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GARMENTS WITH INTERLININGS

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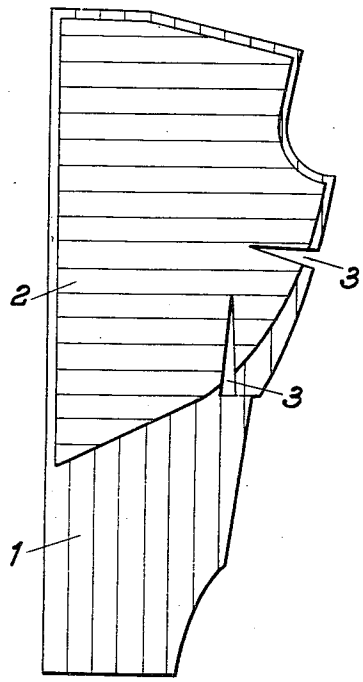

Fig. 1

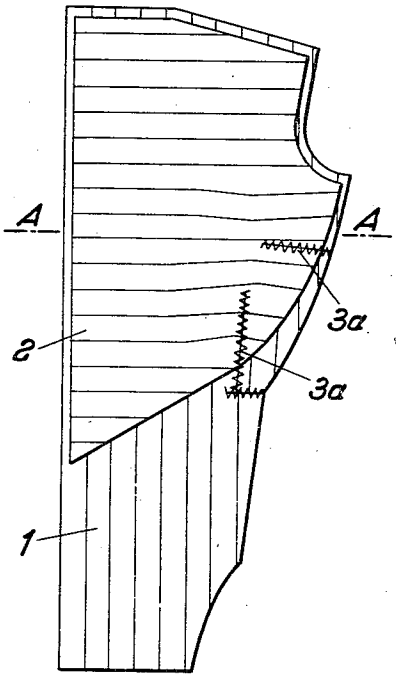

Fig. 2

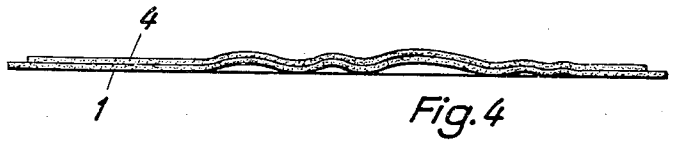

Fig. 4

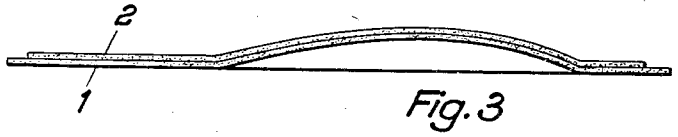

Fig. 3

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GARMENTS WITH INTERLININGS

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This invention relates to garments with shaping and shape retaining interlinings.

In order to give garments such as men's jackets, ladies' jackets, coats and the like a correctly shaped, stylish appearance, it is known to insert, between the outer material and the lining, fabric interlinings which generally consist of horsehair or other animal hair. Linen fabric and jute fabric have also been used for cheap articles of clothing. Interlinings of this type will be referred to hereinafter as "complete interlinings." In order to give the garment the desired shape, such as curvature over the chest, a smaller piece, preferably also of fabric and known as a "pad" is applied to the complete interlining at the positions to be provided with curves. The complete fabric interlining and the pad are joined by sewing them together at the edges and by making a plurality of parallel lines of stitching, partly in pikier stitch, partly in featherstitch. The desired curves are produced by making more or less acute-angled incisions or excisions in suitable positions, the edges formed being brought together and joined by stitching. The desired curves are produced by means of these so-called "darts," and are brought out by means of what are called shaping irons; but these curves are not stable. If a double-layer formation, for example, consisting of a complete fabric interlining and a fabric pad, is given the desired curvature by making darts, and the whole thing is then placed on a table, the curve collapses for lack of inherent stability.

It is understandable that curved interlinings of the type hitherto used and described above, consisting of a complete fabric interlining and a pad, can only fulfill their purpose of giving and retaining shape, to an imperfect extent. This is particularly the case if both the complete interlining and also the pad consists of fabrics which, as a result of their weave (warp and weft), are not resiliently elastic in all directions and can yield when pulled obliquely or laterally.

The disadvantages of these known and usual interlinings composed of fabric interlinings and pads for articles of clothing are overcome according to the invention by applying to the more or less resiliently elastic complete fabric interlining, a pad or pads, which consist of a thin, non-woven, porous, air-permeable, flexible, isotropic sheet material of the type described and claimed in U. S. Patent No. 2,719,802 of October 4, 1952.

