

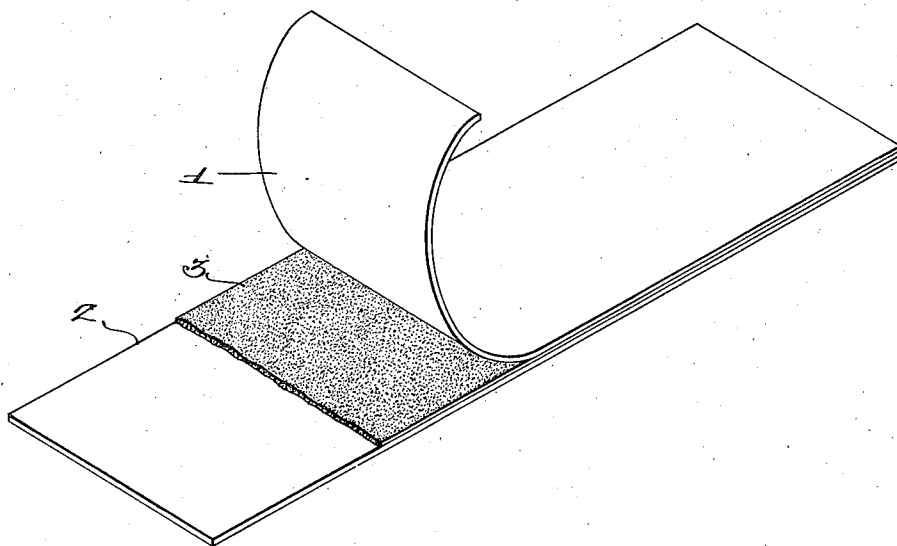
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MULTI-PLY FABRIC ARTICLE

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MULTI-PLY FABRIC ARTICLE

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6 Claims. (Cl. 154-46)

This invention relates to a new and improved process of treating fabric materials, particularly lining material as used in the manufacture of articles of apparel, and to a new and improved article of apparel obtainable thereby. The present application is a division of my application, Serial No. 7,889, filed February 23, 1935, which, on July 23, 1935, matured into Patent 2,009,139.

An object of the invention is, therefore, to provide an improved method of manufacturing lining material particularly adaptable for use in articles of apparel which are subject to repeated laundering.

Another object of the invention is to provide an improved method of manufacturing articles of apparel, such as collars, cuffs, bosoms and the like and to thus produce a novel product having several features of advantage hereinafter set forth.

As this invention is directed particularly to the treatment of lining cloth for articles of apparel and to the manufacture of the finished articles, it will be described with particular reference to this special application, although it is to be understood that it likewise pertains to other articles which are subject to repeated laundering. Moreover, as the problems presented in the manufacture of collars presents all of the major problems of manufacture of article of apparel, particularly referred to in this invention, I shall use collars as an example to disclose the invention and the advantages thereof.

It is general practice in the manufacture of collars to assemble multiple plies of fabric which have previously been cut in desired shape and size. A collar so assembled can be divided into its two major parts, namely, the neck-band and the fold-over top. In general practice, both of these major parts are constructed from three plies of fabric; a face ply, an interlining, and a back ply, the neck-band and fold-over top being made up separately and subsequently stitched together. While there are other processes of manufacturing collars, this method is the one most universally practiced, and the present invention is intended to conform particularly with equipment used to manufacture collars of such general construction, although, as will be noted later, the invention contemplates the possibility of eliminating one of the component plies, if desired.

As stated in my above-mentioned patent, it is desirable to embody certain features in a multi-ply fabric such as above mentioned. Some of these features may be enumerated as follows:

1. Elimination of any noticeable tendency to shrink or stretch during normal use throughout the life of the article.

2. A lining cloth so treated that it will readily become cemented to a cover cloth or cloths by the

application of heat and pressure as generally used in the manufacture of collars without the use of a solvent.

3. Permanent firmness, or stiffness if desired, which obviates the necessity of using starch or the like during repeated laundering.

4. A laminated article which during the initial laundering becomes readily permeated by water to permit satisfactory laundering under normal washing conditions.

