TREATING CELLULOSIC GARMENTS WITH 3-TRIMETHYLOL TRIAZINE TRIOLE, BUFFERED MAGNESIUM CHLORIDE, AND METHYLOL STEARAMIDE

Fig 3.

Fig 1.

1. WET PROCESS

2. PREPARE FINISH

3. IMPREGNATE AND DRY

4. FORM GARMENT

5. PREPARE CURING MOLD

6. CURE RESIN IN MOLD

INVENTOR
WILLIAM E. ALDRICH

BY
Norman M. Hallen
ATTORNEY
TREATING CELLULOSIC GARMENTS WITH A 3-METHYL-1, 2-TRIOL, TRIAZINE TRICHLOROMETHYL STEARIC ACID, AND BUFFERED MAGNESIUM CHLORIDE AND METHYLOL STEARAMIDE
ABSTRACT OF THE DISCLOSURE

A process for producing wrinkle resistant garments and fabrics. The garment or fabric is impregnated with a resin finishing bath comprising s-trimethyl triazine triol, buffered magnesium chloride, and methylol stearamide. The present invention relates to the manufacture of wrinkle-resistant garments and more particularly to a method for treating a garment formed of cotton-containing fabric for obtaining improved wet and dry wrinkle recovery. A variety of processes have been developed and used for improving the wrinkle resistance or recovery of fabrics. These processes are known in general as pad, dry, and cure resin treatments where one or more resins are applied to the fabrics and the curing of the resin is performed as a final step in the manufacture of the garment. Certain of these processes have provided substantial improvements in the wet wrinkle recovery of the treated garments; however, a satisfactory process has not been found for certain types of garments which require both a good wet wrinkle and a good dry wrinkle recovery. These garments such as undergarments, preferably require a good dry wrinkle recovery when they are washed and tumble-dried, or alternatively, a good wet wrinkle recovery when they are washed and line dried.

The present pad, dry, and cure resin treatments have been found to provide excellent dry wrinkle recovery where the garments are dried with a tumble or a similar drying procedure after laundering. The wet wrinkle recovery when these garments are washed and line dried has shown only a slight improvement with the use of these known processes.

Other known processes specifically directed to improve the line drying properties of these garments have been based upon reactions of the garment fabrics with certain chemical cross linkers while the fabrics are in a wet or swollen state. However, these processes of improving the wet wrinkle recovery are relatively complicated and expensive as compared to the above mentioned pad, dry, and cure resin treatments.

There are other known processes for improving the appearance and reducing the wrinkling of garments which are effective with both tumble and line drying. However, these processes require a double treatment including processing the fabric through both an aqueous cellulose reactant procedure as well as a pad, dry, cure resin treatment. This use of a double process to obtain both the dry and wet wrinkle recovery is obviously very complicated and correspondingly more expensive than the use of either technique alone.

The formula and process of the present invention provides for a single process and results in improved dry and wet wrinkle recovery. Not only does this new process provide for both improved dry and wet wrinkle recovery but it also is based upon the use of a single resin whereas the prior resin treatments for wet wrinkle recovery alone have usually employed two or more resins in the treating process.

Accordingly, an object of the present invention is to provide a simplified and effective process for improving the wrinkle recovery of garments including both wet and dry wrinkle recovery providing garments which alternately may be dried using either a tumbler type or a line drying process.

Another object of the present invention is to provide such a process particularly adapted for the treatment of contoured garments including shaped sections or panels as for example garments such as brassieres.

Another object of the present invention is to provide a simplified process for manufacturing garments with improved wet and dry wrinkle recovery and employing a single resin.

Another object of the present invention is to provide a process for manufacturing wrinkle-resistant garments which may be washed in water containing chloride without discoloration.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiments about to be described, or will be indicated in the appended claims and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a flow diagram illustrating the steps of a preferred embodiment of the process in accordance with the present invention;

FIG. 2 is an exploded perspective view of a contoured garment and the various parts of the apparatus used in the curing step;

FIGS. 3 and 4 are vertical sectional views illustrating the apparatus and method for forming a contoured garment in accordance with the process of the present invention; and

FIG. 5 is a sectional view taken along the line 5—5 in FIG. 4.