A non-woven sheet material suitable for the purpose of the present invention consists in its entirety of an open skeleton of an intermingled, fine, cardable, polyposed, moisture absorptive fibers and resulting adhesive means interconnecting said fibers at their points of intersection to form the fibrous sheet material with preservation of numerous, relatively large interstices between the fibers, said interstices communicating with each other to provide circuitous paths for the circulation of air transversely through the sheet material, portions of said fibers intermediate of said points of intersection being exposed for the absorption of perspiration. Preferably the interstices between the fibers assume the form of comparatively

large, preferably flat pores which extend substantially in planes parallel to the main plane of the fibrous sheet. The large pores, present in the various layers are preferably staggered in relation to one another.

For the production of such non-woven sheet materials, fleeces of thin cardable fibres are used, the thickness of which may amount to about 1 to 20 deniers, and which contain the fibres in substantially intersecting or random directions. The fibrous material may consist of resilient fibres such as animal hairs, e. g. wool or human hairs, or resilient synthetic fibres such as acetate fibres, protein fibres or the like. Superpolyamide fibres such as those known as perlon fibres or nylon fibres have proved particularly suitable. The fleeces may also consist of mixtures of different types of resilient fibres or of mixtures of resilient fibres and fibres which are non-resilient or only slightly resilient. But fibre fleeces can also be used which consist of fibres which are only slightly resilient, or contain them in large quantities. In these cases it is advisable to give the fleece material the required properties, particularly as regards resilience and elasticity (resilient elasticity) by the use of special means, particularly impregnants.

For the impregnation of the fibre fleece, film-forming adhesives are used which form resilient binders after setting. Among these, preference is given to vulcanisable adhesives such as synthetic and/or natural rubber. These adhesives may conveniently be introduced into the fibre fleece in an aqueous dispersion or emulsion which may also contain additives such as vulcanizers, vulcanization accelerators, wetting agents, age resistors, fillers and the like. Among other things, various types of synthetic rubber such as butadiene acrylonitrile polymers, butadiene styrene polymers and chloroprene have proved particularly satisfactory. If necessary the rubber can be used in the form of pre-vulcanized rubber latex. In addition to vulcanizable adhesives, the impregnant may also contain subsidiary quantities of film-forming thermoplastic synthetic materials. A particularly advantageous procedure is first to convert the dispersion or emulsion into a comparatively concentrated, stable foam which is nevertheless still capable of flow, and then to press this foam into the fibre fleece. This impregnation can be carried out in a manner known per se, so that the fleece is first subjected to a single-sided superficial preliminary treatment by applying a small quantity of an adhesive such as rubber latex, as a result of which the fibres in the surface layer are covered with a very thin web-like network. As a result of this preliminary treatment, the very sensitive fleece is stabilised in such a manner that it can be subjected to further treatment, particularly impregnation, without being damaged or torn. The impregnation of the fleece, which has been superficially pretreated on one side, is carried out in such a manner that the fibre fleece is conveyed through the nip of a pair of rollers, the foam thus being pressed into the fleece, some of the foam cells being destroyed in the process and the fleece being converted into the desired sheet. During the subsequent drying of the structure, which is carried out without pressing, the remaining foam cells are destroyed. As a result of the surface tension properties of the foam mixture, the impregnant is deposited primarily at the contact and intersection points of the fibres, while between the fibres a large number of comparatively large hollow spaces are left which are preferably present as flattish pores in the finished product. By obeying the conditions given above, particularly by pressing the foamy adhesive into the fibrous structure, the surrounding of the individual fibres with a layer of adhesive, which firmly isolates the fibres, as in other known methods of impregnating, is avoided. Instead, the adhesive which is in contact with the fibres, is so porous that the sheet ma-

terial produced according to the invention has a soft cloth like nature, and the portions of the fibres between the points of adhesion retain their natural absorptive capacity. As a result, the sheet material is permeable to perspiration. The vulcanizing treatment of the impregnated fibrous structure can be carried out in the usual manner. As a result, the rubber is converted into the desired resilient, and at the same time flexible, form, and as a result of the presence of the resilient binder distributed in the desired manner, the resilience and elasticity (resilient elasticity) of the sheet material is ensured in a particularly satisfactory manner.

It has been found that sheet materials having particularly valuable properties are obtained if condensation synthetic resins, such as phenolic resins and/or amino-plastics, particularly such polycondensation products as are insoluble in water and insensitive to organic solvents such as are used for the chemical cleaning of clothes, are incorporated in the fibrous structures in addition to the above-mentioned flexible, resilient adhesives such as vulcanised rubber.

