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J. K. SUMNER ET AL
WASHABLE GARMENT PART

2,864,093

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Fig. 1.

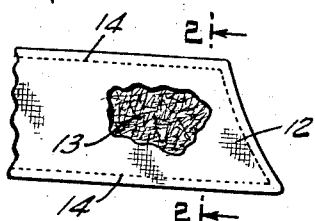


Fig. 2.

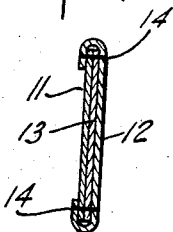


Fig. 3.

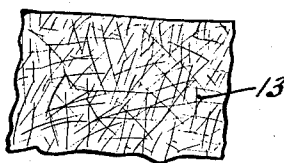


Fig. 4.

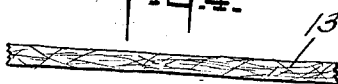


Fig. 5.

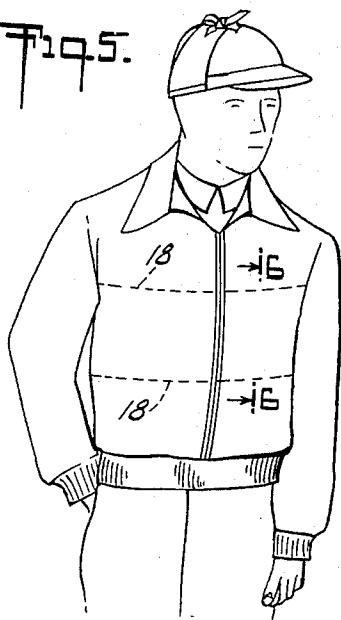


Fig. 7.

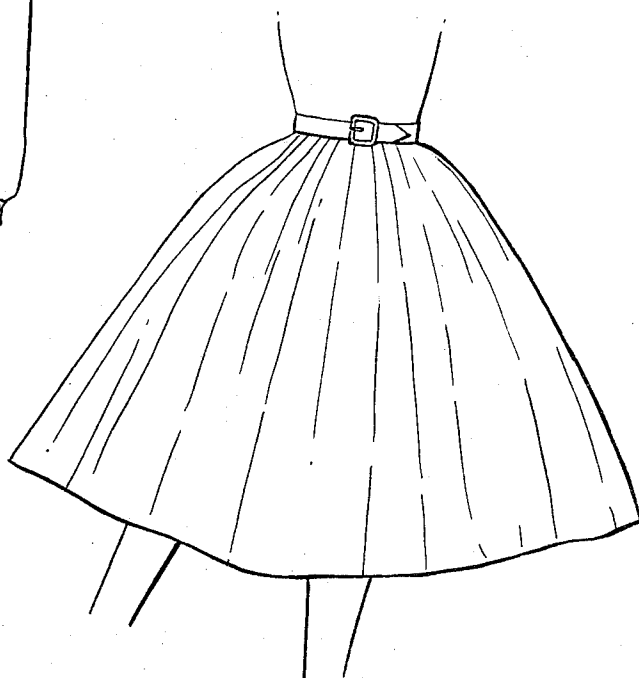
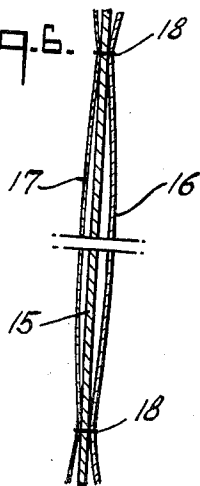


Fig. 6.



INVENTORS:
JOHN K. SUMNER
PHILIP SUROWITZ
BY ELMER J. YEDLICK
Charles A. Harris
ATTORNEY

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WASHABLE GARMENT PART

John K. Sumner, Plainfield, Philip Surowitz, Somerville, and Elmer J. Yedlick, Westfield, N. J., assignors to Chicopee Manufacturing Corporation, a corporation of Massachusetts

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6 Claims. (Cl. 2-243)

The present invention relates to clothing and parts thereof, more particularly to garments which are capable of retaining their shape after repeated washings and dry-cleanings.

This invention contemplates garments and garment parts comprising a relatively inexpensive nonwoven material which is resilient, crease resistant, washable, dry-cleanable, shrink resistant, etc. Clothing, according to this invention, may be washed or dry-cleaned repeatedly without losing its shape and without serious loss of strength or crease resistance. Garments may be stiffened, lined, or shaped with this material or the material itself may comprise independent clothing parts. For instance, a resilient petticoat skirt capable of being worn next to the skin may be formed entirely of this material. The aforementioned resilient nonwoven material is inherently porous and may be formed of different types of fibers and materials depending upon adjacent materials in the garment and the uses for which the garment is intended. Its porosity may be controlled to contribute to the permeability of the clothing on the one hand or its warmth on the other, and its stiffness and resiliency also may be varied to suit the requirements of a particular garment or garment part.

