United States Patent [19]

Passler et al.

[11] **3,787,260**

[45] **Jan. 22, 1974**

[54] **PROCESS FOR MAKING COMPOUND TEXTILE MATERIALS**

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[22] Filed: **Jan. 27, 1972**

[21] Appl. No.: **221,253**

[52] **U.S. Cl.** ..... **156/84,** 26/69 A, 28/72 FT, 156/272, 156/196, 156/301

[51] **Int. Cl.** **D06m 11/00**

[58] **Field of Search** ..... 156/84, 85, 150, 151, 183, 156/206, 272; 264/342; 8/DIG. 21, DIG. 12, 8, 116, 114.5; 250/49.5 TE; 28/72.17; 26/69 A, 26, 18.5

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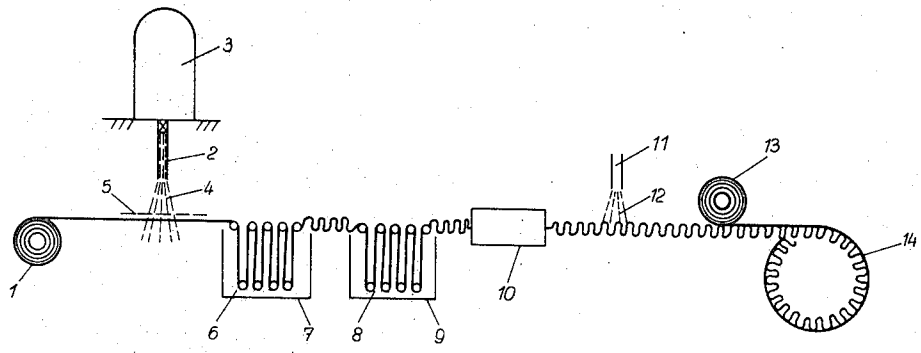
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[57] **ABSTRACT**

Compound textiles, particularly compound sheet materials as used in the garment and interior decorating arts, are made by causing free radicals to form in selected areas of a polymeric textile sheet; then contacting the sheet with a shrinking agent which preferentially affects the said selected areas by reaction with said free radicals; and finally uniting the selectively shrunken sheet on one or both of its major faces with another fabric.

