Aug. 25, 1959 E. WEISS 2,901,373

PATTERN FLOCK FABRIC AND METHODS FOR PRODUCING SAID PATTERN

Filed March 12, 1957

Fig. 1.

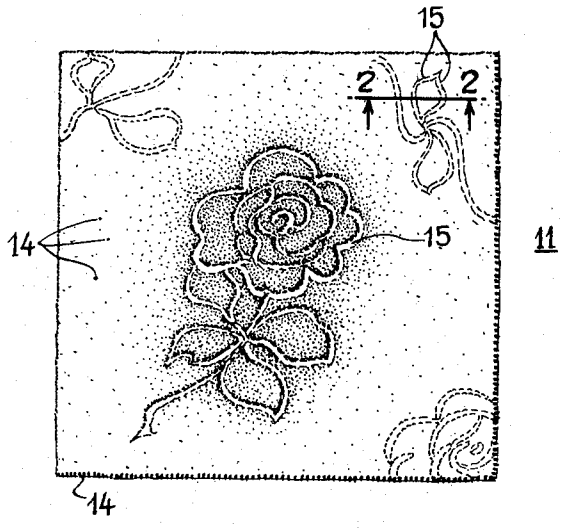
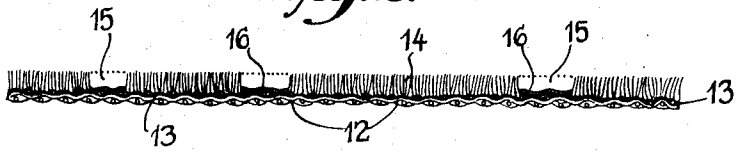


Fig. 2.



INVENTOR.
ERNST WEISS.

BY

Ward, Neal, Haselton, Orme & McElhannon
ATTORNEYS.

United States Patent Office 2,901,373
Patented Aug. 25, 1959

2,901,373

PATTERN FLOCK FABRIC AND METHODS FOR PRODUCING SAID PATTERN

Ernst Weiss, Wattwil, Switzerland, assignor to Heberlein Patent Corporation, New York, N.Y., a corporation of New York

Application March 12, 1957, Serial No. 645,577

Claims priority, application Austria March 13, 1956

12 Claims. (Cl. 117—9)

This invention relates to methods for producing patterns on sheet material having a flock coating, and to the flock sheet material product bearing the particular pattern effect.

Sheet material or fabric having a flock surface of short textile fibers or dustlike matter is well known, and finds general use in the garments industry, particularly for sports jackets, as well as in the shoe industry. Generally, in preparing fabrics of this type, a layer of adhesive material, which is a sticking or drying lacquer, for example, a hardenable thermo-plastic resin or natural or artificial rubber, is first spread on the base fabric and the short fibers or dustlike matter constituting the flock are then uniformly sprayed or scattered onto the adhesive or applied with the aid of an electrostatic high voltage field, and the adhesive then allowed to set or dry.

It is the purpose of the present invention to provide not only a novel flock fabric having pronounced and permanent patterns, which is an interesting addition for the fashion industry, but also a method for producing these patterns in the flock coating.

The invention accordingly consists in the novel processes and steps of processes for the production of novel products, the specific embodiments of which are described hereinafter by way of example, and in accordance with which I now prefer to practice the invention.

In accordance with the present invention, a chemical agent, which at least partially dissolves the flock material in the selected area, as applied patternwise, as by printing, to the flock fabric. The chemical agent or solvent and the adhesive material which bonds the flock to the fabric are selected so that they are inert, or at least substantially so, to one another at the conditions of application. Dissolving or fusing of the flock material in the pattern area is thus stopped when the adhesive layer is reached.

The present invention will be more fully understood from the following detailed description taken in connection with the appended drawings, wherein:

Fig. 1 is a plan of a piece of flock fabric bearing a permanent surface pattern, which pattern was applied in accordance with the method of the present invention; and

Fig. 2 is an enlarged section of a portion of the fabric of Fig. 1 taken on the lines 2—2 thereof, further illustrating the character of the fabric and pattern area.

As indicated, proper selection of the solvent and adhesive material permits flock dissolving or fusion to be terminated at the surface of the adhesive, and the fabric as a whole remains soft and substantially unchanged, except for the pattern effect created by thus selectively removing portions of the flock. In addition to the proper choice of solvent to remove flock material of a given composition, the viscosity of the solvent medium is of considerable importance. By proper adjustment of solvent viscosity with a thickening agent, it is possible to prevent lateral flow of solvent into the flock adjacent the areas being printed. Thus, a sharp line of demarcation between upstanding flock and the pattern

area characteristic of the present method is obtained. It has been found that sharp pattern effects, which are highly desirable, can be obtained when the viscosity of the solvent solution is between about 150 and 450 centipoises at 20° C. as determined on the Hoeppler viscosimeter. The particular viscosity for best results will depend not only upon the density, height and nature of the flock, for example, whether rayon, wool or polyamide, etc., but also upon the particular solvent employed, since as pointed out hereafter, there are several acceptable solvents for each of the variety of flock materials. The aforementioned viscosity range is offered as a guide, and in some instances satisfactory results may be obtained outside this range. In most instances, the solvent medium viscosity is within said range, and usually between 180 and 400 centipoises.