5. A laminated article the plies of which will not become separated at the temperature of boiling water.

6. A laminated article which will not wilt from dampness or perspiration.

In my aforesaid patent, there is disclosed and claimed a method of treating multi-ply fabric comprising two principal steps, viz., the application to the fabric of a material such as starch or preferably a water-insoluble material to prevent shrinking and stretching of the fabric, and the subsequent application of a resinous coating. While it is usually preferable to employ the method including both of these steps or operations, as pointed out in my aforesaid patent, it is found that the use of the second operation, involving the employment of a resinous coating is distinctly advantageous in and of itself and, therefore, this operation may be employed alone and without previous treatment of the fabric. The present invention is directed specifically to the use of the resinous coating.

The drawing illustrates in perspective a multi-ply fabric of the invention, where 1 is the upper fabric, 2 the lower fabric, and 3 the coating of thermoplastic resinous material of the properties described.

In the specific application of the invention to the lining ply of a multi-ply fabric, the thermoplastic resinous material is applied to one or both sides of the lining material whichever may be desired. The resinous material applicable for use is one which does not soften sufficiently at the boiling point of water to lose its adherent qualities but which softens at the temperature of the iron, for example, at temperatures between 250° F. and 300° F. so that during each pressing operation after laundering the material re-assumes a stiffness comparable to that originally provided. These properties are possessed by various resinous compositions; for example, certain resins of the following group have these properties and may be employed: polyvinyl resins, polystyrol resins, polyhydric alcohol-polybasic acid resins, urea-formaldehyde resins, thiourea-formaldehyde resins, aromatic sulphamides-formaldehyde resins, and the like with or without plasticizers. The polyvinyl resins are by virtue of their being water-white basically suitable for the

purpose. These resins may be described as follows:

"Vinylite A" (polymer of vinyl-acetate) has a melting range approximating 150° F. It is not discolored by the application of heat, but by itself it is detrimentally affected by acid or alkali as is frequently used in laundering to the extent of destroying its adhesive qualification.

"Vinylite H" (copolymer of vinylchloride and vinyl acetate) has a melting range substantially above 250° F. and is not affected by the acids or alkali as used in laundering, but is discolored by the action of heat at a temperature used in the manufacture or pressing in laundering.

"Vinyl-benzine" (or polymerized phenylethylene which belongs to the same family as Vinylite only phenyl is substituted for chloride or acetate) has a melting range above 300° F. It is not detrimentally affected by the acid or alkali used in laundering and is not discolored by the application of heat.

As it is desired to effect a permanent bond between the lining cloth and the cover cloth or cloths at a temperature approximately 250° F., or above, which will not separate at the temperature of boiling water, 212° F., it is preferred to blend certain of these resinous materials; first, to obtain the melting range desired; second, to eliminate the tendency of discoloration by laundering including the action of the heat to which the fabric may be exposed; and third, to eliminate the detrimental effect of acid and alkali as used in laundering. By blending the resinous materials in proper proportions, this can be accomplished, for example:

Approximately 69% "Vinylite H"

Approximately 29½% "Vinylite A"

Approximately 1½% calcium stearate (to serve as a stabilizer if desired but not necessary).

The above proportions can be varied within a limited range and still retain the qualities desired. It will be seen that decreasing the percentage of "Vinylite H" and increasing the percentage of "Vinylite A" will serve to reduce the melting range. However, increasing the percentage of "Vinylite H" to 75% approximately, or over, will cause discoloration from heat, although the bond is not affected. As a further example, a blend approximately as follows:

49% "Vinylite A"

50% "Vinyl-benzine"

1% calcium stearate (to serve as a stabilizer if desired, but not necessary)

will likewise obtain the result desired. In this case, the proportion of "Vinyl-benzine" can be increased to 65% and the proportion of "Vinylite A" can be reduced to 35% and still a satisfactory bond is obtained. If, however, the "Vinyl-benzine" is increased substantially above 65%, a satisfactory bond is not obtained. If the percentage of "Vinylite A" were increased substantially above 50%, the melting range would be reduced below that of boiling water, which would permit the separation of the plies of the fabric during the laundering operation.