Garments and garment parts according to this invention may include men's, women's, and children's suits, coats, and jackets, wherein the nonwoven material acts mainly as a resilient lining for shape retention; skirt linings, petticoats, stand-up collars, etc., where the nonwoven material is responsible for a bouffant appearance; collars, cuffs, lapels, panels, etc., where the nonwoven material acts as an interliner or a resilient stiffener; women's bathing suits, brassieres, hip and shoulder pads, etc., where the nonwoven material contributes to shaping; collars, cuffs, etc. for fur coats, where the nonwoven material contributes to flare shape; as well as articles such as skirts for petticoats which are made up entirely of the resilient nonwoven material itself. These garments may be formed by cutting the various components according to patterns and sewing or stitching them together in a conventional manner.

Objects of the invention other than those generally described above will be apparent to those skilled in the art from the following description and claims taken together with the drawings wherein:

Fig. 1 is a partially cutaway plan view of a segment of a collar or cuff according to this invention;

Fig. 2 is a somewhat enlarged sectional view along the line 2-2 of Fig. 1;

Fig. 3 is a greatly enlarged plan view of a piece of the resilient nonwoven material forming a part of the collar or cuff of Figs. 1 and 2;

Fig. 4 is an edge view of the piece of material of Fig. 3;

Fig. 5 is a pictorial view of a short hunting jacket according to this invention;

Fig. 6 is an enlarged partial sectional view along the line 6-6 of Fig. 5;

Fig. 7 is a pictorial view of a woman's skirt according to this invention.

In Figs. 1 and 2 of the drawings there is shown a part of a collar or cuff according to this invention comprising inner and outer layers 11 and 12, respectively, which may be of the same material and an interliner 13 secured between them by lines of stitching 14 adjacent the border of the part. The interliner 13 comprises a resilient and washable nonwoven material formed from a web or webs of overlapping, intersecting fibers. This material or fabric is shown in greater detail in the enlarged view of Figs. 3 and 4. The fibers in the web are loosely arranged and overlapping one another such that a highly porous yet bulky fabric results. Its bulk and porosity may be varied by controlling the denier of the fibers it contains, as well as the material of these fibers and their shape and the way in which the fabric is formed.

Webs suitable for conversion into fabrics of this invention may be formed by carding, garnetting, or by air deposition by techniques such as described in U. S. Patents Nos. 2,676,363 and 2,676,364. While it is preferred that the web be isotropic, for strength purposes, the fibers it contains may be oriented predominantly in one direction as in a card web or a card web laminate. In fact, where uniform porosity is of great importance, the use of card webs may be preferred since they are generally more uniform in nature than loosely assembled fibrous webs of other types. To enhance its resiliency, it is preferred that the web contain a majority of relatively crease-resistant fibers. Fibers of wool, nylon, and similar synthetic materials have been found satisfactory for this purpose. The more resilient fibers may be mixed with cellulosic fibers such as cotton or viscose rayon, alone or in combination, to decrease the cost of the fabric or improve the characteristics of the web. Viscose rayon may be preferred where uniformity is important because of its superior cardability. It may be desirable for a large portion of the fibers in the web to be of relatively large denier to insure a relatively high degree of porosity. For instance, the web may be formed of a majority of 3 to 6 denier nylon fibers and a minority of small viscose rayon fibers. The resulting fabric may be formed in one layer or it may be formed in an isotropic layer with a carded layer on one surface, for instance. In this case, the card web may provide a surface which facilitates web processing.

The web described above may be converted into the nonwoven material of the interliner by depositing a thermosetting resin and a rubbery latex uniformly throughout the web in such a way that its fibers will be bound together and the web will retain a substantial degree of its original porosity. These materials may be deposited in the web as by impregnation, either in a mixture of the two, or by a two-step deposition of the thermosetting resin and the latex in the order named. The thermosetting resin is cured in situ in contact with the fibers in the web by the application of heat in the presence of a catalyst, and the latex may be cured if desired. When the thermosetting resin and the latex are combined in proper proportions, the resulting nonwoven fabric may possess resiliency, strength wet and dry, flexibility, porosity, shape retention, etc., and yet be capable of resisting continued washings and dry-cleanings without appreciable loss of these qualities.

