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J. BEBIE ET AL
FABRIC STRUCTURE AND TREATMENT
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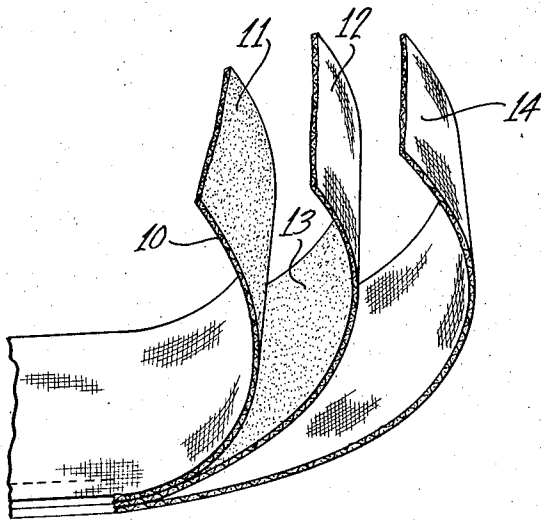
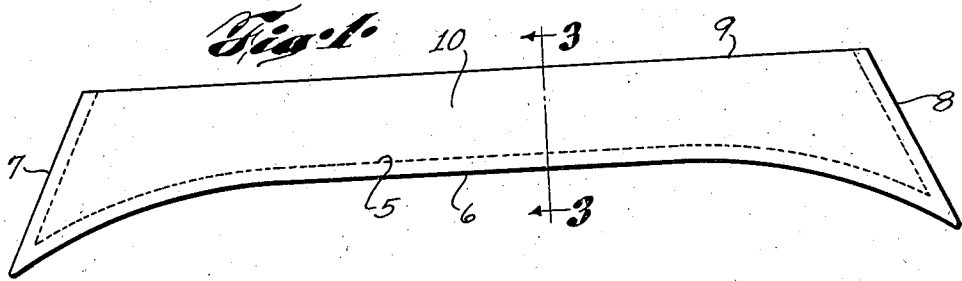


Fig. 2

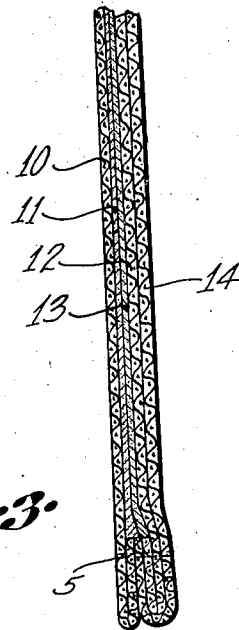


Fig. 3.

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FABRIC STRUCTURE AND TREATMENT

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3 Claims. (Cl. 91—68)

This invention relates to improvements in fabric structures and treatment, and more particularly to improved products and processes involving the use of cementitious or bonding substances in combination with fibrous materials such as leather, cloth, and textiles generally.

In various arts and industries there exists a necessity or desirability for treating fibrous materials to attain stiffening or strengthening effects which process may be advantageously accompanied by a desired resistance to water or certain chemicals. In many instances textile fabrics may be advantageously treated to attain a stiffening effect considerably short of an objectionable brittleness, this result being desirably so attained that repeated flexing of the treated textile fabric will not seriously impair the characteristics of the material. In the case of fabrics which, by their nature, are repeatedly subjected to cleaning operations, such as washing and ironing, it is necessary that the stiffening material remain, over a long period of time, substantially unaffected by water or boiling temperatures, and likewise be unaffected by temperatures of the order incident to the ironing of laundered goods. In the latter case, the treating material employed is preferably of such nature as not to be forced by ironing pressure or otherwise, through the treated cloth, and so that the original color and appearance of the textile is retained throughout its useful life. In addition to meeting a demand for adhesive and/or stiffening compounds fulfilling the requirements noted, in combination with washable textile fabrics and wearing apparel generally, the present invention objectively contemplates an application of its principles, technique and materials, to industrial and mechanical uses generally.

The object of the present invention may be generally stated as the provision of cementitious or adhesive thermoplastic materials, as well as methods of compounding and applying such materials to fabrics, in keeping with the requirements heretofore noted.