In order to put the above resinous compounds into paste form which is practical for handling, the resins are dissolved and thoroughly mixed in approximately an equivalent weight of acetone. If it is desired to reduce the volatility of the solvent, it may be useful to replace part of the acetone with toluol. The fabric is coated at least on one side with the resinous material in

such manner as to obtain a continuous film, the use of a standard type backing machine giving satisfactory results.

It will be obvious that the resinous coating applied as above described will serve to stiffen or make more firm the lining fabric so treated. It is, therefore, practicable to control the degree of stiffness or firmness imparted to the fabric by increasing or decreasing the treatment first described. It is found, however, that in order to obtain a most satisfactory result in the finished article, it is necessary to keep the amount of resinous material subsequently applied within very close ranges, which will be discussed hereinafter.

It will now be seen that if the treated lining fabric is placed between cover cloths or adjacent a cover cloth, dampened if desired, and exposed to heat and pressure, the solvent, or solvents, is removed and the rigidity of the finished article is increased. The temperature used in the manufacture of collars and in the pressing after laundering in general practice is in the neighborhood of 300° F. The temperature that can be used is naturally limited to that temperature at which the fabric pressed would tend to scorch. In view of the fact that any temperature that could be safely used on cotton fabrics is not sufficiently high to destroy the thermoplasticity of the resins used, the resinous coating remains in this condition which is most desirable when the lining is to be used in a soft or semi-soft collar. Furthermore, it will be obvious that if through some unusual action the lining cloth should become separated in spots from the cover cloth, the resinous material still being in a thermoplastic condition can and will be activated to again create a bond between it and the cover cloth when again exposed to heat and pressure. If a collar is desired which is more stiff than that obtained by the mere pressing step set forth above, the assembled lining cloth and cover cloth or cloths may be moistened with a solvent for the resin, for example, acetone, and thereafter pressed as described.

Treated as herein proposed, the lining is coated with a continuous film, but the amount of resinous material controlled within narrow limits to prevent the resinous material, when in its plastic state as a result of applying heat and pressure, from flowing through the cover cloth or cloths to the degree of penetrating the cover cloth or cloths to the surface thereof, although there is a partial transference of the resin from the interliner to the inner surface of the cover cloth or cloths. The amount of resinous material which can be applied safely to the lining fabric depends somewhat on the weight of the lining fabric used, but for the specific purpose in view, it is found that approximately 1½ ounces per square yard of lining fabric will give the results desired without flowing through to the surface of the cover cloth or cloths. The article so produced in its initial state is not permeated by water due to the continuous nature of the resinous film. However, during the first laundering of the article, the mechanical action of the laundering which is generally carried out at a temperature approximately 160° F. to 180° F., which is below the melting range of the resinous material used, causes the resinous coating to crack between the mesh of the fabric which permits the water thereafter to permeate readily. It is well to bear in mind at this point that a proper balance of resinous materials must be obtained

in order to assure that the resinous coating will not, at the temperature usually used in laundering, normally 160° F. to 180° F., become soft and too pliable to permit of its becoming cracked from the mechanical action of laundering.

As will have been seen, the resinous materials used have been chosen and used in such proportion as to give a melting or softening range which is substantially above that of boiling water (212° F.). Consequently, the bond between the lining ply and the cover cloth or cloths of the article is maintained during laundering. Since the treatment has not been applied to the cover cloth or cloths, normally having 1% to 6% residual shrink, there remains in the cover cloth a natural tendency to shrink. However, in view of the lamination between the plies being kept intact and the lining ply being the more rigid of the plies as a result of the above described treatment, the lining ply resists the shrink of the cover ply or plies and imparts to the article itself the quality of non-shrinking. Moreover, a certain portion of the resinous coating of the lining ply is transferred to the cover cloth or cloths during the application of heat and pressure, and this also tends to resist the tendency of the cover cloth or cloths to shrink.

In view of the fact that the resinous materials used have a softening range well above 100° F., no softening action takes place at the temperature of perspiration, and further the resins used are particularly balanced to resist the action of acid or alkali. Accordingly, the firmness of the article is retained during normal usage and no tendency to wilt is apparent.

