

UNITED STATES PATENT OFFICE

2,046,885

TEXTILE MATERIAL

Daniel E. Strain, Wilmington, Del., assignor to
E. I. du Pont de Nemours & Company, Wil-
mington, Del., a corporation of Delaware

No Drawing. Application December 29, 1934,
Serial No. 759,743

9 Claims. (Cl. 91—68)

This invention relates to an improved process for sizing textile materials and more particularly refers to a process for impregnating textiles with a novel class of sizing agents.

5 Heretofore textile materials have been sized with starch, gum, tallow, and similar agents. The sized products, however, were not laundry fast and speedily lost their sizing on washing. The product then became limp and lacked body and weight. Likewise, the feel and appearance of the fabrics was far from satisfactory.

10 It is an object of this invention to overcome the aforementioned defects and numerous other objections which directly or indirectly resulted therefrom. A further object is to size textile material with a class of compounds which improves the appearance and wearing qualities of said materials. A still further object is to produce textile materials which are unusually white and pleasing in appearance, and which retain these characteristics throughout numerous launderings without the necessity of additional sizing treatment. Additional objects will become apparent from a consideration of the following description 15 and claims.

20 These objects are attained according to the herein described invention wherein textile materials are treated with alkyl methacrylates in such manner that polymers of said compounds adhere to the fibers. In a more restricted sense the invention is concerned with the application of methyl methacrylate polymers to textile materials. This invention in its preferred embodiment is directed to the passage of textile materials 25 through a solution or emulsion containing small amounts of methyl methacrylate monomers, and/or polymers, with subsequent evaporation of the liquid from such materials in order to impart thereto a protective sizing of methyl methacrylate polymers.

30 The invention may be more readily understood by a consideration of the following illustrative examples.

Example 1

45 A sample of methyl methacrylate was polymerized by mixing with 0.5% by weight of benzoyl peroxide and heating the mixture at 100° C. for 4 hours. A white amorphous solid was obtained. This polymer was stirred with acetone, in the ratio of 5 parts of the polymer to 95 parts of acetone, until the polymer was completely dissolved. When the solution was cool it was used to impregnate an 80/60 cotton fabric. The cloth was then run through squeeze rolls to remove excess solution and to insure an even distribution of the 55

resin. The solvent was evaporated and the cloth ironed. An unusually white, glossy finish was obtained. The fabric was much fuller and stiffer than the original. Boiling for one-half hour in 0.5% soap solution had no apparent effect on the finish. 5

Example 2

10 100 parts of methyl methacrylate monomer, containing one part of benzoyl peroxide, as added, with vigorous stirring, to 500 parts of a 2% solution of gum tragacanth containing a suitable dispersing agent, such as the sodium salt of an alkyl naphthalene sulfonic acid. The emulsion of the methyl methacrylate monomer obtained in this way was used to impregnate a sample of unfinished cotton voile. After the fabric was thoroughly impregnated, it was squeezed out and then dried in an oven at 100° C. The fabric was rendered stiffer and fuller by the treatment, and the finish was highly resistant to laundering. 20

Example 3

25 The emulsion of methyl methacrylate monomer described in Example 2 was heated at 65° C. for 48 hours. This heating caused the methyl methacrylate to polymerize but did not destroy the emulsion. The result was an emulsion of the polymer. This emulsion was used to size a 48/48 unfinished cotton fabric. The fabric was dried and not calendered. A linen-like effect was obtained, which was resistant to laundering. 30

Example 4

35 100 parts of methyl methacrylate monomer containing one part of benzoyl peroxide was dissolved in 101 parts of the butyl ether of glycol. This solution was used to impregnate an 80/60 cotton fabric. After impregnation, the fabric was heated for 10 minutes at 100° C. A permanent sizing effect was obtained, which, upon calendering with hot rolls, yielded a lustrous, linen-like finish. The glycol butyl ether is a high boiling solvent and tends to retain the methyl methacrylate on the fabric until polymerization occurs. In this manner the loss of methyl methacrylate monomer by evaporation is considerably reduced. 45

Example 5

50 An 80/60 unfinished cotton fabric was immersed in a 15% solution of sodium hydroxide for 10 minutes. It was then squeezed out and washed thoroughly in anhydrous methyl alcohol. After drying it was treated with a 10% solution of polymerized methyl methacrylate in acetone, squeezed 55

out and dried. It was then wet out and dried by ironing. An unusually white and somewhat lustrous finish was obtained which was not removed by boiling for one-half hour in 0.5% soap solution.

5

Example 6

A skein of gel rayon yarn (made up of filaments which have not been dried after coagulation and desulfurization) was washed in water-free acetone until substantially free of water, then treated with a 5% solution of polymerized methyl methacrylate in acetone. The excess solution was carefully removed by pressing the skein between sheets of absorbent material. The treated fibers were found to have a greater elastic recovery and were stiffer and more wear resistant than the untreated fibers.

When the above examples are repeated using mixtures of methyl methacrylate and its homologues, such as ethyl methacrylate or propyl methacrylate, the finished materials possess satisfactory fastness to laundering and a pleasing white appearance.

When the aforementioned experiments are repeated utilizing other alkyl alkacrylates and mixtures thereof, but omitting therefrom methyl methacrylate, the results are superior to the results obtained when starch or similar sizing agents are utilized but are less satisfactory than in the case of the preceding examples.