A further object of the invention is attained in the provision of a cementing and bonding plastic, of such a nature as to be applicable to fabrics generally, and textile materials in particular, and of such nature that it may be employed, selectively, either as an impregnating material for more or less complete incorporation with the associated fabric, or, for other uses, may be employed in the form of a surficial film of fabric-cementing or bonding substance possessing, optionally, a controllable fabric-stiffening effect.

A further object of the invention is attained in an improved fabric cement or impregnant of such physical characteristics as to withstand repeated flexing; a material such as not to flow when subjected to moderately high temperatures, and which will not crack or peel from a fabric or textile with which it is employed as a coating.

Yet another object of the invention, stated more particularly with respect to the examples selected for present illustration, is attained in an improved fabric-bonding, stiffening and cementing material, which is water insoluble and of such a nature that its bond with a layer of fabric or textile is unimpaired by repeated exposure, either to water alone, or to alkaline solutions of substantial strength, such as are often employed in washing and laundering.

A still further object of the invention is attained in a waterproofing, bonding or cementing material possessing the characteristics of the foregoing objects, and yet which is light, or practically white in color, so that when employed in or on either white or colored textiles, its presence will not materially alter the normal appearance or color of the associated fabric. The fullest attainment of the present object further includes a material which will not alter its original light color, or other characteristics, under the influence of heat or the action of the more common chemicals.

An additional object is attained in a material and process for treating fibrous material generally, and textile materials in particular, whereby such materials may not only be protected against absorption of directly applied moisture, but may be treated, according to the methods and with the materials hereinafter described, in such a manner as to control the known affinity of certain of such materials for atmospheric moisture.

Stated with more particularity than in the foregoing objects, the present invention is attained in an improved waterproofing, cementing, bonding and stiffening material, preferably employing as a base, an aromatic cellulose ether, with or without the addition of plasticizers and pigments or filling materials, according to the use intended.

Further objects and advantages of the invention will appear from the following description, considered in connection with the accompanying drawing of an exemplary embodiment of the invention.

In the drawing, Fig. 1 is a plan view of a collar, to which the present invention is applied for retaining the shape of the collar and preventing wrinkling and distortion thereof throughout its

useful life; Fig. 2 is a fragmentary marginal elevation of the collar of Fig. 1, showing the several plies of the collar separated in order to reveal the preferred space relation of the plies of treated and untreated fabric comprising the collar, and Fig. 3 is a transverse section of the collar of Fig. 1, as viewed along line 3—3 thereof.

According to prevailing practice in the manufacture of collars of the so-called semisoft or soft types, the collar structure is produced by superposing a plurality of plies of the textile, these plies ordinarily consisting of an underpanel, being the innermost layer of fabric, an interliner which is disposed next in order on the underpanel, and an exposed ply or top. In either the hand-turned process, or in the production of the machine-turned collar, the several plies are disposed in registration, one upon another, and stitched by a marginal line of stitching 5. The stitching, until the time of attaching the collar to a shirt or neckband, usually extends only along the longitudinal margin 6, and the two end margins 7 and 8 of the collar, leaving open the opposite longitudinal margin 9. Thus, until the margin 9 is closed by a line of stitches, say in securing the collar to the neckband or shirt, the collar is in the nature of a multiple ply envelope and may be selectively turned inside out or right side out, in order to meet the various requirements of stitching and shaping the collar during the various processes of its production, according to prevailing methods of collar and shirt production.

The invention is herein described, by way of example only, with respect to the treatment of a collar; it will, however, be understood that not merely collars, but also practically many types of cuffs, center facings or pleats, neckbands and collar bands of either single or multiple ply type may be treated according to the method and with the materials presently to be detailed. Further, the materials and processes identified with the present invention are applicable for the waterproofing of fabrics generally, by way of example, to wearing apparel such as shirts and adjuncts thereof, to the roll collars of pajamas, the treatment of shoes and millinery, to mention only a few of the possible applications of the present materials in the treatment of textiles.

It is also within the intendment of the present invention to utilize the technique and materials in the treatment of industrial fabrics generally, and textiles in particular, the use of the treating materials not being restricted to the creation of a surficial adhesive, but being importantly susceptible of use as impregnating substances.

