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PRODUCTION OF FUSED COLLARS

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1 Claim. (Cl. 8—111)

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This invention relates to the production of fused collars and more particularly to bleaching the cotton-cellulose acetate interlining used in such collars and which is fused to the lining and facing of the collar by first softening the cellulose acetate of the interlining with a solvent and subsequently applying heat and pressure, the cellulose acetate being thermoplastic.

The purpose of the fused collars to which the present invention relates is to provide a wilt proof and slightly stiffened but highly flexible collar which can be repeatedly washed without destroying the wilt proof properties of the collar. To this end an interlining is interposed between the lining and facing of the collar and fused to both, the fusing material in the interlining being cellulose acetate to provide the above properties in the finished collar. It is important that the interlining be permanently bonded to the facing and lining of the collar and any preliminary treatment of the interlining must be such as not to impair the solubility and thermoplasticity of the cellulose acetate. Further, it is important that the interlining be uniformly bonded to all contacting parts of both the facing and lining of the collar to prevent separation of areas of either the lining or facing from the interlining with a resultant blistered appearance of the collar.

The interlining of such fused collars is in the form of a fabric consisting of cotton and cellulose acetate fibers interwoven in a pattern with the cellulose acetate fibers at regular intervals in the fabric. The cellulose acetate yarn is produced as a white yarn and does not usually require bleaching for use in the interlining. However, the cotton yarn is grey and usually motey. If the interlining is not bleached, the grey color of the cotton in the interlining shows through the facing of the collar, usually very white cotton broadcloth, resulting in a greyed collar contrasting with the fabric of the body of the shirt. Further, the motes in the cotton of the interlining also show through the facing of the collar as dark spots and in addition prevent the formation of a smooth, uniformly and strongly bonded laminated fabric structure.

To provide a satisfactory interlining for fused collars it is necessary to provide such interlining with a whiteness at least equivalent to that of the facing and lining of the collar as well as to remove completely the motes from the interlining. Achieving both the desired degree of whiteness of the interlining and complete mote removal presents a most difficult and unusual problem be-

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cause of the presence of the cellulose acetate in the fabric of which the interlining is composed.

Even conventional mote removal from cotton fabric alone is a difficult process. In this connection alkaline pH's are advantageous for the bleaching of cotton and also for the removal of motes therefrom. Such conditions of high pH, while admittedly being capable of providing an excellent white accompanied by complete mote removal could not be employed to whiten and remove motes from cotton-cellulose acetate collar interlining because the cellulose acetate fibers are alkali sensitive and would be deleteriously modified so as to impair their fusible and thermoplastic properties. Without possessing a high degree of fusibility and thermoplasticity a cotton-cellulose acetate fabric, regardless of its having an excellent whiteness and being devoid of motes, would be useless as a collar interlining for fused non-wilt collars.

In order to avoid the deleterious modification of the cellulose acetate in collar interlinings and at the same time employ bleaching practices known to give optimum white and mote removal, in conventional processes recourse is made to bleaching at lower alkaline pHs where bleaching activity and mote removal are less effective. This results in a compromise process in which effective mote removal, a high degree of whiteness and shortness of time of bleaching are sacrificed so as to avoid modification of the cellulose acetate fibers. For example, in one known process of bleaching cotton cellulose acetate interlining, processing time extends over a few days because of the need for prolonged souring, scouring, washing, and bleaching steps. In this process the bleaching step proper required overnight treatment. Even so, undesirable modification of the cellulose acetate occasionally occurs as well as partial degradation of the cotton itself.

Accordingly, it is the principal object of the present invention to shorten the time required to produce fusible collars and also to improve the quality thereof by providing a cotton-cellulose acetate collar interlining of excellent whiteness and characterized by complete removal of motes and a uniformly high degree of solubility and thermoplasticity of the cellulose acetate fibers thereby providing a durable and neat fused collar in which such interlining is permanently and uniformly bonded to the facing and lining of the collar.

Another object is to provide, in the production of such fused collars, a method for bleaching the cotton in the interlining to a high degree of

whiteness accompanied by complete mote removal and without deleterious effect upon the solubility or thermoplasticity of the cellulose acetate fibers in the interlining.

Another object is to provide a simple method which is low in cost and avoids multiple handling of the goods.

Other objects and advantages will appear from the following description:

Cellulose material, such as coton, is chemically distinctly different from cellulose acetate. Thus cotton is insoluble in acetone whereas cellulose acetate is readily soluble therein. Also cotton cannot be fused by the application of heat whereas cellulose acetate is thermoplastic at comparatively low temperatures. Moreover cotton cannot be dyed with acetate dyes and cellulose acetate cannot be dyed with cotton dyes. Further, cotton is not affected by alkali whereas cellulose acetate is extremely alkali sensitive, the cellulose acetate being saponified by alkali to form a new product which is insoluble in acetone, is of reduced thermoplasticity and can be tinted by cotton dyes.

We have found that the cotton fibers of fused collar interlinings can be brightened to a high degree of whiteness and the motes completely removed therefrom without cotton degradation and without saponification or other deleterious effect upon the solubility or thermoplasticity of the cellulose acetate fibers of the interlining, by the use of peracetic acid under certain narrow operating conditions.