A preferred embodiment of the process will now be described. The general process will first be described including the treatment of the fabric preparatory to the manufacturing steps in which the garment is cut and assembled from the treated cloth. The process will be further described in connection with an example of the manufacture of a contoured garment such as a brassiere as illustrated in FIGS. 2—5 and including the final curing steps. The process as described below may be used with cotton fabric or with a mixture of cotton and polyesters such as the well-known blends of 50% cotton and 50% polyester or 35% cotton and 65% polyester or other mixtures of these blends.

In general, the six steps of the process are shown in FIG. 1. The first step (Step 1) is to wet process the fabric which is to be used in making up the garment in the conventional and known manner; that is, singe, desize, mercerize, scour, heat-set, bleach, wash and dry it.

The second step (Step 2) of the process comprises the preparation of an aqueous resin finishing formula with which the fabric is impregnated.

The fabric is then impregnated and dried (Step 3). After drying it is cut and sewn in the normal way with all the accessories attached so that the garment is substantially in its finished form (Step 4). Thereafter the completed garment is placed in a pre-heated mold (Step...
and subjected to an elevated temperature to cure the impregnated resin and with an accompanying cross linking of the cellulosic component (Step 6). In the preparation of the resin finishing solution in Step 2 there is first prepared an emulsion of N-methylol stearamide by admixing this compound with polyethylene glycol diester, a commonly used waxy material, a poly hydroxy solvent, a dispersing agent and water. This emulsion is admixed with a polyethylene softener, a resin (s-1,3,5-trimethylol triazine-2,4,6-tri) and magnesium chloride as a catalyst. The preferred resin has the following structure:

![Resin Structure]

The preferred resin finishing formula is as follows:

- 8% of a 25% aqueous emulsion methylol stearamide
- 2% of a 25% emulsion polyethylene softener
- 20% of a 50% aqueous solution of s-1,3,5-trimethylol triazine-2,4,6 triol
- 4% of buffered 30% magnesium chloride hexahydrate
- 66% water

It is seen that the preferred resin lacks the primary amino characteristics of certain melamines and therefore does not discolor in the presence of chlorine which is present in most home laundering water.

The finish is prepared by adding the ingredients to water in the order indicated as follows:

- Approximately 20% of the total volume of water is added to an appropriate size mixing tank. The volume of water is added at approximately 120° F. and the methylol stearamide emulsion slowly added with constant high speed agitation. The agitation may be provided by a conventional Eppebach propeller stirring device. After the methylol stearamide has been completely dispersed in this small volume of warm water, additional cold water is added to bring the total water volume to about 75% of that required in the formula. The polyethylene emulsion is then added with constant stirring during addition and then the triazine resin solution is added with continuing stirring. After these materials have been thoroughly mixed into the emulsion, the water volume is brought to the total required with the addition of cold water. The magnesium chloride solution is then added and stirring continued for approximately two minutes. Following this, 0.02% to 0.03% of a 25% solution of sodium diocetyl-sulfosuccinate is added and agitation continued for another two to three minutes. This emulsion is used in the fabric padding described below.

The methylol stearamide used in the above formula contains the following:

- 20% methylol stearamide
- 2.6% polyethylene glycol distearate
- 1.6% sodium alkyl benzene sulfonate
- 1.25% 2-methyl-2,4-pentanediol
- 74.55% water

It is prepared as follows:

The methylol stearamide, polyethylene glycol distearate and 2-methyl-2,4-pentanediol, are mixed together and heated to 230° F. to melt the waxes. When these materials have completely melted, 10% of the total water volume at 200° F. to 205° F. is slowly added with agitation. The sodium alkyl benzene sulfonate is slowly added with continued agitation. Following this, additional water at 205° F. is slowly added until 50% of the total volume of required water is reached. This is stirred for approximately five minutes and the remaining 50% water very slowly added as cold water with continued agitation throughout this water addition. Stirring is continued for approximately ten minutes after the total volume of water has been added.