As far as the utility of the present invention is concerned, the adhesives and/or impregnating materials hereinafter referred to, may be applied to the fabric entirely by manual operation. It is preferred however to employ, for the coating of fabric or particularly textile materials, any suitable apparatus capable of mechanically delivering to the surface of the fabric to be coated, the adhesive or impregnating material. It is, of course, desirable that the discharge of such material onto the fabric, proceed at a substantially uniform rate, and while the coating material is kept at a uniform viscosity, thus conducting to a deposit of an even amount of the treating substance. By preference, a machine is employed for this purpose which, forming of itself no part of the present invention, need not be described in detail as we do not desire to be restricted to specific apparatus for this purpose. It is to be noted, however, in mechanically effecting an even rate and

depth of deposit of the treating material on the fabric, we prefer not to employ the usual calendaring equipment as tending, due to the pressures involved, to force the treating material through the cloth. Accordingly, there is more desirably employed, as for the treatment of textiles for collars, cuffs, shirting and the like, a spreading agency, between which and the cloth there is effected a relative movement to effect an even surface deposit of the viscous treating material on the fabric.

In the case of textiles with which a single layer of the treating material is to be utilized, such layer is most advantageously applied to the under or concealed surface of the fabric. In the case of a multiple ply fabric structure, such as characterizes the production of collars, cuffs, center pleats, shirt bosoms, etc., we prefer to apply a surficial coating of the treating material at least to the inner surface of the exposed ply, and to the outermost surface of the adjacent ply of the structure. This arrangement is illustrated by Figs. 2 and 3 showing a preferred application of the material to certain of the plies of a fold-over type of collar. The details of the structure of the collar illustrated by way of example are equally applicable to the construction of cuffs, center pleats, and any other multiple ply garments, garment items or garment adjuncts.

Referring now to the elements of structure more particularly illustrated by Figs. 2 and 3 of the present drawing, the top or exposed ply of the collar is indicated at 10, on the inner or unfinished side of which is disposed a layer of cementing and/or stiffening substance 11. The interliner, constituting an intermediate member of the finished collar, is shown at 12 and on the surface of the interliner nearest the ply 10, is a layer of material 13 which may be the same as that constituting the layer 11. The underpanel 14 and the adjacent surface of the layer 12 are shown as uncoated; the latter two surfaces may, however, if desired, be provided with the same coating material, or one similar to that employed in the layers 11 and 13 whereby to enhance the stiffening effect produced according to the present invention. Since the structure, say of a neckband or cuff of multiple ply type, may be essentially the same as the multiple ply collar construction illustrated, it is not regarded as necessary to illustrate or describe in detail the latter applications.

It will be understood that in the case of a collar for example, after the collar is stitched, as shown, it may be subjected to any of the usual pressing treatments, accompanied by the application of heat. It may be indicated that the ironing or pressing processes now prevailing require no modification for the finish operations of collars or other garment adjuncts formed according to the present invention. After the collar is completed, and turned right side out, and is subjected to heat and pressure as by ironing, the layers 11 and 13 are rendered plastic. Due to the thermoplastic nature of the material constituting these layers, they are adhesively united with each other and to the layers of cloth by which they are carried, so that, upon finishing the collar according to the usual steps, several or all of the plies thereof become, in effect, a structural unit characterized by a degree of flexibility such as to be entirely comfortable to the wearer, and yet possessed of sufficient stiffness as not to wrinkle or become deformed either under the influence of protracted wear, or when subjected to repeated laundering operations including washing and ironing.

In the case of treatment of fabrics or textiles for industrial and mechanical uses, for example such as friction materials employed for brake linings and the like, or in the production of packing materials of fibrous nature, it is desirable in some cases more or less completely to treat the fabric, and to attain a more or less thorough penetration thereof by the treating material. In such cases, application may be effected by applying the material in a liquid or semi-liquid state, effected by the use of a sufficient amount of solvent. A certain higher degree of pressure than heretofore mentioned, is desirable, and application of the impregnating or treating material may be effected with the aid of rollers, calendering equipment, or in any other suitable manner.