Hereinabove, the use of a cover cloth or cloths has been mentioned, and it has been stated that the general practice involves the use of an inner ply between two cover cloths. A satisfactory article can be obtained, however, using only a front surface cover cloth with the inner ply. In this case, it is desirable to employ a fine weave inner ply with a resinous coating applied only on the surface of the inner ply to be placed in contact with the cover cloth.

A multi-ply fabric which is to be subjected to repeated laundering when treated as above described exhibits to a substantial degree the desirable features hereinbefore enumerated. It will be understood, of course, that the invention is not limited to the details herein set forth for the purpose of disclosure, but is capable of considerable modification.

I claim:

1. A multi-ply fabric for use in articles subjected to repeated laundering, of which at least one of its plies has associated therewith, causing adherence of said plies, a thermoplastic material comprising a blend of at least two of the resins of the group consisting of a polymer of vinyl ester of the lower aliphatic acids, a copolymer of a vinyl chloride and a vinyl ester of the lower aliphatic acids and vinyl benzene, each of which resins of itself lacks at least one of the properties of softening at pressing temperatures, retaining adhesion at and below the boiling point of water and remaining substantially unaffected in color when subjected to repeated laundering, but which resins, when at least two are blended in proper proportions, acquire all of the above-mentioned properties.

2. A multi-ply fabric for use in articles subjected to repeated laundering, of which at least

one of its plies has associated therewith, causing adherence of said plies, a thermoplastic material comprising a blend of a polymer of vinyl acetate, and a copolymer of vinyl chloride and vinyl acetate, each of which resins of itself lacks at least one of the properties of softening at pressing temperatures, retaining adhesion at and below the boiling point of water and remaining substantially unaffected in color when subjected to repeated laundering, but which resins when blended in proper proportions, acquire all of the above-mentioned properties.

3. A multi-ply fabric for use in articles subjected to repeated laundering, of which at least one of its plies has associated therewith, causing adherence of said plies, a thermoplastic material comprising a blend of approximately thirty percent of a polymer of vinyl acetate, and approximately seventy percent of a copolymer of vinyl chloride and vinyl acetate, each of which resins of itself lacks at least one of the properties of softening at pressing temperatures, retaining adhesion at and below the boiling point of water and remaining substantially unaffected in color when subjected to repeated laundering, but which resins when blended in approximately the above-specified proportions, acquire all of the above-mentioned properties.

4. A multi-ply fabric for use in articles subjected to repeated laundering, of which at least one of its plies has associated therewith, causing adherence of said plies, a thermoplastic material comprising a blend of a polymer of vinyl acetate and vinyl benzene, each of which resins of itself lacks at least one of the properties of softening at pressing temperatures, retaining adhesion at and below the boiling point of water and remaining substantially unaffected in color when subjected to repeated laundering, but which resins, when blended in proper proportions, acquire all of the above-mentioned properties.

5. A multi-ply fabric for use in articles subjected to repeated laundering, of which at least one of its plies has associated therewith, causing adherence of said plies, a thermoplastic material comprising a blend of approximately fifty percent of a polymer of vinyl acetate and approximately fifty percent of vinyl benzene, each of which resins of itself lacks at least one of the properties of softening at pressing temperatures, retaining adhesion at and below the boiling point of water and remaining substantially unaffected in color when subjected to repeated laundering, but which resins, when blended in approximately the above-specified proportions, acquire all of the above-mentioned properties.

6. A multi-ply fabric for use in articles subjected to repeated laundering of which at least one of its plies has associated therewith, causing adherence of said plies, a thermoplastic material comprising a blend of from approximately thirty-five percent to fifty percent of a polymer of vinyl acetate and from approximately fifty percent to sixty-five percent of vinyl benzene, each of which resins of itself lacks at least one of the properties of softening at pressing temperatures, retaining adhesion at and below the boiling point of water and remaining substantially unaffected in color when subjected to repeated laundering, but which resins, when blended in approximately the above-specified proportions, acquire all of the above-mentioned properties.

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