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PROCESS FOR THE TREATMENT OF
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1 Claim. (Cl. 8—120)

This invention relates to the manufactures of textiles which are rendered water-repellent without their other properties being unfavorably affected thereby. One object of the invention is the manufacture of water-repellent textiles which do not lose their soft feel. Another object of the invention is the manufacture of water-proof textile goods which do not lose their permeability to air. A further object of the invention is the manufacture of water-proof woollen materials which retain their heat-insulating property. A further object of the invention is the manufacture of water repellent textiles which do not lose their water-repellent property either through extraction with organic solvents or on treatment with warm soap suds. A still further object of the invention is the manufacture of water repellent textiles which have the same properties in dyeing as the non-treated textiles of the same kind. Further objects of the invention are mentioned in the following.

I have found that textiles of the most various kinds such as cotton, linen, hemp, jute, artificial silk, wool, silk, etc., can be made to repel water without changing their other physical and textile-technical properties by treating them in a special careful manner with derivatives of higher fatty acids. By higher fatty acids are understood here: acids with at least 12 carbon atoms such as lauric acid, myristic acid, palmitic acid, margaric acid, stearic acid, oleic acid, ricinoleic acid, etc. As to the derivatives, the corresponding halides, such as lauryl chloride, etc., and acid anhydrides such as lauryl anhydride, etc., are illustrative.

The process may be carried out equally well with raw textiles as with those previously submitted to a process of improvement such as for instance bucking, bleaching, dyeing, mercerizing and the like. It could also be applied in the yarn or to raw or finished woven fabrics, knitted fabrics, hosiery and the like.

One method of carrying the process into practical effect consists in dipping the material to be treated into a solution which contains $\frac{1}{2}$ –1% stearyl anhydride in benzine, benzol, alcohol, tetrachloride of carbon and the like, in thereupon expressing, drying and exposing the material for several hours to a temperature above 35° C. It is preferable to use for the purpose temperatures between 70 and 100° C. the material being exposed to the said temperature for about 6 hours.

The concentration of the anhydride may be made higher, but this does not result in any great advantage. In such a case, for instance,

when using a concentration of 5%, the material must be subsequently washed out.

The process may be carried out also by replacing the stearyl anhydride by stearyl chloride. In such a case, however, it is preferable to add such a quantity of a weak organic base such as dimethyl-aniline, diethyl-anilin and the like, so that the hydrochloric acid produced is bound.

The process may be carried out also by heating the textiles to be treated in the solutions described, for instance for 6 hours to the boiling point, and by thereupon drying the materials. In such a case a subsequent treatment at a higher temperature is not necessary.

The process may also be carried out by impregnating the textiles with a molten mass of the above mentioned acid anhydrides and by exposing them in that state for a number of hours, say for 6 hours, to an increased temperature for instance of 70° C. In such a case the excess of anhydride must be washed out.

Instead of impregnating the textile material with a molten mass of acid anhydride, it may be impregnated also with a molten mixture of acid anhydride and of a non-volatile substance such as paraffin, and treated in the same way as just described.

In the treatment of artificial silk composed of ethers or esters of cellulose, it is necessary to avoid such liquids wherein the fibers are dissolving or swelling. Otherwise the material is destroyed or altered in an unfavorable manner. In such cases benzine is the best solvent for the esterifying agents.

The process may be carried out also with the assistance of an emulsion of fatty acid anhydride. For instance, stearyl anhydride is energetically stirred in a solution of about 0.2% ammonia preferably under addition of 1% of dissolved starch, gum or the like so that a milky liquid is produced. The textile material is impregnated with the said liquid, dried and exposed then to a temperature of about 80° C. for 6 hours.

The materials treated in the manner described possess pronounced water repellent property. They can be used for the manufacture of water-proof fabrics for any purposes, which are permeable to the air as no materials choking or clogging up the pores are used in their manufacture. In the case of finer fabrics, more particularly of artificial silk, there is a great advantage that the water drops falling on them, run off directly without leaving any stains.

The "effect" produced in the manner described does not alter in any way the textile-technical

properties of the material, which remains exactly as soft and porous as the raw material, does not lose any strength and chiefly does not lose its property of being dyed by or taking up the dyes with which the fibre could be dyed before the treatment. Thus, for instance, cotton or artificial silk which comprises regenerated cellulose, can be dyed by means of direct dyestuffs in exactly the same way as the non-treated fibre.

10 The effect obtained is not destroyed by the treatment with organic fat-dissolving liquids such as benzine, benzol, tetrachloride of carbon. The material can also be washed in the ordinary way, for although it is not wetted by cold water, it takes up directly warm water, more particularly when it contains soap. After rinsing and drying after the washing, it regains its water-repelling property. Nor does repeated washing destroy the effect.

20 The most important point is to treat the textiles in a very mild manner with the fatty acid derivatives, for instance not to impregnate them with alkali before the treatment with stearyl chloride. If this is done, the whole surface of the textile fibre will be esterified in the well known manner, and therefore simultaneously

with the appearance of the water-repelling force, there will take place a change in the textile-technical properties, more particularly in the ability to take up dyes. The materials in which owing to the intensive simultaneous action of alkali and acid chloride, there takes place an esterification of the whole surface, change their textile-technical properties, more particularly their ability to be dyed by, or to take up the dyes which dye the natural fibre. For instance, cotton or artificial silk fabrics which have been treated in that way, cannot be technically dyed with direct dyes.

I claim:

A process for making cotton water repellent without destroying its porosity, softness and dyeing properties, which comprises taking a solution containing an esterifying agent selected from the group consisting of an acyl halide and an anhydride of a higher fatty acid, impregnating cotton therewith in the absence of alkalies, drying the cotton and thereafter heating the impregnated cotton at a temperature within the range of from about 35° C. to 100° C. for several hours.

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