Proceeding now to a description of certain materials which, among others, have been found suitable for the treatment of fabrics to produce the results heretofore expressed, we have eliminated as being less desirable for application to wash fabrics, those substances which will either discolor a printed or white textile material; also those substances which, because of their chemical nature, will not withstand repeated action of hot water and/or laundry chemicals, and the heat incidental to ironing and pressing operations. The commercial success of a textile coating to fulfill the present objects, requires that it withstand without objectionably changing its physical characteristics, a substantial number of washings under usual laundry conditions, and at the same time shall retain a substantial degree of flexibility and cloth-stiffening effect. It is recognized that many adhesives are available, but that for use on launderable goods, very few fulfill any substantial number of the above requirements. Gum arabic, dextrin or glue are all extremely water-soluble. Most resin are too brittle, and usually possess such a depth of color as to be unsatisfactory in exhibiting adverse effects on the color of washable fabrics. Rubber is not satisfactory either as latex, or in so-called solution, due to its changes in the presence of heat, as in ironing. Acetyl cellulose is considerably affected by water, and is particularly susceptible to the action of alkalies employed as, or in connection with, laundry chemicals. After numerous experiments it has been found that certain of the aromatic cellulose ethers may be utilized without extensive compounding for the treatment of certain classes of fabrics, particularly those which are employed in situ without requiring to be extensively flexed in use. Dibenzyl cellulose may be indicated as an example of a material particularly suited for the impregnation of certain industrial fabrics. The treating material may be dissolved in a suitable solvent or mixture thereof in an amount to render it sufficiently fluid to be forced into the fabric. This mode of treatment, with or without modifications, may be employed for fabrics utilized in single thicknesses, or in multiple ply structures of such a nature and to be so utilized that a high degree of flexibility is not required. Certain of the cellulose ethers, including benzyl cellulose, while water insoluble, when utilized without compounding or plasticizing, exhibit a certain brittleness and a tendency to crack in case the textile is to be flexed frequently or through any substantial angle.

It has accordingly been found by experiment desirable to modify by admixed material the benzyl cellulose or equivalent, when the compound is to be employed as a coating, film or adhesive, carried on the surface of the associated fabric.

Among other compounds suitable for the coating or adhesive treatment say of collar fabrics, cuffs, etc., our preference is to utilize the following:

A base consisting of a cellulose ether, and by still further preference dibenzyl cellulose. This material may be obtained as a whitish, pulverulent, non-crystalline solid. This ingredient is employed as the base of the treating material, and results, when compounded in a manner to be described, in a thermoplastic compound;

A plasticizing agency, which when compounded with the base, obviates any objectionable degree of brittleness, and, through variation of the proportion of the plasticizer, enables a control of flexibility and hence the stiffening effect produced by the resulting coating. The plasticizer eliminates much of the tendency for the coating to crack, even when subjected to repeated flexing and repeated laundering. For this purpose we prefer to utilize a formaldehyde-toluene sulfonamid condensation product, the preferred proportion being four grams in a compound including ninety-six grams of dibenzyl cellulose;

A filler or pigment is preferably added, the choice of this material depending somewhat upon the required physical characteristics of the desired compound. For this purpose, our preference, particularly when the compound is to be employed with white or light colored textile fabrics, is a mixture consisting of the following, for compounding with the indicated amounts of the base and plasticizer: Titanium oxide 17.5 grams, zinc oxide 22.5 grams. It will be appreciated, of course, that these pigments or filler materials may be replaced by other water-insoluble pigments such as barium sulfate, lithopone, or mixtures thereof;

A solvent or mixture thereof which serves the purpose of imparting the necessary degree of initial fluidity to the base and other materials, to enable their homogeneous mixture and application upon and into bonding relation with the associated fabric, the utilization of a solvent being advisable for the purpose of evenly disposing the treating material in place on the fabric;

As a solvent for the dibenzyl cellulose base and a vehicle and/or solvent for the remaining ingredients, we have found to be admirably suitable, a mixture of toluene and ethyl alcohol in the proportion, say of 240 cc. of toluene and 40 cc. of ethyl alcohol;

A tinting material may be optionally employed, in case it is desired to alter or heighten the color of the compound, particularly when it is to be employed on white or light color goods. This should be water insoluble, and we have found that for use on white or light fabrics, a blue or purple dye such as D. P. anthraquinone iris R base, may be employed as a complementary color to enhance the apparent whiteness, and avoid any objectionable contrasts between treated and untreated fabric portions. The amount of the tinting substance is regulated according to the nature and amount of pigment employed, and the tinting effects of the pigment. Usually an amount of .015 gram will be sufficient when utilized in the noted proportions of the other ingredients.

