of mineral oil in yarn sizing without its disadvantages has been known.

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

It is a further object to provide an improved method of sizing fibers with use of a modified mineral oil composition which overcomes the prior disadvantages of mineral oil alone.

It is another object to provide a sized textile fiber containing a modified mineral oil composition as a sizing agent.

It is another object to provide a method of sizing fibers with use of mineral oil to obtain uniform impregnation and improved desizing efficiency.

Other objects of the invention will appear from the following description.

The above objects are accomplished in accordance with this invention by sizing textile fibers with a composition comprising a solution of a rosin alcohol or an ether of a rosin alcohol or an ester of a rosin alcohol in mineral oil.

I have found, in accordance with this invention, that combination of a rosin alcohol or its ether or ester derivative with mineral oil in a sizing composition makes it possible to overcome the former disadvantages of mineral oil in yarn sizing, and particularly the uneven impregnation of the fibers and the non-uniform removal of the mineral oil from the fibers during the desizing process. I have found that the rosin alcohols or ether or ester derivatives thereof render mineral oil more satisfactory for yarn sizing by providing more uniform impregnation and by facilitating the complete removal of the mineral oil from the fibers after weaving. I have found that rosin alcohols or their ether and ester derivatives are very easily emulsifiable in the presence of mineral oil and consequently are capable of complete removal from the fibers with ordinary soap solutions. In combination with mineral oil they effect a complete emulsification of the mineral oil and thereby facilitate its complete removal from the fibers during the usual desizing treatment.

In addition to the above advantages, the use of mineral oil solutions of rosin alcohols or ether and ester derivatives of thereof provides more effective tension control in the sizing of rayon yarn than results from use of mineral oil alone. Yarns of higher pliability without stiffness and having increased breaking strength and elasticity are thus obtained by the process of this invention. Improvements in weaving properties also result, such as decreased shedding of fibers during weaving. Less solids are required on the fibers to provide efficient weaving results.

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 comprising a solution of a rosin alcohol, an ether of a rosin alcohol or an ester of a rosin alcohol in mineral oil. 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 rosin alcohol or derivative thereof. If desired, the composition may also contain softeners or other sizing materials such as, for example, starches, gums, etc. The rosin alcohol or ether or ester derivative thereof 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 relative proportions of the rosin alcohol or derivative thereof and mineral oil utilized in the process of the invention may be varied within the range of about 5 to about 75% by weight of the rosin alcohol or ether or ester derivative thereof in the mineral oil solution thereof. More preferably, the rosin alcohol or

ether or ester derivative thereof will comprise about 40% to about 60% by weight of the mineral oil solution thereof.

The rosin alcohols which may be used are those alcohols obtained by reduction of rosin or rosin acids. These may include the alcohols obtained by reduction of wood or gum rosin or the individual acids thereof. They may also include the alcohols obtained by reduction of the hydrogenated forms of these rosins or acids. Thus, the alcohols will include abietyl alcohol, hydrogenated derivatives thereof such as dihydroabietyl alcohol and tetrahydroabietyl alcohol, sapinyl alcohol, pimaryl alcohol, and hydrogenated forms thereof. The ether derivatives of the rosin alcohols will include the various glycol ethers such as those obtained from ethylene glycol, diethylene glycol, triethylene glycol, etc., and the glycerol ethers which may be the mono-, di-, or triethers. The ester derivatives of the rosin alcohols which may be utilized will include the esters obtained by esterifying the alcohols with fatty acids such as, for example, oleic acid, stearic acid, lauric acid, ricinoleic acid, etc.

The mineral oil which will be used in the sizing compositions in accordance with this invention may be any of the various grades of mineral oil, but preferably will be one of the refined grades of mineral oil ordinarily used in the textile industry. Its viscosity may be varied to suit the characteristics desired in any particular sizing composition.

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

*Example 1*

Dihydroabietyl alcohol was dissolved in mineral oil to give a 50% by weight solution. The 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 solution of dihydroabietyl alcohol. Seven parts by weight of this emulsion were diluted with 85 parts by weight of water and the diluted emulsion used to impregnate 200 denier bright viscose skein yarn. The impregnated yarn was then centrifugally extracted and dried. As a result of the treatment the yarn was evenly impregnated and the filaments were lubricated and bound together in such a way as to provide excellent control of pebble in crepe yarns. The size was easily removed from the fibers by light scouring in warm soapy water.