17 Claims, 2 Drawing Figures



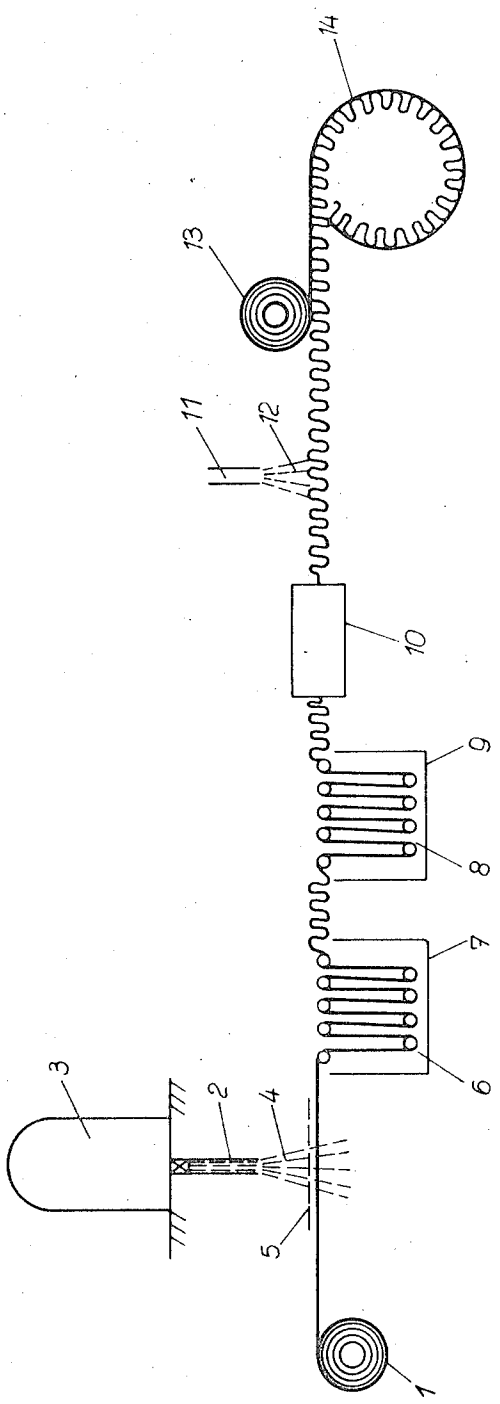


Fig. 1

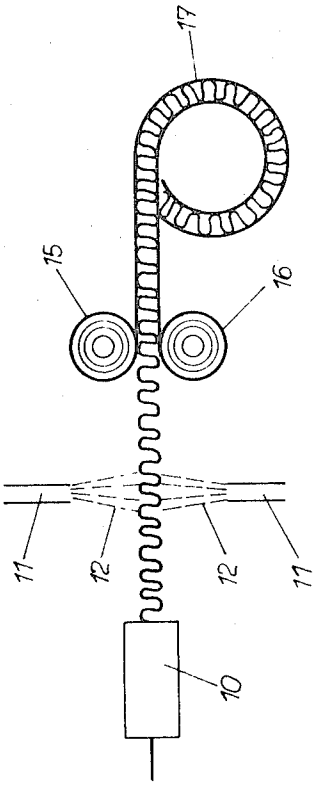


Fig. 2

PROCESS FOR MAKING COMPOUND TEXTILE MATERIALS

BACKGROUND OF THE INVENTION

The invention relates to a process of making compound textile materials, mainly compound texturized textiles such as are used in the garment and interior decorating industries.

Compound textiles made of sheet textiles and polyurethane foam are known. These compound materials are used in particular in the garment industry. They have the disadvantage that their properties are undesirable in physiological respects, particularly regarding air and moisture transmission. These compound materials are only of limited use for interior decorating purposes, particular for carpets, flooring, etc.

It has also been proposed to subject fiber materials and products formed therefrom, such as textiles, knits, and other textile sheet products, to a chemical radiation process and thus cause them to shrink, the shrinkage depending on the radiation dose, the type of fiber material and the type and amount of additives used in the process. This type of treatment, however, does not lead to a compound material, nor does it result in a structuring of the sheet material, since in this process the sheet material is subject to a homogeneous shrinking throughout its body.

It is therefore an object of the present invention to provide for a process of making compound materials which avoids the shortcomings of the prior art, and in particular the poor physiological properties when used for garments. The novel process also permits employment of a broader range of materials.

SUMMARY OF THE INVENTION

The invention resides in making compound textile materials by causing reactive groups to form in selected areas of a textile sheet, for instance by selected high speed electron radiation, whereupon the sheet is contacted with a shrinking agent which preferentially affects the areas where the reactive groups are located. The thus-pretreated and shrunken sheet is then united on one or both of its major faces with another flat fabric.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The two FIGURES illustrate, in diagrammatic form, two different embodiments of the process of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The products of the invention are particularly suited for purposes of the garment and interior decorating industries.

The textile may for instance be a flat woven polyamide fabric, but the invention is applicable to all polymeric textiles which are subject to radiation-chemical modification, such as polyolefines and polyesters.

The reactive groups are preferably initiated by high-speed electrons. They are, for instance, free radicals which are formed by exposure to high-energy radiation and which are capable of initiating a graft polymerization. Preferably, they are formed on strip-shaped portions of the textile.

The amount of radiation energy required depends primarily on the thickness of the textile treated. If, for example, a uniform irradiation throughout the cross-section of the textile is to be effected, the energy must be such as to provide for a radical concentration which is more or less constant for each unit of volume. For instance, for a textile sheet of a mass of 400 g/m^2 the energy may be 500 keV.