It may here be noted that all of the ingredients of the described cloth treating compound are susceptible of being tinted, dyed or otherwise colored to attain or match any usual, desired shade, so that the mixture may be employed with any of the usual textiles without adverse or contrasting color effects. A colored compound may

be produced by dissolving a dye, which is preferably water insoluble, in the solvent employed in compounding the treating material.

As to the order of steps in preparing the ingredients above noted, it has been found convenient to mix the benzyl cellulose with the solvent, in which the solid softens, swells, and then goes into solution. To this solution is added the plasticizer, and then the pigment or filler materials. It is suggested that the tinting material, if utilized, be added to the solvent and employed in amounts requisite to effect the desired shading of the resulting mixture or compound.

In the application of the treating material or compound to a fabric, the solvents evaporate in a very short time after the material is spread in a thin layer upon the textile. The film then takes an initial set, and is firmly united to the cloth. Following this initial set, and upon evaporation of the greater part of the solvent, the coated fabric is subjected to pressure, accompanied by a moderate heat, say of the order of 100° C. to 130° C., under the influence of which the coating material softens slightly, retaining its adhesive qualities, and serving, as in the case of a collar, neckband, or cuff, to become plastic to a degree that as two adjacent films of the coating material are pressed together, the coated fabrics become united to constitute a unitary multiple ply fabric structure.

It may also be noted at this point that the treatment of single layer fabrics or fabric structures may be effected with the materials, or certain thereof, and the processes herein described. It is usually not necessary, in such cases, to apply heat and pressure, but merely to impregnate or coat the fabric with the compound in a liquid vehicle. Such processes are contemplated for example in the treatment of sail cloth, awning materials, canvas and other woven fabric generally.

The use of a thermoplastic substance having the characteristics described above as being admirably possessed by dibenzyl cellulose, is particularly desirable in a cementing or stiffening material for use with launderable goods. Experiments have indicated that if the dissolved base together with any other compounding ingredients be carefully and correctly applied to the fabric, practically no separation occurs between the fabric and coating material during the useful life, say of a garment. If, however, any such separation does occur, the fabric and adjacent film of plastic material, upon being subjected to ironing pressures and temperatures, will once again become evenly united. Wrinkling is thus minimized, as

well as any objectionable distortion in shape or conformity of garment adjuncts such as collars and cuffs, during the periods of wear.

It will be understood, of course, that considerable variations from the ingredients and proportions above set forth may be made without rendering the resulting compound unsatisfactory for its intended purpose. For example, all or part of the toluene and alcohol preferred as solvents, may be replaced by other solvents or mixtures thereof, for example ethyl lactate, xylene, and others. Also the formaldehyde sulfonamid condensation product may be replaced by an equivalent amount of other plasticizers, such as dibutyl phthalate or triphenyl phosphate. Still other condensation products such as glycerol-phthalic anhydrid condensation products may be employed. Obviously, the pigments for which a preference has been expressed, may be replaced by a number of other suitable, known or commercially available materials. Accordingly, the foregoing specific description of preferred ingredients and proportions is to be understood solely as illustrative of one example of a suitable fabric treating compound, and is not to be understood as limiting the invention except as required by the scope of the appended claims. It will also be understood that the mode or modes of application of the material to the fabric may be varied within wide limits according to various natures of the fabric and the coating and/or impregnating materials.

We claim:

1. As a composition of matter, a textile adhesive which is white in color and unaffected by repeated laundering operations such as by boiling in slightly alkaline aqueous soap solution and subsequent ironing, including dibenzyl cellulose, and a condensation product of formaldehyde and toluene sulfonamid in the approximate proportions of 96 parts of dibenzyl cellulose to 4 parts of the said condensation products.

2. A treated textile including a layer of cloth and a film carried by said cloth, said film including a base of a cellulose ether, a water-white plasticizer therefor comprising the condensation product of formaldehyde and toluene sulfonamid of amount approximating 4% by weight of the said base, and a white mineral filler.

3. A garment adjunct embodying a layer of white cloth and a layer of stiffening material thereon including a mixture of approximately 96 parts of dibenzyl cellulose, 4 parts of the condensation product of formaldehyde and toluene sulfonamid, and 40 parts of a white mineral filler.

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