It is to be understood that the aforementioned examples are illustrative merely of the manner of carrying out the practical application of the present invention. They are not intended to be considered as a limitation upon the scope of this invention since the individual agents and the methods of application may be varied widely without departing from the scope hereof. For example, the sizing agent selected in accordance with this invention may be applied to the fibers in unpolymerized, partially polymerized or completely polymerized condition. In place of an individual alkyl alkacrylate a mixture of two or more may be selected. Where ethyl methacrylate and/or its higher homologues are used it is particularly advantageous to incorporate therewith methyl methacrylate. Beneficial results may also be obtained by incorporation of esters of higher alpha-alkylacrylic acids.

The sizing agents previously described may be applied to the textile materials in a variety of ways, and the invention is not to be restricted to any given method of sizing such materials. In general, it is advisable to accomplish this sizing by passing the material to be treated through a dilute suspension or emulsion of the sizing agent. Solutions of these agents may be prepared by utilizing well known organic solvents and mixtures thereof, such as alcohols, esters, ketones, hydrocarbons, etc. Aqueous emulsions of the alkyl esters of alpha alkyl substituted acrylic acids may be prepared, for example, by the use of dispersing agents such as alkyl naphthalene sulfonic acids, their sodium salts, alkali metal salts of fatty acids, sodium petroleum sulfonate, sulfonated castor oil and other sulfonated vegetable oils, etc. The amount of sizing agent in this solution or emulsion may vary considerably depending upon the particular agent selected, the material to be treated and the degree of stiffness desired. However, an amount ranging from about 0.5% to about 35% based upon the solution or emulsion, is ordinarily quite sufficient.

Very satisfactory results have been obtained by applying the sizing agent to the textile ma-

terials in an unpolymerized condition and causing polymerization to take place thereon. This may conveniently be accomplished by incorporating in a sizing solution or emulsion a small quantity of a polymerizing agent. Such agents are advisably those which are capable of giving off oxygen such as organic peroxides, ozonides, and in particular benzoyl peroxide.

Furthermore, the sizing solution or suspension may contain additional materials such as plasticizers. A representative few of the many plasticizers which are suitable for use herein are camphor, phthalates such as ethyl-, propyl-, isopropyl-, butyl-, isobutyl-, cyclohexyl-, dibutyl-, esters of dibasic acids, etc. For the sake of brevity additional plasticizers and combinations thereof as well as additional modifications of other features of the present invention will not be given in detail herein, since one familiar with the art should have no difficulty in carrying out this invention in accordance with the instructions hereof. For a very detailed description of the numerous modifications of this invention reference may be had to copending application Serial No. 759,744, filed Dec. 29, 1934.

The use of protective colloids in producing dispersions of methyl methacrylate monomers and related alkyl alkacrylate derivatives is particularly helpful. As mentioned in Example 2, gum tragacanth is well adapted for this purpose. However, the invention is not restricted thereto since other well known protective colloids may be substituted therefor or used in admixture therewith. A representative few of these compounds are, for example, casein, gelatin, glue, Russian isinglass, Irish moss, etc.

Dispersions of, for example, polymeric methyl methacrylate, may readily be obtained by dissolving said compound in an organic solvent, adding thereto a suitable dispersing agent, and then adding water under continuous violent agitation. Likewise, dispersions may be obtained in an internal mixer, such as a Bunbury mill, by working the compound to be dispersed with a dispersing agent and a protective colloid, and diluting with water to the desired solids content.

Textile materials to be sized may be derived from animal, synthetic or vegetable sources. The term "textile materials" when used herein is understood to include woven, knitted and material otherwise fabricated from fibers, threads, filaments, etc., of silk, artificial silk, cotton, wool, linen, jute, etc. After passing the aforementioned or related materials through the sizing bath they may be run through squeeze rolls to remove excess solution and to improve the penetration of the solution into the material. The solvent or dispersing medium may then be evaporated therefrom, or if a water-soluble solvent is used, the resin may be precipitated on the textile material by immersing said material in water. Finally, the treated article may be ironed or calendered.

By means of the present invention the disadvantages of prior art sizing agents are overcome to a great extent. The process is both speedy and efficient, and results in a surprisingly white product of pleasing feel and appearance. The product possesses exceptional fastness to laundering, and retains its superior characteristics after repeated launderings.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited

to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. Textile materials sized with alkyl alkacrylate polymers.
2. Cellulosic textile materials sized with alkyl methacrylate polymers.
3. Textile materials sized with methyl methacrylate polymers.
4. Cellulosic textile materials sized with methyl methacrylate polymers.
5. Cotton fabrics sized with methyl methacrylate polymers.
6. A process for sizing textile materials which comprises passing said materials through a liquid containing an alkyl alkacrylate and subsequently evaporating the liquid from the treated material.
7. A process for sizing textile materials which

comprises passing said materials through a liquid containing methyl methacrylate polymers and subsequently evaporating the liquid from the treated material.

8. A process for sizing textile materials which comprises passing said materials through a liquid containing methyl methacrylate monomer and a polymerizing agent and subsequently evaporating the liquid from the treated material and polymerizing the methyl methacrylate monomer.

9. A process for sizing textile materials which comprises passing said materials through a liquid containing methyl methacrylate monomer and benzoyl peroxide and subsequently evaporating the liquid from the treated material and polymerizing the methyl methacrylate monomer.

DANIEL E. STRAIN.