Following the irradiation, the textile may then be subjected, for example, to the action of acrylic acid to form a graft copolymer. The graft polymer preferentially forms in the areas where previously the reactive groups, such as free radicals, have been caused to form.

Instead of acrylic acid, derivatives may be used, such as the sodium salt of the acid. For instance, with a 20 percent concentration of acrylic acid, a treatment time of 10 minutes and a temperature of 30°C, a graft polymerization degree of 40 percent can be obtained in the desired areas.

By means of graft polymerization a shrinkage will occur in selected areas, resulting in a wavy shape.

It is also possible to subject the textile, after the irradiation, to intermediate heat treatment in specific areas. In this case, a homogeneous irradiation throughout the cross-section of the textile can be effected. The subsequent heat treatment, however, is applied only, for instance, to strip-shaped areas of the textile. In these areas the previously formed free radicals are disintegrated thermally. There then follows the above-discussed graft treatment with, for instance, acrylic acid, which will affect only the areas which have not been thermally treated and where, accordingly, free radicals are still present. Thus, a wavy form is again caused to arise in the same manner as in the aforementioned case.

The heat produced in the heat treatment, e.g., by passing the textile over heated rollers, must be sufficient to destroy the previously formed radicals in the desired areas. Generally, the temperature will depend on the type of radicals, polymer and length of heat application.

The shrinking may be effected also by reaction with, for instance, a vinyl compound, such as acrylamide, acrylic acid, styrene, etc., or also by treatment with hot air, hot water or saturated steam.

The final uniting of the treated textile sheet, which now has a wavy form, with a flat sheet may be effected on one face of the textile or on both faces. The second sheet may be any kind of fabric or textile, such as a foil, a woven textile, a knit, a non-woven fabric, etc., or also a thin aluminum foil, a glass fiber textile, or the like. The union between the two textiles or fabrics may be effected in conventional manner, for instance by means of an adhesive.

The following examples will further explain the invention.

EXAMPLE 1

With reference to FIG. **1**, it will be seen that a smooth-fiber textile sheet **1** of a polyamide (Nylon 6) compound having a right-left velvet-tricot weave with a mass per unit area of 240 g/m² is passed under the scanner **2** of an electron accelerator **3**. It is there irradiated in selected areas with the rays **4** having an energy of 400 keV until a dose of 10 Mrad is applied. Strip-shaped protective areas shielded against the radiation are formed by aluminum strips **5** which extend in the direction of the textile and have a width of 5 mm, while the widths of the exposed areas is likewise 5 mm. After completion of the irradiation, the polyamide textile is contacted in the vessel **7** with acrylic acid **6**. The time of contact is selected to obtain a graft polymerization degree of 100 percent on the radiated strips. The grafting operation will furthermore cause a shrinkage, so that the textile assumes the wavy form shown in FIG. **1**.

The fabric is then rinsed in vessel **9** with a rinsing medium **8**, is dried in drier **10**, and finally sprayed by means of nozzle **11** with an adhesive **12**, and then united with the textile **13**, a polyester textile.

There is thus obtained a floor covering **14** which, by means of the grafted acrylic acid, has high soil-resistant properties.

EXAMPLE 2

With reference to FIG. **2**, it will be seen that in this case, likewise, a polyamide textile consisting of a smooth-fiber weave having a right-left velvet-tricot weave with an area of 100 g/m² is irradiated in strip-shaped areas as in Ex. 1. The widths of the aluminum strips which serve as shields and the widths of the exposed surfaces in this case are 3 mm each. Grafting is then effected as in Example 1 up to a degree of 70 percent. After rinsing and subsequent drying in drier **10**, the wavy polyamide weave is united by an adhesive on both major faces with a smooth, flat textile such as a silk product **15** one one side and a hydrophobized polyester textile **16** on the other side. The adhesive is applied by means of nozzle **11**.