The solvent medium for the flock may advantageously be applied to the fabric with the aid of stencils, for example, by screen printing. However, the solvent can also be applied by roller printing.

Referring to Figs. 1 and 2, there is illustrated a printed flock fabric generally designated as 11, which is composed of a base fabric 12, which bears an adhesive layer 13 of its upper surface, which adhesive bonds flock material 14 to the base fabric. In the fabric of the drawings, the flock material consists of upstanding short textile fibers. Upon application of the solvent for the flock material to selected pattern areas 15, the flock is at least partially dissolved and deposited on the adhesive layer 13 forming an adherent film 16. Following application of the solvent to the selected areas, a major portion of the dissolved flock is precipitated to form the adherent film, after which the fabric is washed to remove residual solvent and finally dried. Precipitation is generally effected by a preliminary drying, but may also be accomplished by chemically or physically altering the solvent.

In most instances, the dried film of dissolved and precipitated flock on the treated areas of the finished cloth presents not only a contrasting surface, but also a glossy one, as compared with the surrounding normally pile fabric like finish of the flock fabric.

The short textile fibers or dustlike material constituting the flock may be of wool, natural or regenerated cellulose, for example cotton or viscose, or cellulose derivatives such as acetate rayon, or synthetic organic materials such as polyamides, polyesters, or materials on a polyvinyl basis including polyacrylonitrile.

These varied materials require a variety of solvents. When the flock material is natural or regenerated cellulose, aqueous solutions of metal salts such as zinc chloride, calcium thiocyanate or sodium zincate are preferred, although solutions of the quaternary ammonium bases, for example, benzyltrimethyl ammonium hydroxide, solutions of cuprammonium hydroxide or of copper oxide in ethylenediamine may be used. Also, unripened cellulose xanthogenate solutions have proven satisfactory as have mineral acids such as sulfuric acid and phosphoric acid. Alkali metal hydroxides, particularly caustic soda, work well.

For short fibers of acetate rayon, solutions of metal salts or organic solvents such as acetone, amylacetate, diacetone alcohol, dioxane, furthermore softeners such as triphenylphosphate and dimethylglycolphthalate are suitable.

When the flock material is wool, aqueous caustic soda is preferred, although the quaternary ammonium bases are also satisfactory.

For polyamide flock material, particularly nylon, phenol is preferred, although organic acids such as acetic or haloacetic acid, as well as mineral acids or solutions of

metal salts such as zinc chloride, calcium thiocyanate, calcium chloride, to which at least partially water soluble organic solvents may be added, can be employed. With polyester flock material, phenols are again preferred, also sulfuric acid is satisfactory. For polyacrylonitrile materials, aqueous solutions of metal salts, or the strongly polar solvents, for example, dialkylformamides, e.g. dimethylformamide, or dialkylsulfoxides such as dimethylsulfoxide may be employed.

In most instances, the solvent will comprise a water solution or suspension of the active ingredient, although no water is employed with the strongly polar organic solvents often used for dissolving polyacrylonitrile flock material. In any event, the solvent medium is thickened so as to have a viscosity of about 150 to 450 centipoises and preferably between about 190 and 400 centipoises. Thickening is often easily effected by dissolving a quantity of a material corresponding chemically to the material of the flock, in the solvent liquid. Alternatively, wheat flour, gum arabic, water soluble methyl cellulose and similar inert thickening materials may be employed to raise the viscosity of the solvent medium sufficiently so that it is retained in the desired area on the fabric. Also, the printing paste of the solvent may contain a quantity of dye so that the dried film of dissolved and precipitated flock material on the pattern area may exhibit a similar or contrasting color as compared with the adjacent flock.

As indicated, the adhesive material which bonds the flock to the base fabric is selected so as to be inert with respect to the flock solvent. Among such adhesives are the high polymers in suitable solution or dispersion as for example plastified vinyl resins, acryl- and methacryl resins, alkyd resins, ethoxylin resins, adducts of polyesters and isocyanates, plastified urea, melamine- and phenol-resins, natural and synthetic rubber, polyethylene, and silicones, as well as compatible mixtures of these high polymers. Softeners, filling agents, dyestuffs etc. can also be added to the adhesive solution or dispersion.

