

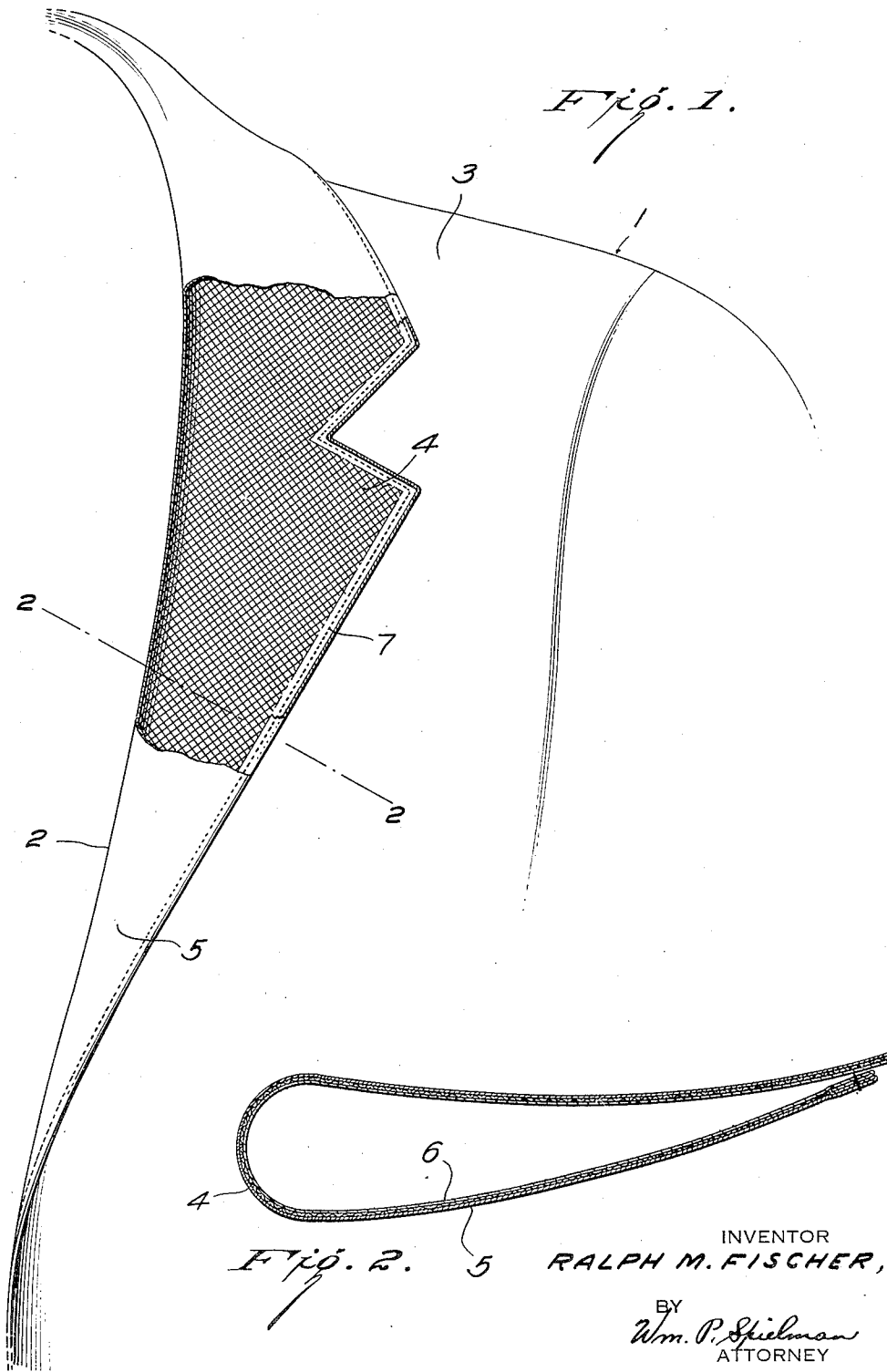
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TREATMENT OF INTERLINING MATERIALS

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TREATMENT OF INTERLINING MATERIALS

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1

This invention relates to a resin-treated interlining material for garments such as coats, soft collars and the like, and to garments containing the resin-treated interlining material. More particularly, the invention is directed to an interlining material and to garments containing the same wherein the interlining material is stiffened and made resistant to shrinkage by the application of a combination of resinous materials as will hereinafter be more fully described.