The details of the preferred finishing Step 3 as are follows:

The dry fabric is padded in open width through the finishing bath and is then passed through single nip squeeze rollers so as to give sufficient wet pick-up to retain, in the fabric, a wet add-on of 30 to 90% of a dry resin solids add-on of 5 to 9%. The fabric is dried in a conventional tenterframe dryer to the point that it contains 8% to 10% moisture but not less than 8% moisture retention in the fabric. The finished fabric is now cut and sewn into the garment by conventional techniques completing Step 4.

A preferred embodiment of the finished product including the manufacturing steps, Step 5 and 6, of a typical garment will now be described in detail. For purposes of illustration the preferred embodiment shall be described in connection with the manufacture of a brassiere or bra.

The bra is cut and sewn exactly as is any normal bra of a given design. As shown in FIG. 2 the completely fabricated bra 10, including straps 12 and closures 13, is placed in a curing mold which is shaped to accept the entire garment. The male mold 14 is covered by two top layers of heat and fume resistant material preferably felt-like temperature nylon (15 and 16). The felt layers 15 and 16 act as a pad or cushion when the molds are pressed against the bra 10.

The fabricated garment 16 is placed over the nylon felt layer 15 in such a manner that it conforms precisely to the curvature of the male mold 14. The female mold 17 is then moved down to apply a pressure of 8 to 10 p.s.i. uniformly against the fabric between the male and female molds as shown in FIG. 4. The fabric is held in this position for about one minute and forty-five seconds with the female mold 17 at about 350° F. and the male mold 14 at about 300° F. The mold is then opened and the fabric 10 removed from the male mold 14.

The molds 14 and 17 are pre-heated to their respective temperatures as indicated so that when the female mold 17 is lowered in place, the fabric 10 attains the 350° F. temperature almost instantaneously and is held at this temperature for the indicated curing period. Grooves 11 are preferably provided in the male mold 14 to accommodate the various garment seams thereby insuring even heating and pressing of the garment between the molds as shown in FIG. 5 without wrinkles in any area including the area of the seams.

While the above described process uses the terms mold or molding, it is clear that the precise process involved is a yieldable pressing of a flexible material in its final three-dimensional shape and rendered wrinkle resistant during subsequent laundering and tumble or line drying. The preferred form of the curing apparatus or mold described above including the felt pads is seen to provide a yieldable or pressing or gripping force during the curing period but it does not result in a rigid or molded article in the customary sense such as where molds are used to confine liquids, plastics, or metals during a molding operation.

It will be seen that an improved process has been provided for the manufacture of wrinkle resistant garments. In particular a process has been provided which differs from prior processes in its ability to improve both the dry wrinkle and wet wrinkle resistance of the same garment thereby permitting the garment to be alternately dried using either tumble or line drying. The process is also relatively simple and is additionally desirable through its use in the preferred formulation of a single curing resin.
In addition the preferred resin provides both the wet and dry wrinkle recovery and also has been found to provide a cloth which is not discolored even when washed in water having a relatively high chlorine content.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A process for forming a contoured garment from a cellulose fabric comprising the steps of wetting the fabric with an aqueous solution of a cellulose reactant heat curable resin comprising \( s-1,3,5 \)-trimethyl triazine-2,4,6-triol, buffered magnesium chloride hexahydrate, and methyl stearamide, reducing the moisture content of the fabric to between about 8% and about 10% by weight, yieldably pressing the formed garment into its final shape and simultaneously curing the resin contained thereon at a temperature between about 300° F. and about 350° F. by using mold means which touch and conform to the shape of the contoured garment.

2. A process as claimed in claim 1 in which the garment is pressed with a force of from about 8 to about 10 p.s.i.

3. The process of claim 1 in which the finishing formulation further comprises about 2% of a 25% emulsion of a polyethylene softener.