Patented Dec. 16, 1941

2,266,203

UNITED STATES PATENT OFFICE

2,266,203

PENETRATION CONTROL OF AQUEOUS RUBBER

Glen S. Hiers, Bala-Cynwyd, Pa., assignor to Collins & Aikman Corporation, Philadelphia, Pa., a corporation of Delaware

No Drawing. Application March 10, 1939, Serial No. 261,046

8 Claims. (Cl. 91—68)

This invention relates to fabrics and to the treatment thereof with aqueous dispersions of rubber, including latex, so as to prevent "striking through" or excessive penetration of the rubber.

More specifically, this invention is directed to providing a fabric to one or both sides of which has been applied a coating. The coating may be applied for the purpose of securing pile tufts in position, providing an anti-slip surface to carpets or floor coverings, water-proofing and analogous uses involving the production of what are essentially textile products.

It is known, as in the production of V-pile upholstery fabrics having a cotton backing and animal fiber or blends of animal fiber and other fibers in the pile, to scour the cloth to remove all dirt, oil, grease and foreign matter associated with the animal fiber in the pile, as well as certain naturally occurring gums, pectins and resins associated with the cotton of the backing, and then to apply to the back side of the still moist fabric a thickened aqueous adhesive for the purpose of securing the pile V's in position. It is often desirable that the amount of rubber applied be kept to a minimum and that normal or less than normal concentrations of rubber be present in the latex. The viscosity of the thickened aqueous dispersion is conveniently 800 to 1100 centipoises prior to application to the fabric.

Immediately after application of the rubber to the back of the pile fabric the coated fabric is passed in web form into a drier for the purposes of evaporating the water, coagulating the rubber and curing the rubber as by hot vulcanization. This drier is normally operated at a temperature of about 290° F., and although this heat functions in the three ways just mentioned it also has the effect of reducing the viscosity of the rubber to the point where it becomes much thinner and by capillarity tends to pass through the backing of the cloth and into the pile tufts and the channels formed by the individual fibers of these tufts. Strong coagulants, even when reacting at this high temperature, do not entirely overcome the difficulty mentioned, as none of them are completely effective. It is a known fact that serums which remain after use of such strong coagulants as acetic or formic acids for coagulating rubber from natural latex still contain from 1 to 3% of dispersed rubber. The presence of even this small amount of rubber in the face of the pile fabric is objectionable and creates difficulty in finishing and dyeing operations of the fabrics. Its removal requires extra finishing, such as brushing and tigering, and causes a build-up of rubber on rolls with which the fabric comes in contact during these finishing operations.

An object of this invention is to provide a fabric having a coating of rubber thereon with a small degree of penetration.

Another object of this invention is to prevent the "striking through" to the face of the rubber applied to the back of a loosely woven or irregular pile fabric.

Another object of this invention is to treat the cloth before coating in such a way that when the coating is applied there will be a reaction on the coating which will cause the aqueous rubber composition to gel before any subsequent operation is effected.

A further object of this invention is to treat the fabric with a gelling agent for the thickener used in the latex composition.

These and other objects of invention will be manifest from a consideration of the following description and claims.

I propose to utilize as a thickener for the latex or other aqueous rubber quantities of certain vegetable gums generally identified as polysaccharids, which in solution are caused to gel by the addition of an alkaline salt of boric acid, such as borax, and which are compatible with and do not tend to coagulate latex. The vegetable gum is preferably used in quantities of less than 5% based on the dry weight of the rubber.

Accordingly this invention contemplates saturating a fabric with a very dilute borax solution in the last rinse bowl after the scouring operation above mentioned. If the process is applied to pile fabrics as little as $\frac{1}{16}$ of 1% borax is sometimes sufficient in the last rinse after scouring to eliminate rubber "striking through" into the face of the fabric. This can be determined microscopically or by the removal of the pile from the face of the fabric by chemical means and subsequent visual examination of the top side of the backing for the presence of rubber. The use of borax concentrations greater than 2% is unnecessary and from the standpoint of subsequent dyeing operations is to be avoided. If porosity of the fabric is desired the concentration should be kept as low as possible within practical limits. If the pile fabric is to be dyed by a continuous operation, as set forth in United States Patent No. 2,071,922, the concentration of the borax solution should not exceed ¼ of 1%, as a greater amount will necessitate a re-scouring of the cloth after coating and before dyeing. Other methods of

dyeing, such as kettle dyeing, will not be adversely effected by less than 2% borax concentrations in the rinse bath.

Particular latex thickeners which I have found will react with the borax treated fabric to form a gel include the seed powder obtained from legumes of the tamarind tree, koniaku gum and locust kernel gum. Borax is mentioned only as an example of tetra-borate ion which is responsible for the gelling action above described. Any other soluble tetra-borate such as ammonium or potassium borate may be used. Boric acid, on the other hand, is ineffective to produce the desired result.

As above suggested, the procedure can be extended to other types of fabrics than upholstery, and is especially desirable in treating very loosely woven pile fabrics or pile fabrics which have irregularities resulting from the weaving operation or the like. These irregularities may be in the nature of defects or a result of design produced by the omission of pile yarns in selected portions of the fabric. The procedure further contemplates to be within its scope the treatment of flat fabrics as opposed to pile fabrics for the purpose of water-proofing.

In such cases as when the coating is applied to a marketable or marketed product, such as oriental rugs and other floor covering, the lack of penetration permits the formation of a desirable anti-slip surface without the use of excessive amounts of rubber. The amount of rubber deposited may be as low as one ounce per square yard, and in the case of use as an anchoring medium for the pile of V-pile upholstery it will not ordinarily exceed five ounces per square yard.

Immersion of the fabric in the borate solution is not essential, and if but one side of the fabric is to be treated for the purpose of providing an anti-slip surface it is preferred to apply the solution to that side only.

Having described my invention in connection with a preferred embodiment, I claim:

1. A base impregnated on at least one side by a gum thickened aqueous dispersion of rubber which has been gelled in situ by an alkaline salt of boric acid.

2. A fabric impregnated on at least one side by a composition containing an aqueous dispersion of rubber and a vegetable gum which has been gelled in situ with a tetra-borate ion.

3. A pile fabric having on its reverse side a thin application of an aqueous rubber composition including a gum gellified in situ by a tetra-borate.

4. A V-pile fabric, the pile V's of which are secured in the fabric by an aqueous rubber composition including a gum gellified in situ by a tetra-borate.

5. In a method of applying an aqueous rubber to a base, the steps which consist in subjecting the base to a solution containing a tetra-borate, then applying an aqueous rubber composition containing a vegetable gum gelliflable by the borate, drying and vulcanizing the resulting product.

6. In a method of applying thickened aqueous rubber composition to a pile fabric, the steps which consist in subjecting the fabric to a dilute solution of borax before the application of the rubber composition, said solution being less than ¼ of 1% concentration, and then applying an aqueous rubber composition containing a vegetable gum gelliflable by the borax to the back of the pile fabric.

7. In a method of applying a thickened aqueous rubber composition to a pile fabric, the steps which consist in subjecting the fabric to a dilute solution of borax before the application of the rubber compositon, said solution being less than 2% concentration, and then applying an aqueous rubber composition containing a vegetable gum gelliflable by the borax to the back of the pile fabric.

8. In a method of limiting penetration of aqueous rubber compositions in fabrics, the steps which consist in applying a tetra-borate solution to at least one side of the fabric and then applying a rubber composition containing a polysaccharid gellifiable by the tetra-borate solution.

GLEN S. HIERS.