A wide variety of men's and women's garments such as men's and women's coats and collars, foundation garments, etc., contain an interlining material adapted to stiffen and aid in retaining the desired shape and form of the garment after continued wear. This interlining material usually is a heavy cloth made up of a cotton warp and filling threads of such materials as rayon, worsted, linen, goat's hair and the like. Usually the filling threads contain two or more of these materials; thus, for example, rayon and goat's hair are frequently used. It is a principal object of the present invention to provide an interlining material of this class which has both an improved springiness or resiliency, thus aiding in retaining the desired shape of the garments, and a greatly increased resistance to shrinkage when the garments are wetted with water or dry cleaned. A still further object is the provision of a garment containing the improved interlining material. Garments containing interlining material treated in accordance with the present invention retain their shape better after continued wear and have a decreased tendency to pucker after wetting or dry cleaning.

I have found that improved resiliency and a high degree of shrinkage control is obtained when interlining material of the above described class, which is also known in the trade as Hymo cloth, is impregnated with a resin-containing finish of a certain definite type which is then cured on the fabric by the application of heat. I have found that such a finish should contain at least 2 classes of ingredients; namely, (1) a curable, water-soluble methylated methylol melamine resin capable of penetrating into the interior of the textile threads and controlling the shrinkage characteristics thereof, and (2) a heat-curable, water-insoluble resin mixture capable of remaining on the surfaces of the threads and serving to improve the resiliency of the woven fabric.

The amounts of the two classes of resin may vary considerably with the type of interlining material and with the purposes for which it is used. In general, however, I have found that

2

about 2-15% of water-soluble methylated methylol melamine resin, based on the weight of the interlining cloth, with a maximum of about 20% represents the most important range for obtaining adequate shrinkage control. In interlining cloth of the type used in coats, for example, about 2-10% usually represents the optimum quantity. The heat-curable, water-insoluble resins which are used to improve resiliency may vary over a considerably wider range, inasmuch as the degree and type of stiffness and springiness in various interliners will depend largely on the use of the material. In general, however, adequate stiffness is obtained with a minimum of about 1-5% of this type of resin, based on the weight of the interlining material, and this quantity may be increased up to about 20-25% of the weight of the cloth. By the combination of these two classes of resins, prepared and applied as hereinafter described, I have succeeded in obtaining a resin finish for interlining material that will reduce the shrinkage after extensive washing or dry cleaning to less than 25% of that which takes place with the corresponding untreated fabrics and have also obtained a degree of resiliency or springiness in the fabric that is not obtainable with other types of finishes.

A garment typical of many in which my improved interlining material may be incorporated is a coat provided with stiffened lapel and shoulder portions, and such a coat is illustrated in the accompanying drawing. In the drawing Fig. 1 shows a portion of a coat in which a part of the outer cloth layer of the lapel is broken away to show the interliner beneath and Fig. 2 is a cross section on the line 2-2 of Fig. 1 showing how the improved resiliency of the interlining fabric aids in retaining the shape of the garment.

Referring to Fig. 1, the coat indicated generally by reference numeral 1 is provided with a lapel portion 2 and a shoulder portion 3 which contain a stiffening interliner indicated generally by reference numeral 4. This interliner usually consists of cotton warp threads and filling threads of rayon and goat's hair. The interliner is held in place between the outer and inner layers 5 and 6 as by a stitched seam 7 and its resiliency or springiness imparts a characteristic curve and shape to the coat, the particular style illustrated being known to the trade as a soft roll. The ability of the garment to retain its shape and appearance after wetting by rain or by perspiration, or after it has been dry cleaned, is an important factor in its effective life. Ordinarily an untreated interlining material, being consid-

3

erably heavier than its surrounding layers of cloth, will cause the cloth to pucker and will pull the garment out of shape if it shrinks considerably upon wetting. Moreover, the removal of a substantial part of a water-soluble size such as starch from the interlining by wetting may cause it to become soft and flabby, and much of its stiffening action is destroyed.

In accordance with the principles of the present invention the interliner 4 is composed of cloth impregnated with a curable, water-soluble methylated methylol melamine and also with a heat-curable, water-insoluble resin mixture of the type hereinafter described and is then heated to cure the resins and render all of them insoluble in water. The interlining material is then incorporated into the coat in the usual manner, and the resulting garment retains its original shape and appearance under the ordinary conditions of wear for a much longer period of time than when the same interlining material is used in untreated form.

The water-soluble methylated methylol melamine which I employ as a shrinkage controlling agent is prepared by reacting a substantially monomeric methylol melamine with methanol under slightly acid conditions with careful temperature control. The following procedure has been used with success in preparing this resin:

1 mol of melamine is mixed with 3.3 mols of aqueous 37% formaldehyde previously adjusted to a pH of approximately 8.0, the temperature being raised to 70° C. and maintained at this point until a clear solution is obtained. The solution is then immediately cooled and allowed to set and the mass is broken into small pieces and dried by circulating warm air at a temperature not exceeding 55° C.

