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METHOD OF MAKING PUCKERED FABRICS

Frederick Charles Wedler, Media, Pa., assignor to
American Viscose Corporation, Wilmington,
Del., a corporation of Delaware

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This invention relates to improved methods of making puckered fabrics of the type disclosed and claimed in William G. Luttge's application Serial Number 405,617, filed August 6, 1941.

In accordance with the Luttge application referred to, yarns comprising stretched artificial filaments or fibers, such as those of polyvinyl chloride, the co-polymers of vinyl chloride and vinyl acetate, the chlorinated co-polymers of vinyl chloride and vinyl acetate, cellulose acetate, etc., are fabricated into textile products, such as woven, braided, or knitted fabrics, and pre-selected areas of the fabric are subjected to a heated instrument at a temperature above the shrinkage or softening temperatures of the stretched filaments or fibers in the fabric. During the application of heat, or at least before the heated fabric has cooled sufficiently to result in a setting of the fabric structure, the unheated areas are permitted to move freely, whereby the shrinkage effects which occur at the heated areas result in a puckering or ruffling of the adjacent unheated areas.

In accordance with the present invention, pre-selected areas of the fabric, composed of yarns of the stretched artificial filaments or fibers mentioned above are treated in such a manner as to impart to them a different susceptibility to the subsequently applied heat treatment than the susceptibility of the remainder of the fabric not so pretreated. This preliminary treatment to alter the susceptibility of the selected areas of the fabric may involve either increasing the susceptibility of the treated areas so that subsequent heat treatment for a shorter time or at a lower temperature will affect the pretreated areas without affecting the remainder of the fabric, or the pre-treatment may involve decreasing the susceptibility of the treated areas so that the application of the subsequent heat treatment results in a shrinkage of the areas not pretreated and the puckering of the areas pre-treated. Essentially, the procedure involves the application of the pre-treatment steps in localized fashion and the application of the subsequent heat treatment to the entire fabric without localization. If desired, however, both the pre-treatment and the subsequent heat treatment may be applied locally, in which case the areas subjected to pre-treatment may or may not be of the same size as the areas subjected to the heat treatment subsequently. In other words, the heat treated areas may correspond exactly or may be larger or smaller than the pre-treated areas and furthermore, the heat treated areas may coincide, over-

lap, or be entirely surrounded by the pre-treated areas.

According to one form of this invention, a plasticizing material may be applied to the areas or lines desired to be shrunk and between which the puckered areas are to be made. The plasticizer may be applied to the local areas by hand painting, by textile printing methods, by spraying, by brushing through a stencil, or otherwise. The substances applicable as plasticizers depend upon the particular composition of the yarns in the fabric. For example, such compounds as dimethoxy ethyl phthalate, dimethylene glycol monomethyl ether and methylene glycol dipropionate are suitable plasticizers for chlorinated or unchlorinated copolymers of vinyl chloride and vinyl acetate. For cellulose acetate, suitable plasticizing substances are dimethyl phthalate, dibutyl phthalate, diethyl tartrate, dibutyl tartrate, and triacetin. Liquid plasticizers may be applied without dilution while either liquid or solid plasticizers may be applied in solution, preferably in a solvent which is also a solvent for the material of which the yarns are composed. After the fabric has absorbed sufficient plasticizer at the areas treated, it may then be subjected to the heat treatment at a temperature below the shrinkage temperature of the unplasticized regions but sufficiently above the shrinkage temperature of the pre-treated areas to effect rapid shrinkage thereof. Since this heat treatment may be an overall treatment, the entire fabric may be placed within an atmosphere having the desired temperature. The atmosphere may consist of heated air or any other heated gas or liquid inert chemically to the fabric material. Alternatively, the fabric may be submerged or immersed in a heated liquid, such as hot water or other non-solvent liquid.

A second embodiment of the invention involves the application in the desired pattern of a wetting agent. This may be applied in the form of a solution which after application is dried upon the fabric, or it may be applied in the form of a powder in which case the powdered material is worked thoroughly into the fibers or filaments of the yarns at the desired areas of the fabric. Suitable wetting agents are the sulfonated alkyl naphthalenes, fatty alcohol sulfates, and the sulfonated dicarboxylic acid esters, such as dioctyl sulfo-succinate. The pre-treated fabric thus obtained may be immersed in hot water. The time of treatment in hot water is controlled so that the pre-treated areas are impregnated more

rapidly than and are shrunk differentially with respect to the untreated areas.