There is thus obtained a heavy heat-insulating product which, because of the grafted acrylic acid, has hydrophilic properties. This product **17** is therefore of particular use for the garment industry in view of its favorable physiological properties.

EXAMPLE 3

The same type of polyamide textile sheet was used in this example as in the previous example. The textile had a surface a mass per unit area of 240 g/m². It was passed under the scanner of an electron accelerator as in the previous example. However, the irradiation with electron rays was effected homogeneously throughout its surface with an energy of 400 keV until a dose of 10 Mrad had been obtained. The textile was then passed around a heated roller which on its surface had axially directed grooves and ridges of a width of 5 mm in each case. The uniformly radiated polymide textile thus was exposed to a locally limited thermal treatment. In this manner, the free radicals which had been formed by the radiation treatment were disintegrated in the strip-shaped areas. There followed then a grafting with acrylic acid as in Examples 1 and 2. However, the graft

treatment affected only the thermally untreated strips where the free radicals were still present. The selected grafting caused a selective shrinkage of the polyamide textile and resulted in the wavy form shown also in FIG. **1**.

After rinsing and drying, a second flat fabric or textile sheet was united with the structured sheet by means of an adhesive which was applied through a nozzle device.

There was thus obtained a floor covering which had excellent soil-resistance, because of the grafted acrylic acid.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can be applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

1. A process for making compound texturized textiles, comprising the steps of irradiating selected areas of a polymer textile sheet with high-speed particles so as to cause reactive groups to be formed in said areas; contacting said sheet with a shrinking agent adapted to effect shrinkage of said areas by reaction with said reactive groups; and uniting the selectively shrunken sheet on one or both of its major surfaces with another fabric.

2. A process as defined in claim **1**, wherein said high-speed particles are high-speed electrons.

3. A process as defined in claim **1**, wherein the step of uniting said shrunken sheet with said other fabric comprises adhesively connecting the same.

4. A process as defined in claim **1**, wherein said shrinking agent is a vinyl compound.

5. A process as defined in claim **1**, wherein said shrinking agent is selected from the group consisting of acrylic acid and salts thereof.

6. A process as defined in claim **1**, wherein said shrinking agent is selected from the group consisting of hot air, hot water and saturated steam.

7. A process as defined in claim **1**, wherein said sheet is composed of a substance selected from the groups consisting of polyamides, polyolefines and polyesters.

8. A process as defined in claim **1**, wherein said fabric is composed of a substance selected from the group consisting of woven textiles and non-woven fabrics.

9. A process for making compound texturized textiles, comprising the steps of homogeneously irradiating a polymer textile sheet with high-speed particles so as to cause reactive groups to be formed in said sheet; heat treating predetermined areas of said sheet at a temperature sufficient to cause disintegration of only the reactive groups in said predetermined areas, the reactive groups in selected, thermally untreated areas of said sheet still being present; contacting said sheet with a shrinking agent adapted to effect shrinkage of said selected areas by reaction with the still existing reactive groups therein; and uniting the selectively shrunken sheet on one or both of its major surfaces with another fabric.

10. A process as defined in claim **9**, wherein said high-speed particles are high-speed electrons.

11. A process as defined in claim 9, wherein the step of heat treating said predetermined areas comprises contacting said sheet with a heated profiled roller.

12. A process as defined in claim 9, wherein the step of uniting said shrunken sheet with said other fabric comprises adhesively connecting the same.

13. A process as defined in claim 9, wherein said shrinking agent is a vinyl compound.

14. A process as defined in claim 9, wherein said shrinking agent is selected from the group consisting of acrylic acid and salts thereof.

15. A process as defined in claim 9, wherein said shrinking agent is selected from the group consisting of hot air, hot water and saturated steam.

16. A process as defined in claim 9, wherein said sheet is composed of a substance selected from the group consisting of polyamides, polyolefines and polyesters.

17. A process as defined in claim 9, wherein said fabric is composed of a substance selected from the group consisting of woven textiles and non-woven fabrics.

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