The resulting dried powder is added to twice its weight of 95% methanol containing 0.5% of oxalic acid crystals, based on the weight of the methylol melamine. The mixture is heated to 70° C. and held at this temperature for approximately 15 minutes, or until a clear solution is obtained, whereupon it is immediately neutralized by the addition of sufficient sodium hydroxide solution to raise the pH to approximately 9.0. The neutralized reaction mixture is then evaporated to 80% solids under reduced pressure so that the temperature does not rise above 50° C.

It should be understood that the invention is not limited to the ratios of formaldehyde, melamine and methanol described in the foregoing example. On the contrary, from 2 to 6 mols of formaldehyde may be combined with each mol of melamine, and the resulting methylol melamine may be reacted with from 2 to 6 mols of methanol. The term "water-soluble methylated methylol melamine" therefore describes any water-soluble product prepared by reacting methanol with a substantially monomeric methylol melamine containing 2-6 mols of combined formaldehyde under conditions such that a water-soluble reaction product is formed.

The heat-curing, water-insoluble resin which I employ in admixture with the water-soluble methylated methylol melamine resin described above consists of a mixture of a phthalic anhydride-polyhydric alcohol resin with an organic solvent-soluble urea-formaldehyde resin or with an organic solvent-soluble melamine-formaldehyde resin, or with a mixture of the latter two resins. These resins are somewhat similar to the methylated methylol melamine resin described above, inasmuch as they are the reaction product

4

of a methylol urea or a methylol melamine with an alcohol, but the resins in their uncured condition, are insoluble in water and soluble in organic solvents such as alcohols, toluol, solvent naphtha and the like. Resins of this class are also known as lacquer-type resins, and are prepared by reacting an uncured dimethylol urea or an uncured melamine-formaldehyde condensation product containing 2-6 mols of combined formaldehyde for each mol of melamine with a higher alcohol such as propanol, butanol, or amyl, hexyl or octyl or higher alcohols at considerably higher temperatures or with larger amounts of acid catalyst than are used in preparing the water-soluble methylated methylol melamine. Typical methods of preparing these two types of resins are as follows:

Resin A

A mixture of 40 parts by weight of aqueous 37% formaldehyde, 12 parts urea and 0.1 part of 85% phosphoric acid is heated with agitation at 70° C. for approximately 2 hours, after which time 20 parts by weight of butanol are added and the heating continued at 85-90° C. for an additional ½ hour. An additional 10 parts of butanol is then added and the temperature of the batch is raised to the boiling point. A butanol-water mixture is distilled, with separation and return of the condensed butanol, until the batch is substantially dehydrated. A mixture of butanol and xylene is then added in sufficient quantities so that the final composition contains 50% resin by weight, 30% butanol and 20% xylene.

Resin B

A mixture of 400 parts by weight of 37% aqueous formaldehyde solution, 125 parts by weight of melamine and 550 parts of butanol is heated with agitation under a reflux condenser until the melamine is dissolved, after which a butanol-water mixture is distilled off at atmospheric pressure. The distillate is separated and the butanol is continuously returned to the reaction vessel and the distillation is continued until the resin solution is substantially dehydrated. Sufficient xylol is added and the mixture adjusted to 50% resin solids.

In the preferred compositions for the treatment of interlining material the phthalic anhydride-polyhydric alcohol resin is present in amounts of about 30-85% of the total water-insoluble lacquer-type resin, the remainder being the melamine-formaldehyde resin or the urea-formaldehyde resin or a mixture thereof. These latter resins, if used alone, would ordinarily cure to a hard, inflexible condition, but I have found that they are plasticized to an extent suitable to impart the requisite degree of springiness or resiliency to the interliner when they are first blended with a phthalic anhydride-polyhydric alcohol resin in the above amounts. Preferably a phthalic anhydride-polyhydric alcohol resin is used which is modified by the incorporation therein of a non-drying or semi-drying vegetable oil such as coconut oil, cottonseed oil, soya bean oil and the like, or the fatty acids thereof. Typical resins of this class which I have used with success are the following:

Resin C

(a) A mixture of 10 parts by weight of phthalic anhydride, 10.1 parts of glycerine and 10.6 parts of cottonseed fatty acids is heated with agitation at 380-395° F. until a resin having an acid num-

5

ber of 57-66 and a softening point of 63-66° C. is obtained.