In another form of the invention, preselected areas of the fabric are protected by the application of a resist material, such as a gum, wax, lacquer or resin coating. In effect, this resist coating acts as an heat insulator, thereby preventing the activation or shrinkage of the protected areas prior to the shrinkage of the unprotected areas. It is not essential that the resist material be entirely water-insoluble. It is sufficient for effective operation to apply a water-soluble material provided it is applied in a sufficiently thick layer or coating as to prevent complete removal or complete heat transfer by the subsequent heat-treating fluid, which may be air or water, before the shrinkage of the unprotected areas can occur.

Any means or instrumentality may be employed to effect the subsequent heat-treatment to cause shrinkage and puckering. For example, a tool having a blunt heated point may be drawn over the fabric by hand or an engraved heated roller may be employed. The use of a heated roller, however, lacks the advantages of the fluid heated bath in that in the bath, the fabric being treated may be freely and limply suspended whereas the heated engraved roller necessitates the employment of special care to see that the heated areas are not cooled while maintained in a taut condition by the roller.

While preferred embodiments of the invention have been disclosed, the description is intended to be illustrative only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a method of finishing a fabric containing yarns comprising stretched thermoplastic fibers tending to shrink at elevated temperatures, the steps of pre-treating a group of selected areas of said fabric to increase the heat-susceptibility of said areas with respect to that of the remaining group of areas and then applying heat to said fabric sufficient in amount and intensity to effect shrinkage in said pre-treated areas.

2. In a method of finishing a fabric containing yarns comprising stretched thermoplastic filaments or fibers tending to shrink at elevated temperatures, the steps of pre-treating a group of selected areas of said fabric with a plasticizer and then applying heat to said fabric sufficient in amount and intensity to effect shrinkage in said pre-treated areas but insufficient in amount and intensity to affect substantially the remaining group of areas.

3. In a method of finishing a fabric containing yarns comprising stretched thermoplastic filaments or fibers tending to shrink at elevated temperatures, the steps of pre-treating a group

of selected areas of said fabric with a plasticizer and then subjecting the fabric to a heated fluid medium to apply heat thereto sufficient in amount and intensity to effect shrinkage in said pre-treated areas but insufficient in amount and intensity to affect substantially the remaining group of areas.

4. In a method of finishing a fabric containing yarns comprising stretched filaments or fibers of a vinyl copolymer, the steps of pre-treating a group of selected areas of said fabric with a plasticizer and then applying heat to said fabric sufficient in amount and intensity to effect shrinkage in said pre-treated areas but insufficient in amount and intensity to affect substantially the remaining group of areas.

5. In a method of finishing a fabric containing yarns comprising stretched filaments or fibers of a vinyl co-polymer, the steps of pretreating a group of selected areas of said fabric with a plasticizer and then treating said fabric in a heated fluid medium while permitting free movement of the fabric therein thereby to apply heat to said fabric sufficient in amount and intensity to effect shrinkage in said pre-treated areas but insufficient in amount and intensity to affect substantially the remaining group of areas.

6. In a method of finishing a fabric containing yarns comprising stretched thermoplastic filaments or fibers tending to shrink at elevated temperatures, the steps of pre-treating a group of selected areas of said fabric with a wetting agent and then applying heat to said fabric sufficient in amount and intensity to effect shrinkage in said pre-treated areas.

7. In a method of finishing a fabric containing yarns comprising stretched thermoplastic filaments or fibers tending to shrink at elevated temperatures, the steps of pre-treating a group of selected areas of said fabric with a wetting agent and then subjecting the fabric to a heated fluid medium to apply heat thereto sufficient in amount and intensity to effect shrinkage of said pre-treated areas.

8. In a method of finishing a fabric containing yarns comprising stretched filaments or fibers of a vinyl co-polymer, the steps of pre-treating a group of selected areas of said fabric with a wetting agent and then applying heat to said fabric sufficient in amount and intensity to effect shrinkage in said pre-treated areas.

9. In a method of finishing a fabric containing yarns comprising stretched filaments or fibers of a vinyl co-polymer, the steps of pre-treating a group of selected areas of said fabric with a wetting agent and then subjecting said fabric to a heated fluid medium while permitting free movement of the fabric therein to apply heat thereto sufficient in amount and intensity to effect shrinkage in said pre-treated areas.

FREDERICK CHARLES WEIDLER.