The phenolic resins and/or amino-plastics may be incorporated in the form of pre-condensed or semi-condensed products, in the emulsions or dispersions containing rubber, and used, together with these, preferably in the form of foam, to impregnate the fibre fleece. The impregnation can be set by heat agglomeration, for example by drying under conditions in which the pre-condensed products are converted into the non-water-soluble final product, which is also proof against cleaning agents. The heat treatment may be carried out in such a manner that, in addition to the hardening of the pre-condensed product, vulcanization of the vulcanizable constituents of the impregnant also takes place. This operation may be carried out for example at temperatures between about 80 and 100° C. Sheet materials which, in addition to vulcanized resilient rubber, also contain phenolic resins or amino-plastics, such as about 4% phenolformaldehyde resin, in relation to the rubber, are characterised by improved resilient elasticity and greater resistance to wear.

The phenolic resins and/or amino-plastics may also be introduced as an after-treatment into the fibrous structure which has already been impregnated with a dispersion or emulsion containing rubber. In this manner it is also possible to incorporate in the sheet material those condensation products which are not compatible with certain constituents of the adhesive containing rubber which is used for the main impregnation. This includes, among other things, certain melamine resins. The after-treatment may take place with crystalloid-dispersed or colloid-dispersed or hetero-dispersed solutions, dispersions or emulsions of the pre-condensed product. The hardening of the pre-condensed product may be encouraged by means of condensation catalysts, e. g. ammonium salts such as ammonium chloride, acids such as tartaric acid or hydrochloric acid, bases such as ammonia, triethanolamine, etc. The phenolic resins and amino-plastics may also be used partly in the first stage of impregnation, e. g. as a constituent of the dispersion or emulsion containing rubber, and partly in the second stage of impregnation. In this case it is possible to use pre-condensed products of the same type in both stages of treatment or alternatively to use different pre-condensed products. Melamine pre-condensed products, preferably etherified melamine pre-condensed products, have proved particularly suitable. The two-stage impregnation may be carried out in such a manner that the structure impregnated with the dispersion or emulsion containing rubber is slightly dried or is subjected to the after-treatment with synthetic resin pre-condensed products after solidifying and if necessary after vulcanization.

In any case care should be taken to ensure that the finished products contain the rubber in the vulcanized state and the synthetic resin condensation product in the insoluble finished state.

The after-treatment with synthetic resin pre-condensed products may also be carried out in such a manner that only one surface layer or both surface layers of the fibrous structure are impregnated with the synthetic resin pre-condensed solution, e. g. by sprinkling or spreading. Specific surface effects can thus be achieved.

The invention is hereinafter explained, by way of example, with reference to the accompanying drawings.

Figures 1 and 2 show a plan view of a shaping and shape retaining interlining for an article of clothing, **1** being a complete interlining consisting of fabric, for example horsehair fabric or linen fabric. A pad **2** of a suitable non-woven sheet material is applied to the complete interlining **1**.

The interlining as shown in Figure 1 has two acute-angled excisions **3**, which are made to produce a curved shape. Figure 2 shows the dart **3***a* produced by bringing together the edges of the acute-angled excision **3** and joining them by sewing them together, as a result of which the interlining is given the desired curved shape.

Figure 3 shows an interlining as shown in Figure 2, which is placed on a table in which position it has retained, unaltered, the curvature resulting from the pad of sheet material.

Figure 4 shows an interlining produced from a complete fabric interlining **1** and a fabric pad **4** in the manner hitherto usual, and provided with a curve, which has collapsed because of its instability when placed on a table.

According to one embodiment of the invention, an intermediate pad (not illustrated in the drawing) also made of non-woven sheet material, may be additionally inserted between the complete interlining **1** consisting of fabric and the pad **2** consisting of non-woven sheet material. In this embodiment, the intermediate pad does not need to have any incisions or darts.