*Example 2*

The diethylene glycol ether of dihydroabietyl alcohol was dissolved in mineral oil to give a 50% by weight solution and the solution emulsified in water with triethanolamine oleate as the emulsifying agent to give an emulsion containing 50% by weight of the mineral oil solution of the ether. Fifteen parts by weight of this emulsion were diluted with 85 parts by weight of water and the diluted emulsion used to impregnate 150 denier, 40 filament bright viscose skeins. After centrifugal extracting and drying the yarn was evenly impregnated. The filaments provided excellent control of pebble in crepe yarns and the size was easily removed from the fibers by light scouring in warm soapy water.

*Example 3*

A sizing composition suitable for spun rayon fiber was prepared by mixing 16 pounds of the emulsion prepared in Example 1 containing 50% by weight of the mineral oil solution of dihydroabietyl alcohol with 100 pounds of dextrin, and diluting with water to give 100 gallons of sizing composition. This composition was then used to impregnate a mixture of 85% spun rayon and 15% 64's wool. After drying the treated fibers, they were found to be evenly impregnated and to have high pliability and high breaking strength. In the weaving of fabric from the treated rayon fibers excellent weaving efficiency was obtained with very little shedding of fibers. The sizing composition was completely removed from the fabric by the usual desizing.

*Example 4*

A sizing composition was prepared by mixing 14 pounds of the 50% mineral oil emulsion used in Example 1 with 80 pounds of 60 fluidity corn starch and heating the mixture to a boil with agitation to gelatinize the starch. Water was then added to bring the total volume to 100 gallons. This composition was used to impregnate cotton warp yarn according to usual sizing procedure. The sized yarn possessed excellent tensile strength and elasticity and was uniformly impregnated.

*Example 5*

The lauric acid ester of dihydroabietyl alcohol was prepared by esterifying the alcohol with lauric acid. A 50% by weight solution of the ester in mineral oil was emulsified in water by use of triethanolamine oleate as emulsifying agent to give an emulsion containing 50% by weight of the mineral oil solution of the lauric acid ester of dihydroabietyl alcohol. A sizing composition was then prepared by mixing 14 pounds of the above emulsion with 80 pounds of 60 fluidity corn starch, and heating the mixture 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 impregnated with the above emulsion according to the usual sizing procedure. The sized yarn obtained possessed excellent breaking strength and elongation. The yarn was very evenly impregnated. After weaving of a fabric with the sized yarn, the sizing composition is completely removed by the usual desizing.

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

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 material selected from the group consisting of rosin alcohols, ethers of rosin alcohols and esters of rosin alcohols.

2. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising an aqueous emulsion of mineral oil and a material selected from the group consisting of rosin alcohols, ethers of rosin alcohols and esters of rosin alcohols.

3. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising a solution of about 5 to about 75% by weight of a material selected from the group consisting of rosin alcohols, ethers

of rosin alcohols and esters of rosin alcohols in mineral oil.

4. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising a solution of about 40 to about 60% by weight of a material selected from the group consisting of rosin alcohols, ethers of rosin alcohols and esters of rosin alcohols in mineral oil.

5. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and a rosin alcohol.

6. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and an ether of a rosin alcohol.

7. The method of sizing textile fibers prior to weaving which comprises treating the fiber with a composition comprising mineral oil and an ester of a rosin alcohol.

8. A textile fiber sized with a composition comprising mineral oil and a material selected from the group consisting of rosin alcohols, ethers of rosin alcohols and esters of rosin alcohols.

9. A textile fiber sized with a composition comprising a solution containing 5% to 75% by weight of a material selected from the group consisting of rosin alcohols, ethers of rosin alcohols and esters of rosin alcohols in mineral oil.

10. A textile fiber sized with a composition comprising a solution containing 40% to 60% by weight of a material selected from the group consisting of rosin alcohols, ethers of rosin alcohols and esters of rosin alcohols in mineral oil.

11. A textile fiber sized with a composition comprising mineral oil and a rosin alcohol.

12. A textile fiber sized with a composition comprising mineral oil and an ether of a rosin alcohol.

13. A textile fiber sized with a composition comprising mineral oil and an ester of a rosin alcohol.

JULIUS G. LITTLE.