(b) 18.4 parts by weight of phthalic anhydride, 10 parts of glycerine and 23.5 parts of castor oil is heated together with agitation at 425° F. until a resin having an acid number of 6.8 is obtained. The mixture is then cooled to 290° F. and 11.5 parts of butanol are added.

(c) Equal parts by weight of the two resins are blended together.

Resin D

148 parts by weight of phthalic anhydride, 102 parts of glycerine and 183 parts of soya bean fatty acids were reacted at 385-425° F. until a resin having an acid number of 6-12 was obtained. The batch was then cooled and 330 parts of a hydrocarbon solvent known as "Solvesso No. 2" was added.

The water-insoluble lacquer-type resins are preferably applied to the interlining cloth as the dispersed phase of an aqueous emulsion having the water-soluble methylated methylol melamine dissolved in its continuous aqueous phase. Preferably an emulsion of the water-insoluble resins is first prepared by adding an aqueous solution of glue, ammonium caseinate or other water-soluble emulsifying agent to the molten or dissolved resins with continuous agitation, after which the methylated methylol melamine is added and dissolved. Shortly before use the emulsion is diluted with water to the proper consistency for application and a curing accelerator is added, usually in an amount equal to about 3% of the methylated methylol melamine resin.

The following is a typical example of the preparation of an emulsion of the above class:

A blend of 13.5 parts by weight of Resin A with 55 parts of Resin C was prepared by mixing the two resins and warming at 40° C. with agitation until the mixture was homogeneous.

A dilute ammonium caseinate solution was prepared by dissolving 2.5 parts by weight of casein in 27.5 parts of water to which 1.7 parts of concentrated ammonium hydroxide had been added. The ammonium caseinate solution was allowed to stand for several hours after its preparation.

The blend of alkyd resin and butylated urea-formaldehyde resin was agitated vigorously at 30° C. and the ammonium caseinate solution was slowly added over a period of about 40 minutes, after which agitation of the mixture was continued for an additional 30 minutes or until a completely uniform emulsion was obtained. This emulsion was stable upon storage and could be easily diluted with water without separation.

25 pounds of water-soluble methylated methylol melamine resin of 80% resin solids was added with agitation to 50 pounds of the emulsion prepared as described above and the agitation was continued until solution of the water-soluble resin was complete. The resulting product was an emulsion of the oil-in-water type, wherein the continuous phase was an aqueous solution of water-soluble methylated methylol melamine, together with the emulsifying agent, and the dispersed phase was a blend of water-insoluble butylated urea-formaldehyde resin and phthalic anhydride-polyhydric alcohol resin.

The emulsion was made up to 50 gallons by the addition of warm water and 2 ounces of sodium dioctyl sulfosuccinate (a wetting agent serving to increase the ease of penetration of the cloth) was added. 1.5 pounds of a curing accelerator consisting of a mixture of about equal parts of

6

diammonium hydrogen phosphate and hexamethylene tetramine was also added. Pieces of interlining cloth made up of 52% cotton warp and a 48% filling of a mixture of equal parts of rayon threads and goat's hair were run through the bath at 80° F., and then passed through squeeze rolls set to retain a quantity of the impregnating emulsion equal to the weight of the cloth. The cloth was then run directly into a loop dry box and dried at 230° F. It was then cured in an air-lay dry box for 6 minutes at 290-300° F.

The resulting hand of the treated cloth was full and flexible, whereas a starch finish always left the material rather stiff. Shrinkage tests were conducted by subjecting the treated cloth to laundering with soap and water and to dry cleaning in comparison with samples of the untreated cloth. The cloth was measured before and after the tests, and the shrinkage figures were as follows:

	Laund- ered	Dry cleaned
Untreated:	Per cent	Per cent
Warp.....	4.1	4.5
Filling.....	2.0	0.8
Treated:		
Warp.....	0.5	0.0
Filling.....	0.2	0.0

Odor development tests were also run on the treated material and at the end of 16 hours at 76° F. no odor was apparent.

Similar results were obtained with another impregnating composition made by emulsifying a blend of 18 parts by weight of Resin B and 15.3 parts of Resin D in 66 parts of an aqueous solution containing 1.8 parts of concentrated ammonia and 2.6 parts of casein, using the procedure described above, adding 20 parts of the methylated methylol melamine and making up to 250 parts by the addition of water. The composition of these emulsions is typical of a wide variety that may be used to obtain the advantages of the invention.

From the foregoing description of preferred embodiments of the invention it is apparent that all the objects thereof are accomplished. It should be understood, however, that the invention in its broader aspects is not limited to these specific examples and that variations and substitution of equivalents may be resorted to within the scope of the appended claims.