In particular, the pH of the peracetic acid solution must be adjusted to fall within the range of pH 5–7. It is also essential that the amount of peracetic acid in relation to the interlining material being processed be between 0.5% and 3% peracetic acid (100% basis) based on the weight of the interlining material. To effect a rapid bleaching of the cotton fibers in the interlining and the removal of motes therefrom without saponifying the cellulose acetate fibers, processing is carried out at elevated temperatures within the range of 150–200° F. Under these conditions, substantial bleaching is achieved within 1 hour although it is common to continue the bleaching operation for a total time of 2–3 hours.

It is desirable to stabilize the peracetic acid solution and for this purpose it is preferred to employ a polyphosphate such as sodium hexametaphosphate, sodium tetraphosphate and trisodium polyphosphate. It is recommended to employ a liquor ratio, that is, the ratio of the weight of the peracetic acid solution to the dry weight of the interlining material being processed, of from 10:1 to 20:1. A slack loop type washer of conventional design is a suitable piece of equipment to carry out the process.

The exact conditions used for whitening the cotton fibers of the collar interlining and removing the motes therefrom without deleterious effect upon the cellulose acetate fibers are dependent to some degree upon the original whiteness of the cotton fibers and the degree of motiness in the cotton fibers. Further, the practice of the invention can also be varied depending upon the equipment used. In general it has been found advantageous to first scour the interlining material and neutral detergents must be used in such scouring inasmuch as the cellulose acetate fibers are alkali sensitive. Other suitable preliminary treatment of the cloth such as desizing, souring, etc. may be used. The amount of peracetic acid used, concentration, and liquor ratio can be varied and in general are determined by the condition of the grey goods.

The following is an example of the practice of the present invention: 1800 yards of a grey motey cotton-cellulose acetate collar interlining material weighing 3.3 yards to the pound were processed. The goods were initially scoured with a neutral synthetic detergent for 2 hours in a slack loop type of washer. The bath was then dropped, and the goods rinsed. Without removal of the goods, the following bleach bath was prepared in the washer. Water was run into the 1000 gallon mark and to this were added in the order given 2 lbs. of sodium hexametaphosphate, 27 lbs. of a 40% peracetic acid solution, and 27.5 lbs. of caustic soda, 28.8% (63° Tw.). With the machine in operation, the temperature of the bath was increased to 180° F. over a 20-minute period and thence slowly increased to 200° F. and maintained at this temperature for the remainder of the process. Bleaching was carried out for 2 hours, the bath dropped, and the goods water washed and dried in accordance with standard mill practice.

The interlining material so treated had an excellent hand with complete mote removal and with the cotton fibers bleached to an excellent white entirely suited for use in the construction of fused non-wilt collars. Further, there was a complete absence of saponification of the cellulose acetate fibers, the cellulose acetate having retained its original thermo-plasticity and solubility in acetone.

The interlining material so treated was then cut to the proper shape for use as collar interlining and the cut interlinings treated with acetone to soften the cellulose acetate fibers. The cut interlinings were then placed between cotton broadcloth facings and linings and formed into collars. Heat and pressure were then applied to the collars by a steam press to fuse the cellulose acetate and to bond the linings and facings thereof to the interlining throughout the entire contacting areas thereof.

The collars so formed had an excellent appearance, the whiteness of the collars being the same as that of the cotton broadcloth used as the collar facings and for the shirts and being entirely free from any spottiness. The bond between the interlinings and the facings and linings of the collars was found to be strong and uniform. The collars had the desired degree of flexibility to provide a non-wilt collar and retained this quality after repeated washings. While the invention has been described specifically in connection with a non-wilt fused collar, it will be appreciated that the invention is applicable to the fabrication of any type of laminated fabric article having a cotton-cellulose acetate interlining which is bleached, softened and fused to the contacting fabric laminae in a manner similar to that described hereinabove in connection with the production of a fused non-wilt collar.

In aqueous solution peracetic acid and its salts, particularly its alkali forming salts, are full equivalents of each other. In any given solution the relative amounts of peracetic acid and salt thereof depend generally upon the pH of the solution. In view of this, the term "peracetic acid" has been used in this specification and in the appended claims generally to include not only peracetic acid itself, but its salts, particularly its alkali forming salts.

It will be apparent that changes and modifications can be made which will nevertheless fall

within the scope of this invention. Accordingly, it is intended that the invention is not restricted to the various details, conditions, amounts and procedures given as typical and illustrative of preferred procedure except as necessitated by the prior art and appended claim.

We claim:

In the method of treating a fabric interlining consisting of interwoven grey cotton fibers and soluble and thermoplastic cellulose acetate fibers, before fusing the interlining to fabric laminae; the improvement which comprises subjecting the interlining to an aqueous solution containing from 0.5 to 3% peracetic acid based on the weight of the interlining and containing a stabilizing amount of a polyphosphate and having a pH of from 5 to 7 and a temperature in the range of from about 150° to 200° F. for a period of time not exceeding three hours, thereby to whiten said cotton fibers and remove any motes therefrom and to retain the strength of the cotton fibers and also to retain the original solubility and thermoplasticity of the cellulose acetate fibers.

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