The thermosetting resin may comprise a material selected from the group consisting of melamine-formaldehyde, urea-formaldehyde, phenol-formaldehyde, and dicyandiamide-formaldehyde or equivalent materials. The rubbery latex may comprise a material selected from the group consisting of Buna N, Buna S, and chloroprene type latices and emulsions or dispersions of rubbery resins such as soft acrylate polymers and copolymers. Buna

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N latices such as copolymers and tripolymers of butadiene and acrylonitrile are known to give good results and the tripolymer of butadiene, acrylonitrile, and methacrylic acid has proven particularly satisfactory. However, Buna S and chloroprene type latices, such as copolymers and tripolymers of butadiene and styrene and polymerized 2-chloro-butadiene 1,3, respectively, may be used. The soft acrylates are particularly advantageous when the nonwoven fabric component of a garment is to be worn next to the skin or exposed to light and heat in inner and outer garments, respectively. The use of these resins results in softer more supple fabrics possessing particularly good light and heat aging characteristics. Typical soft acrylates which may be employed in forming garment parts according to this invention include ethyl acrylate, butyl acrylate, octyl acrylate, methyl methacrylate, butyl methacrylate, the copolymers of ethyl acrylate and acrylonitrile and ethyl acrylate and polyvinyl chloride, etc.

To form the aforementioned nonwoven fabric, the thermosetting resin may be applied to the web in a conventional manner, either alone, or in a mixture with the rubbery latex. The resin is applied in the form of a monomer which tends to penetrate the fibers in the web, particularly if these fibers are cellulosic. The monomer then is converted to a polymer or cured in situ by the application of heat in the presence of a conventional catalyst applied to the fabric with the thermosetting resin. Curing may be effected by heating in an oven at a temperature of at least about 300° F. for a period in the neighborhood of two minutes. Conventional acid catalysts such as diammonium phosphate have proven satisfactory for this use. It is believed that the cured or polymerized thermosetting resin tends to increase the wet strength, resiliency, and shape retention of the individual fibers in the fabric of this invention.

The latex may be deposited in the web in a mixture with the thermosetting resin or in the second step of a two-step process, as mentioned before. For example, the web containing the thermosetting resin may be impregnated with the latex and then subjected to a temperature of 220° to 250° F. until dry. For maximum dimensional stability or shrink resistance, it also is preferred that the rubbery latex be cured in situ after impregnation. For this purpose, a conventional vulcanizing or curing agent for latices of this type may be added to the web with the latex. The web containing the latex and the vulcanizing agent then may be heated at a temperature and for a period necessary to effect the curing desired. Zinc oxide is typical of a vulcanizing agent which is effective for this use. The latex and the thermosetting resin may be mixed together or separately with other materials such as conventional textile softening agents or other materials to facilitate processing, before they are added to the web.

It is preferred that the total combined thermosetting resin and latex solids comprise between 25 and 75 percent by weight of the nonwoven fabric to achieve optimum results. Also, it is preferred that the fabric contain a greater amount of latex than thermosetting resin in order that the latex, which tends to be soft and flexible, may offset the tendency of the resin to be brittle. It is preferred that the ratio of latex to resin be at least about 1.5 to 1 and up to about 8 to 1 for this reason. It also is preferred that the thermosetting resin be present in an amount weighing at least about 5 percent of the dry web for best results. However, it may be present in greater amounts up to about 40 percent of the weight of the dry web depending upon the ratio of latex to thermosetting resin present, as described hereinbefore. The amount of latex present normally would exceed the amount of thermosetting resin in the fabric by a fairly substantial amount. For instance, a fabric containing approximately 60 percent latex and 25 percent thermosetting resin by

weight of the dry web has been demonstrated to give good results from the standpoint of this invention.

As shown in Fig. 6, the same nonwoven fabric which comprises the interliner of Figs. 1 and 2 may be employed as an inner lining 15 for stiffening and preserving the shape of a man's short hunting jacket of the type shown in Fig. 5, for instance. The inner lining material may be secured in place between an outer weather resistant surface material 16 and an inner conventional lining material 17 by spaced lines of stitching 18, as indicated in Figs. 5 and 6. If it is desired to use a still thinner outer layer, the inner lining 15 may be increased in thickness to provide body to the jacket and improve its shape retention. Thus, savings in the cost of the more expensive weather-proof outer materials may be achieved without seriously sacrificing the shape, toughness, and general durability of the resulting garment. Fig. 7 illustrates another garment of this invention comprising a bouffant skirt containing a resilient inner lining or inner facing, not shown, of the nonwoven fabric of Figs. 3 and 4. The nonwoven fabric may be cut and secured in place in any conventional manner, such as by lines of stitching designed to form pleats, or stitching in way of the waist and hem lines of the skirt. Due to the characteristics of the nonwoven material, the skirt will retain its shape as well as its resiliency and "bounce" even after it has been washed or dry-cleaned repeatedly.

To illustrate a garment or a garment part comprising the aforementioned resilient nonwoven fabric, itself, the skirt of Fig. 7 may be considered as being supported by a separate petticoat or under-skirt, not shown, formed entirely of this fabric. A petticoat such as this would provide its own support as well as support for a skirt such as shown in Fig. 7.