The production of the shaping and shape-retaining interlinings, which is done by the tailor or clothing factory making the garment, is considerably simpler than the production of the interlinings hitherto usual and composed of a fabric interlining and a fabric pad. Since the shape-retaining stability of the pad made of non-woven sheet material is fully adequate and the sheet material has a very strong adhesive capacity as a result of its structure, the pad made of non-woven sheet material can be joined to the complete fabric interlining with a few stitches. The sewing with parallel rows of pikier stitches about 1 cm. apart, which was hitherto necessary, and which was done for the sake of the stability of the curvature, is omitted, because the shape-giving stability of the pad of non-woven sheet material is sufficient to maintain the curve. With the interlinings hitherto usual and composed of a fabric interlining and a fabric pad, the tailor had to bear in mind the direction of the threads in the fabric. Consequently he had to avoid making the darts obliquely in the fabric, otherwise the tension in the fabric would be destroyed. According to the invention, on the other hand, when the pad of non-woven sheet material has been applied to the complete fabric interlining, the darts can be made as desired. The shaping iron, which was hitherto necessary can be dispensed with when complete fabric interlinings with pads of non-woven sheet material are used. The curve produced is reliably retained by the structure of the pad consisting of non-woven sheet material, which does not yield to oblique and lateral pulling.

Garments which contain pads made from a combination of fabric and non-woven sheet material as shaping and shape-retaining interlinings offer a number of advantages.

The pads of non-woven sheet material the thickness of which is between 0.10 and 1.5 mm. the weight of which is between about 40 g. and 350 g. per square metre, and the proportion of binding agent in which amounts to between 30 and 65%, have a very low specific weight which generally only amounts to about 0.25 to 0.40; they are generally at least 50% lighter than woolen fabrics of

a corresponding thickness. The pads made of non-woven sheet material have a high porosity and excellent permanent permeability to air. The pads of non-woven sheet material are supple and have excellent resilience and elasticity (resilient elasticity); they are easy to sew and can be sewn for example at high speeds of up to 4000 R. P. M.; they are heat resisting, can be ironed and stand up well to chemical cleaning agents. A particular advantage of the pads consisting of non-woven sheet materials is that as a result of their isotropic and isoelastic properties, they are exceptionally resistant to unwanted changes in shape, creasing, wrinkling and the like. When deformed, they always automatically resume the shape given to them. Another advantage of the pad made of non-woven sheet material resides in the fact that, in contrast to fabrics consisting of warp and weft, they cannot be pulled on the cross; they are consequently "diagonally stable." Consequently it is possible to incorporate permanently molded shapes into the garments even with very light non-woven sheet material. The pads made of non-woven sheet material have a good "breathing" capacity in conjunction with excellent permeability to moisture (sweat). As a result of the presence of numerous flat pores lying in various planes and generally staggered in relation to one another, circuitous paths for the circulation of air transversely through the sheet material are provided and satisfactory permeability to air at low air speed is ensured. As a result of the slight shrinkage which does not amount to more than about 0.8%, pads made of non-woven sheet material can be joined easily and reliably to the fabric interlining. If they become wet or are subjected to wet treatments, no harmful deformations take place. Pads which consist of non-woven sheet material and are produced with the addition of phenolic resins and/or amino-plastics, are characterised by particularly good resilient elasticity, a very fine feel and a particularly smooth surface.

What I claim is:

1. In combination with an article of apparel which includes a shape imparting interlning, said interlining consisting of a full interlining and at least one arched plaque secured thereto for imparting said shape, the provision of a plaque comprising: a thin, non-woven, porous, air-permeable, flexible, isotropic sheet material

consisting in its entirety of an open skeleton of intermingled, fine, cardable, polyposed moisture absorbent fibers; and resilient adhesive means interconnecting said fibers at their points of intersection to form said fibrous sheet material with preservation of numerous, relatively large interstices between the fibers, said interstices communicating with each other to form circuitous paths for the circulation of air transversely through the sheet material, portions of said fibers intermediate said points of intersection being exposed for the absorption of perspiration.

2. The combination according to claim 1, in which said adhesive means comprises a vulcanized rubber compound.

3. The combination according to claim 2, wherein said adhesive means further comprises a phenoplast in completely hardened condition.

4. The combination according to claim 3, in which said phenoplast is confined to a surface portion of said sheet material.

5. The combination according to claim 2, wherein said adhesive means further comprises an aminoplast in completely hardened condition.

6. The combination according to claim 5, in which said aminoplast is confined to a surface portion of said sheet material.

7. The combination according to claim 2, wherein said adhesive means further comprises a small quantity of a melamine aldehyde condensate confined to a surface portion of said sheet material.

8. The combination according to claim 7, wherein said melamine aldehyde condensate is an etherified melamine formaldehyde condensate.

9. The combination according to claim 8, in which the thickness of said fibers is in the range from 1 to 15 deniers and in which the adhesive means constitutes from 25% to 60% of the weight of said fibrous sheet material.

References Cited in the file of this patent

UNITED STATES PATENTS

1,123,224	Bernard	Jan. 5, 1915
2,574,849	Talalay	Nov. 13, 1951