What I claim is:

1. Interlining material for garments comprising cloth pretreated by impregnation with 2-20% of its weight of curable water-soluble methylated methylol melamine in the form of an aqueous solution thereof and with a heat-curable, water-insoluble mixture containing 0.15% to 17.5%, based on the weight of the cloth, of a lacquer-type resin selected from the group consisting of organic solvent-soluble urea-formaldehyde resin and organic solvent-soluble melamine-formaldehyde resin together with sufficient phthalic anhydride-polyhydric alcohol resin to plasticize said lacquer-type resin, followed by heating the cloth to cure said resins therein.

2. Interlining material for garments comprising cloth pretreated by impregnation with 2-20% by weight of a curable water-soluble methylated methylol melamine resin and with 1-25% by weight of a heat-curable, water-insoluble mixture consisting of 30-85% of a phthalic anhydride-polyhydric alcohol resin and 15-70% of a member of the group consisting of organic solvent-solu-

ble urea-formaldehyde resin and organic solvent-soluble melamine-formaldehyde resin followed by heating the cloth to cure said resins therein.

3. Interlining material for garments comprising cloth pretreated by impregnation with 2-20% by weight of a curable water-soluble methylated methylol melamine resin and with 1-25% by weight of a heat-curable, water-insoluble mixture consisting of 30-85% of a non-drying or semi-drying oil acid modified phthalic glyceride resin and 15-70% of a member of the group consisting of organic solvent-soluble urea-formaldehyde resin and organic solvent-soluble melamine-formaldehyde resin followed by heating the cloth to cure said resins therein.

4. Interling material for garments comprising cloth pretreated by impregnation with an aqueous emulsion of the oil-in-water type wherein the continuous aqueous phase has dissolved therein a curable water-soluble methylated methylol melamine and the dispersed phase contains a mixture of 30-85% of a non-drying or a semi-drying oil acid modified phthalic glyceride resin and 15-70% of a member of the group consisting of organic solvent-soluble urea-formaldehyde resin and organic solvent-soluble melamine-formaldehyde resin, the composition and take-up of the emulsion being such that the impregnated cloth after drying contains 2-20% by weight of said methylated methylol melamine resin and 1-25% of said resin mixture, followed by heating the cloth to cure said resins therein.

5. A method of producing an interlining material for garments having improved resiliency and resistance to shrinkage which comprises impregnating heavy cotton warp cloth with an emulsion of the oil-in-water type wherein a curable water-soluble methylated methylol melamine resin is dissolved in the continuous aqueous phase and the dispersed phase contains a mixture of 30-85% of a phthalic anhydride-polyhydric alcohol resin and 15-70% of a member of the group consisting of organic solvent-soluble urea-formaldehyde resin and organic solvent-soluble mel-

amine-formaldehyde resin, retaining in the cloth 2-20% of its weight of the water-soluble methylated methylol melamine and 1-25% of the mixed water-insoluble resins, and then heating the impregnated cloth to cure said resins therein.

6. A garment having a stiffened portion comprising inner and outer layers of unstiffened cloth and between said layers a permanently stiff and shrink-proof liner adapted to prevent puckering of the outer layers upon wetting, said liner comprising a layer of interlining fabric normally subject to shrinkage and loss of stiffness from wetting pretreated by impregnation with an aqueous solution of curable water-soluble methylated methylol melamine resin in amounts such that 2-20% of the methylated methylol melamine is impregnated therein and with 1-25% of a heat-curable water-insoluble mixture of a phthalic anhydride-polyhydric alcohol resin and a member of the group consisting of organic solvent-soluble urea-formaldehyde resin and organic solvent-soluble melamine-formaldehyde resin followed by heating the cloth to cure said resins therein to a water-insoluble condition.

7. A coat having a stiffened lapel portion consisting of inner and outer layers of unstiffened cloth and between said layers a permanently stiff and shrink-proof liner adapted to prevent puckering of the outer layers on wetting, said liner comprising a layer of interlining fabric normally subject to shrinkage and loss of stiffness from wetting pretreated by impregnation with an aqueous solution of curable water-soluble methylated methylol melamine resin in amounts such that 2-20% of the methylated methylol melamine is impregnated therein and with 1-25% of a heat-curable water-insoluble mixture of a phthalic anhydride-polyhydric alcohol resin and a member of the group consisting of organic solvent-soluble urea-formaldehyde resin and organic solvent-soluble melamine-formaldehyde resin followed by heating the cloth to cure said resins therein to a water-insoluble condition.

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