Where the garments of this invention comprise liners, inner linings, facings, etc. of the type of nonwoven fabric described hereinbefore, this fabric may be formed of a large percentage of fibers of a material which will possess substantially the same characteristics as the materials making up the remainder of the garment. For example, if the inner and outer plies of a collar or cuff are substantially of nylon, the interliner of Fig. 1 may comprise a majority of nylon fibers with the result that it may possess substantially the same characteristics as the inner and outer facings of the garment.

Having now described the invention in specific detail and indicated the manner in which it may be carried into practice, it will be readily apparent to those skilled in the art that innumerable variations, applications, modifications, and extensions of the basic principles involved may be made without departing from its spirit or scope. We therefore intend to be limited only in accordance with the appended patent claims.

The invention claimed is:

1. A resilient washable garment part comprising a laminated fabric of a plurality of layers of material, at least one of which is a web of nonwoven material, secured to each other, said web of nonwoven material being comprised of overlapping intersecting fibers containing a thermosetting crease-proofing resin, selected from the group consisting of melamine-formaldehyde, urea-formaldehyde, phenol-formaldehyde and dicyandiamide-formaldehyde resins, and a binder material selected from the group consisting of soft acrylate polymers and soft acrylate copolymers, said acrylate being an ester of acrylic acid selected from the group consisting of ethyl acrylate, butyl acrylate, octyl acrylate, methyl methacrylate, and butyl methacrylate, the proportion of the binder material to the thermosetting resin being at least about 1.5 to 1 and the combined weight of the thermosetting resin and the acrylate being from about 25% to about 75% of the weight of the web, whereby the web is soft and flexible and possesses shape retention properties.

2. A resilient washable garment part comprising a

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laminated fabric of a plurality of layers of material, at least one of which is a web of nonwoven material, secured to each other, said web of nonwoven material being comprised of overlapping intersecting fibers containing melamine-formaldehyde as the thermosetting crease-proofing resin, and an ethyl acrylate copolymer as the binder material, the proportion of the binder material to the thermosetting resin being at least about 1.5 to 1 and the combined weight of the thermosetting resin and the acrylate being from about 25% to about 75% of the weight of the web, whereby the web is soft and flexible and possesses shape retention properties.

3. A resilient washable garment part comprising a laminated fabric of a plurality of layers of material, at least one of which is a web of nonwoven material, secured to each other, said web of nonwoven material being comprised of overlapping intersecting fibers containing urea-formaldehyde as the thermosetting crease-proofing resin, and an ethyl acrylate copolymer as the binder material, the proportion of the binder material to the thermosetting resin being at least about 1.5 to 1 and the combined weight of the thermosetting resin and the acrylate being from about 25% to about 75% of the weight of the web, whereby the web is soft and flexible and possesses shape retention properties.

4. A resilient washable garment part comprising a laminated fabric of a plurality of layers of material, at least one of which is a web of nonwoven material, secured to each other, said web of nonwoven material being comprised of overlapping intersecting fibers containing phenol-formaldehyde as the thermosetting crease-proofing resin, and an ethyl acrylate copolymer as the binder material, the proportion of the binder material to the thermosetting resin being at least about 1.5 to 1 and the combined weight of the thermosetting resin and the acrylate being from about 25% to about 75% of the weight of the web, whereby the web is soft and flexible and possesses shape retention properties.

5. A resilient washable garment part comprising a laminated fabric of a plurality of layers of material, at least one of which is a web of nonwoven material, secured to each other, said web of nonwoven material being comprised of overlapping intersecting fibers containing a thermosetting crease-proofing resin, selected from the

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group consisting of melamine-formaldehyde, urea-formaldehyde, phenol-formaldehyde and dicyandiamide-formaldehyde resins, and a binder material selected from the group consisting of soft acrylate polymers and soft acrylate copolymers, said acrylate being an ester of acrylic acid selected from the group consisting of ethyl acrylate, butyl acrylate, octyl acrylate, methyl methacrylate, and butyl methacrylate, the proportion of the binder material to the thermosetting resin being at least about 1.5 to 1 and up to about 8 to 1 and the combined weight of the thermosetting resin and the acrylate being from about 25% to about 75% of the weight of the web, whereby the web is soft and flexible and possesses shape retention properties.

6. A resilient washable garment part comprising a laminated fabric of a plurality of layers of material, at least one of which is a web of nonwoven material, secured to each other, said web of nonwoven material being comprised of overlapping intersecting fibers containing melamine-formaldehyde as the thermosetting crease-proofing resin, and an ethyl acrylate copolymer as the binder material, the proportion of the binder material to the thermosetting resin being at least about 1.5 to 1 and up to about 8 to 1 and the combined weight of the thermosetting resin and the acrylate being from about 25% to about 75% of the weight of the web, whereby the web is soft and flexible and possesses shape retention properties.

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