The base fabric may if desired be of the same chemical composition as the flock material, since the adhesive layer protects the fabric from attack by the solvent. For example, wool, cotton, viscose, rayon, acetate rayon, as well as synthetic fiber material including polyamides, polyesters and polyvinyl base materials are all suitable for the base fabric. Also, agglutinated and pressed fiber fleeces, so called unwoven fabrics, made for example of polyamide staple fibers and/or cotton fibers are suitable.

The following non-limiting examples illustrate various base fabrics, adhesives, flock materials and solvent solutions. In each instance, the solvent solution is intentionally thickened in order to obtain sharply defined pattern effects. Several of the examples report the viscosity of the solvent medium as measured at 20° C. on the Hoeppler viscosimeter.

Example I

A catton fabric covered with a viscose rayon flock bonded thereto with a natural rubber adhesive was printed with a solution containing 69 g. pulverized technical grade zinc chloride, 31 g. water and 2 g. of viscose rayon waste. The solution had a viscosity of 243 cp. The printed fabric was then dried at 90° C. Subsequently, the fabric was thoroughly washed with cold water and finally dried under tension, to give a patterned fabric like that shown in the drawings.

Example II

A rayon fabric having a viscose rayon flock surface bonded with a polyvinylchloride solution containing a dioctylphthalate softener as the adhesive, was printed with a solution containing 860 g. of calcium thiocyanate crystals, 130 g. of water and 10 g. of viscose rayon. It was then dried at 120° C., after which it was thoroughly washed with cold water and dried under tension, to give a patterned fabric like that shown in the drawings.

Example III

A fabric covered with flock as set forth in Example I was printed with a solution containing 30 g. zinc oxide, 100 g. caustic soda, 850 g. water and 20 g. viscose waste. It was then allowed to stand at room temperature for 5 minutes after which it was treated for one minute with dilute sulfuric acid, to assure flock precipitation thoroughly washed with cold water and dried under tension, to give a patterned fabric like that shown in the drawings.

Example IV

A cotton fabric flocked locally with short viscose fibers employing melamineformaldehyde butylether resin modified with an alkydresin as the adhesive was printed with a solution containing 940 g. 16° Bé. caustic soda and 60 g. of wheat flour; the printing solution was cooled to −10° C. and applied at this temperature. Subsequently, without intermediate drying, the fabric was freed from the caustic with hot water and then soured with cold diluted sulfuric acid, washed neutral in cold water and dried under tension, to give a pattern in the flocked areas, whereas the unflocked cotton base remained practically unaltered. The hot water treatment effectively precipitated the viscose flock.

Example V

A cotton fabric covered with bleached cotton flock employing an adhesive ester of polyacrylic acid was treated with the zinc chloride solution of Example I. It was then dried at 100° C., washed in cold water and dried under tension, to give a patterned fabric like that shown in the drawings.

Example VI

A pressed and agglutinated fiber fleece, so-called unwoven fabric, consisting of nylon and cotton fibers covered with cotton flock fixed with a synthetic rubber adhesive, was printed with a cuprammonium-solution of the following concentration: 160 g./l. NH_3, 18 g./l. Cu, thickened with 20 g./l. of viscose waste, and activated with 10 g./l. of sodium hydroxide. After printing the fabric was dried, subsequently freed of copper oxide in 2° Bé. sulfuric acid, washed neutral in cold water and dried. A pattern fabric was thereby obtained.

Example VII

A process and agglutinated cotton fleece flocked with acetate rayon fibers on a polyvinylbutyral adhesive was printed with a solution containing 69 g. zinc chloride, 31 g. water and 2.5 g. of acetate rayon waste. The printing solution had a viscosity of 377 cp. The printed fabric was dried in warm air at 70–90° C., thoroughly washed with cold water and again dried, to give a patterned fabric like that shown in the drawings.

Example VIII

A fabric consisting of nylon staple fiber yarns flocked with short cut polyamide fibers employing an adhesive consisting of adducts of polyesters and isocyanates was printed with a solution containing 220 g. of phenol, 400 g. water and 380 g. of gum arabic. The solution had a viscosity of 260 cp. After printing, the fabric was dried and then subsequently washed and again dried under slight tension, to give a patterned fabric like that shown in the drawings.

Example IX

A cotton fabric flocked with wool employing natural rubber as an adhesive was printed with a solution containing 700 g. of 25° Bé. caustic soda, 260 g. water, 45 g. of wheat flour and 10 g. of Turkey red oil, which solution had a viscosity of 42 cp. The fabric was then steamed for 7 minutes and subsequently soured with 1° Bé. sulfuric

acid, whereby the solubilized wool was precipitated in the form of a thin adherent film on the rubber adhesive layer. The fabric was then washed neutral in cold water and dried. The result was a flocked fabric with a pattern such as that shown in the drawings.

