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FABRIC TREATMENT

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This invention relates to the removal of creases from fabrics and relates more particularly to the removal of creases from fabrics which are composed of or contain yarns which are thermoplastic in nature.

An object of this invention is the rapid and economic removal of creases from fabrics.

Another object of this invention is the removal of creases from fabrics which contain yarns made of thermoplastic materials and more particularly yarns of organic derivatives of cellulose.

Still another object of this invention is the removal of said creases without affecting the strength, elasticity and other physical characteristics of the fabrics or the individual yarns composing the fabrics.

Other objects of this invention will apepar hereinafter from the following detailed description.

In the preparation of organic derivative of cellulose fabrics, and other fabrics composed of or containing thermoplastic materials for commercial use after they are woven, the fabrics are given various treatments before they are in a commercially acceptable condition. Such treatments involve the washing, scouring, de-sizing, dyeing, printing, embossing, etc., of the fabric, and during the course of these various operations in which the fabric is alternately wetted and dried, it frequently happens that the fabric becomes creased to a greater or lesser extent depending on the amount of working it has been subjected to. When large quantities of fabrics are being processed the removal of creases from the materials becomes a serious problem. While the creases may be removed by ironing the cloth under the pressure of a heated surface or surfaces, such a process requires much individual handling.

We have now discovered that creases may be easily and permanently removed from fabrics made of or containing yarns of organic derivatives of cellulose or other thermoplastic materials if the creased fabrics are stretched and then subjected to the action of heat while they are in the stretched condition. Not only are the creases in the fabric therey completely removed, but the action of the applied heat has the added effect of tautening and strengthening the fabric. These desirable and beneficial effects are achieved without applying a heated surface directly to the fabric as is the case when fabrics are ironed in the ordinary manner with a hot metal surface or with heated, cloth-covered rolls.

In accordance with our invention, we apply heat to the fabric by passing it in close proximity to a source of heat or in some cases, by passing the heat source near the surface of a stationary fabric. In this manner our beneficial results are obtained by the radiation and convection of the heat to the fabric and not, as in the ordinary case in which fabrics are ironed, by pressure and the direct conduction of the necessary heat.

The temperature of the heating zone to which the stretched or tautened fabric is subjected may vary from about 250° F. to about 900° F. but we preferably expose the fabric to a source of heat in such a manner that the temperature at the fabric heating zone itself is about 450° F. When the stretched fabric is thus exposed to a temperature of about 450° F. the time during which it is so exposed is generally about 5 seconds. When the fabric is exposed to higher or lower temperatures the necessary time of exposure will of course vary and will be from about $\frac{1}{10}$ to about 15 seconds. Shorter periods of exposure will give desirable results where the temperatures are above 450° F., while longer periods of exposure are necessary when the temperature is below 450° F.

To obtain the desired temperature at the fabric heating zone, the source of heat is generally operated at temperatures varying from about 800° F. to about 1500° F., but we preferably maintain the heat source at temperatures of from about 1000° F. to about 1200° F. Where the heat source is maintained at from about 1000° F. to about 1200° F. the temperature in the heating zone about one inch from the heat source will be about 450° F. When the heat source is maintained at the same temperature, a heating zone about two inches from the heat source is at a temperature of about 250° F. It is obvious therefore, that if the distance of the fabric from the heat source is held constant, the length of time during which it must be exposed will be in direct relation to the temperature. When the distance from the heat source is varied, the time and temperature relation will also vary, since the further the fabric is away from the heat source employed, the lower will be the temperature of the fabric.

In some cases where the fabric is heavy and closely woven and is deeply creased, it is necessary to operate at the higher temperatures and expose the fabric for longer periods of time. On the other hand where the fabric is light or where it is not deeply creased the time of exposure will

be shorter and the temperature to which it is exposed will be lower.

Various sources of heat are suitable. Electric radiant heaters, electric light globes, gas heated metal surfaces superheated steam in coils heated to the desired temperature, or heated mercury vapor in coils are all excellent heat sources whose temperatures may be closely controlled. Besides steam and mercury vapor, other liquids such as diphenyl ether, etc., commonly used as heat transfer mediums may also be utilized. The choice of a heat source is an arbitrary one and is only determined by factors such as cost and convenience, the primary object being a heat source subject to accurate control.

The fabrics to which our process of crease removal may be applied are those fabrics which are composed of or contain yarns of organic derivatives of cellulose or other thermoplastic materials. Among the organic derivative of cellulose fabrics from which creases may be removed are fabrics composed of yarns of organic esters and organic ethers of cellulose. Such organic esters as cellulose acetate, cellulose propionate, cellulose butyrate and mixed esters as cellulose acetate-proprionate are suitable as well as such organic ethers of cellulose as ethyl cellulose, methyl cellulose and benzyl cellulose. Fabrics composed of other thermoplastic materials such as those composed of yarns of synthetic linear polyamide condensation products (nylon) or synthetic resins such as vinyl acetate-vinyl chloride copolymers may also be treated in accordance with our process. Creases may also be removed from fabrics which are in part composed of thermoplastic yarns and in part mixed with other textile materials such as silk, wool, cotton and the regenerated cellulose types of artificial fibers.

The material may be stretched or tautened in any suitable manner. In treating large quantities of fabric it is desirable to stretch the fabric on a tenter frame but where only small areas are to be treated those areas alone may be tautened between a pair of flexible concentric circular fabric frames in a manner similar to that in which fabric is held upon which a design is to be embroidered.

To further illustrate our invention but without being limited thereto the following examples are given:

Example I

A creased taffeta fabric woven from cellulose acetate yarns is stretched tightly over a frame and held so as not to allow any slippage from the edge of the piece. The fabric is then passed at a distance of about one inch from a heater which is heated by electricity to a temperature of from 1000° F. to 1200° F. so that the temperature at the face of the fabric is about 450° F. The cloth is exposed to this temperature for not more than about 5 seconds. When removed from the frame it is noted that the creases are completely removed from the fabric and there is no tendency for the creases to return to the fabric.

Example II

A light ninon fabric containing creases which is woven from cellulose acetate yarns is stretched over a tenter frame and held in position. It is then passed at a distance of 1 inch from an electric radiant heater held at a temperature of about 1200° F. The temperature at the face of the fabric about 1 inch from the heater is about 450° F. The cloth is exposed to this temperature for not more than 2 seconds. When removed from the tenter frame the fabric is flat and free from creases.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. Process for the removal of creases from fabrics containing yarns of a thermoplastic material without the application thereto of pressure with a heated surface, which comprises subjecting the tautened fabric to a temperature of from 250–900° F. for a period of from 0.1–15 seconds, the maximum moisture content of the fabric before the heat treatment being its normal moisture regain.

2. Process for the removal of creases from fabrics containing yarns of a thermoplastic organic derivative of cellulose without the application thereto of pressure with a heated surface, which comprises subjecting the tautened fabric to a temperature of from 250–900° F. for a period of from 0.1–15 seconds, the maximum moisture content of the fabric before the heat treatment being its normal moisture regain.

3. Process for the removal of creases from fabrics containing yarns of cellulose acetate without the application thereto of pressure with a heated surface, which comprises subjecting the tautened fabric to a temperature of from 250–900° F. for a period of from 0.1–15 seconds, the maximum moisture content of the fabric before the heat treatment being its normal moisture regain.

4. Process for the removal of creases from fabrics containing yarns of cellulose acetate without the application thereto of pressure with a heated surface, which comprises subjecting the tautened fabric to a temperature of about 450° F. for a period of about 5 seconds, the maximum moisture content of the fabric before the heat treatment being its normal moisture regain.

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