Example X

A cotton fabric flocked with short cut acrylonitrile fibers employing an ethoxylin resin adhesive was printed with a solvent solution containing 900 g. of dimethylformamide and 100 g. of polyacrylonitrile fiber waste which had a viscosity of 195 cp. After printing, the fabric was dried with hot air, to give a patterned fabric like that shown in the drawings.

Example XI

A cotton fabric flocked with short nylon fibers employing a polyester-isocyanate adduct adhesive was printed with a solution containing 700 g. zinc chloride, 190 g. water, 10 g. water soluble methylcellulose and 100 g. of butanol. The printed fabric was dried at 120° C., washed with water and again dried under slight tension, to give a patterned fabric like that shown in the drawings.

Examples XII

A cotton fabric flocked with short polyester fibers ("Terylene") and a polyvinylbutyral adhesive was printed with the phenol solution of Example VIII. After printing, the fabric was dried at 120° C. and then thoroughly washed and again dried under slight tension, to give a patterned fabric like that shown in the drawings.

Although certain particular embodiments of the invention are herein disclosed for purposes of explanation, various further modifications thereof, after study of this application, will be apparent to those skilled in the art to which the invention pertains. Reference should accordingly be had to the appended claims in determining the scope of the invention.

What I claim is:

1. A process of treating a sheet material having an area of its surface coated with a flock material which is bonded to said sheet by an intermediate film of adhesive material which is inert to the later mentioned solvent, which process includes applying a solvent for said flock material to local points within said area which conform to a predetermined pattern to cause said solvent to penetrate the flock to said adhesive film at said points and to at least partially dissolve flock material, and precipitating the so dissolved flock as a deposit adhering to said adhesive film at said points, to thereby delineate upon said sheet the said pattern as an adherent film upon the adhesive film and bounded by the flock material adjacent said local points.

2. A process according to claim 1 wherein the solvent is in an aqueous medium.

3. A process according to claim 1 wherein said solvent prior to application exhibits a viscosity of about 150 to 450 centipoises at 20° C. as determined by a Hoeppler viscosimeter.

4. A process according to claim 1 wherein the flock coating is short fiber or dustlike material selected from the group consisting of natural and regenerated cellulose and cellulose derivatives, and the solvent is selected from the group consisting of aqueous solutions of zinc chloride, calcium thiocyanate, sodium zincate, and cuprammonium hydroxide.

5. A process according to claim 1 wherein the flock coating is acetate rayon, and the solvent is selected from the group consisting of diacetone alcohol, acetone, amyl acetate and dioxane.

6. A process according to claim 1 wherein the flock coating is wool, and the solvent comprises an alkali metal hydroxide solution.

7. A process according to claim 1 wherein the flock coating is a polyacrylonitrile material, and the solvent is selected from the group consisting of dialkylformamides and dialkylsulfoxides.

8. A process according to claim 1 wherein the flock coating is selected from the group consisting of polyamide and polyester material, and the solvent is selected from the group consisting of phenols.

9. A process according to claim 1 wherein the flock coating consists of polyamide material and the solvent is an aqueous solution of a metal salt of an inorganic acid.

10. A process according to claim 1 wherein the flock coating consists of polyamide material and the solvent is selected from the group of aqueous solutions of metal salts of inorganic acids to which at least partially water-soluble organic solvents are added.

11. A fabric having an area of its surface coated with flock material in the form of upstanding short textile fibers or dustlike matter bonded thereto by means of an intermediate film of adhesive material which is inert to the later mentioned solvent, said area having a pattern which is free of upstanding flock material and in which a firmly adherent film of dissolved and precipitated flock material covers the adhesive film, said pattern being bounded by adjacent upstanding flock material, which is produced by applying a solvent for said flock material to local points within said area which conform to the predetermined pattern to cause said solvent to penetrate the flock to said adhesive layer at said points and to at least partially dissolve flock material, and then precipitating the so dissolved flock as a deposit adhering to said adhesive film at said points, to thereby delineate said pattern upon the fabric.

12. A fabric as set forth in claim 11 wherein the fabric and the flock material comprise material of the same chemical composition.

References Cited in the file of this patent

UNITED STATES PATENTS

556,794	Wissel et al.	Mar. 24, 1896
880,983	Fulton	Mar. 3, 1908
1,425,520	Giesler	Aug. 15, 1922
1,588,951	Dreyfus et al.	June 15, 1926
1,818,505	Rivat et al.	Aug. 11, 1931
1,980,191	Dickie et al.	Nov. 13, 1934
2,307,118	Doring et al.	Jan. 5, 1943
2,511,171	Mitchell	June 13, 1950
2,636,837	Summers	Apr. 28, 1953