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FLOCKED PATTERN EFFECTS IN CELLULOSIC FABRICS AND THE PRODUCTION THEREOF

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This invention pertains to improved ornamental effects on cellulosic fabrics and to the production thereof, and more especially to such fabrics embodying flocked pattern effects alone or in conjunction with other ornamental effects, such as parchmentized, shrinkage or discharge effects, pigmented or dyed color effects, or a combination of these.

It is known to provide fabrics with so-called "flocked" designs by locally printing the fabric with a varnish according to a selected design, and then, while the varnish is moist and sticky, applying thereto, as for example by dusting or blowing, a coating of loose and finely comminuted fibers or flocks. The excess of such flocks not adhering to the varnished areas is removed mechanically, for example by beating, brushing or suction. This so-called flock print can be produced in colors by the use of flocks dyed in colors. The flocking may be applied to one or both sides of the fabric, as desired, depending on whether the varnish employed adheres only to one side of, or penetrates through, the fabric.

Although greatly enhanced ornamental effects would result from combining flocked pattern effects with various combinations of the other effects above referred to, no satisfactory methods have heretofore been devised for accomplishing this owing to the difficulties encountered. For example, the attempt to produce combined flocked and parchmentized effects by locally printing the fabric in different patterns with a flocking varnish and with a parchmentizing paste, such as zinc chloride, calcium thiocyanate solution or cellulose dissolving quaternary organic bases or organic amino oxides, thickened with cellulose, and thereupon applying the flock, results in permanent adherence of the flock not only to the varnish but also to the parchmentizing paste, owing to the parchmentizing action of the latter. The result is that the areas of the fabric intended to be parchmentized and made more transparent, are transformed into slightly flocked, cloudy areas. Also the flock in these areas will be stiffened by the parchmentizing agent, which of itself is undesirable. Also the fabric must be washed shortly after the parchmentizing paste is applied in order to prevent its impairing the fabric, but this must be done before the flock varnish has time to dry sufficiently, so that the washing operation will remove a large portion of the flock from the varnish printed areas. If, on the other hand, the fabric is first pattern printed with the varnish, then flocked, and then passed through a bath to parchmentize, the flock will again be stiffened and parchmentized along with the exposed portions of the fabric. Similarly, if the attempt is made to produce combined flocked and shrinkage pattern effects, by locally printing the fabric in different patterns with the flocking varnish and with a shrinking agent paste, followed by flocking, the fabric must be washed within a few minutes thereafter to prevent the shrinking agent from impairing the fabric. But within this interval, the varnish does not dry sufficiently to prevent the flock from being removed to a considerable extent during the washing operation. Alternatively, if the fabric is first printed only with the varnish, then flocked and dried, and then passed through a shrinking bath, the flock as well as the fabric will be attacked by the shrinking agent. Other proposals for combining the flocked patterns with the various ornamental effects above referred to are similarly objectionable for one reason or another.

In accordance with a principal feature of novelty of the present invention, it is proposed to overcome the above and like difficulties, by employing as the flock, a fiber material consisting of natural or regenerated cellulose which has been rendered relatively insensitive to strong swelling agents by treatment with formaldehyde in the presence of acid catalysts at temperatures of about 90° to 160° C., or by surface etherification or esterification, for example by treating the fibers with p-toluol sulfochloride or other etherizing or esterifying agents.

By employing such a flock, the fabric, after flocking, may be treated with swelling agents to produce, for example, parchmentized, shrinkage or discharge effects without impairing the desired soft and fleece-like qualities of the flock. For example, the fabric may be pattern printed with the flock varnish, then flocked and dried and thereupon passed through a bath of an appropriate swelling agent to produce desired parchmentized, or shrinkage effects in conjunction with the flocked pattern effects.

A desensitized flock of the character above described is, owing to its insensitiveness to the influence of moisture, particularly suitable generally in place of the flocked materials heretofore employed. Also special color effects can be produced due to the fact that such a flock has a resist action toward substantive colors. A further advantage consists therein that a colored flock which, for example, has been made insensitive in the manner stated, by treatment with formaldehyde, has an increased fastness to washing as compared to ordinary colored flocks.

If the fabric, after pattern printing with the flocking varnish followed by flocking and drying, is passed in this condition through a swelling agent bath, all portions of the fabric other than the flocked areas will be parchmentized, mercerized or shrunk, etc., depending on the swelling agent employed. In accordance with a second feature of the invention, parchmentized or shrinkage, etc., pattern effects may be combined in a predetermined relation or "registry" with the flocked pattern effects, by pattern printing the fabric in a single printing operation, i. e. by passing over successive printing rolls, with a resist against the swelling agent and also with the flocking varnish in such sequence that the varnish is always printed on last, following which the fabric is flocked with the desensitized flock and dried, and is thereupon treated in a bath of an appropriate swelling agent in order to parchmentize, shrink, etc., exposed areas, i. e. those other than the flocked and resist protected areas.

The reason why the flock varnish must be printed on the fabric last, i. e. subsequent to printing of the resist, is that in order to assure proper adherence of the flock, a relatively heavy coating of a highly adhesive or tacky varnish is required, such as would be spread out by and adhere to any subsequent print rolls, thereby impairing not only the subsequent printing operations but also the sharpness of delineation of the varnish pattern on the fabric. On the other hand, the resist when printed first, is substantially unaffected by the varnish print rolls, owing to the light coating of the resist required and to the rapid penetration of the resist into the fabric.

The resist against the swelling agent may be water-soluble, for example, gum arabic 1:1, or it may be a water-insoluble resist, such as a fast drying cellulosic lacquer, for example, a lacquer of medium viscosity nitrocellulose, in which case the resist will remain permanently in the fabric for imparting desired characteristics to the areas so reserved, such as slight but permanent and wash-resistant stiffness and smoothness. Also water-soluble resists, when employed, may contain suitable dyes, and the water-insoluble resists, when employed, may contain pigments, for providing dyed or wash-resistant pigmented effects in the resist areas.

During the flocking operation, little or no flock will adhere to the resist printed areas owing to the thin coating applied, its penetration into the fabric, and its relatively non-tacky character. Such flock as may adhere to the water-soluble resist, when employed, will be removed along with the resist during subsequent washing. Also the preferred water-insoluble lacquer resists employed, being fast drying, will be relatively dry and smooth when the flock is applied, thereby substantially eliminating any tendency of the flock to adhere thereto.

Parchmentizing can be effected in the manner above described by employment of a sulfuric acid bath of over 50.5° Bé. in the case of cotton fabrics, or below 50.5° Bé. in the event in the case of regenerated cellulose, in connection with which, if desired, a subsequent treatment with lye of mercerizing strength, with or without tensioning, may be used.

For shrinking, the flocked fabric either printed with the resist or not as desired, depending on the effect to be produced, is treated in loose condition in a liquor of mercerizing strength or is impregnated on the padding machine with such liquor and, after squeezing out, is allowed to lie for a few minutes, or is treated in loose condition with sulfuric acid below parchmentizing strength, for example, sulfuric acid of 50° Bé. Where resist printing is employed, localized shrinkage will of course be effected in the non-reserved areas. Other interesting results may be obtained by merely varnish printing, flocking and drying the fabric, and thereafter pattern printing with a thickened alkali shrinking agent, followed by washing after a few minutes to remove the shrinking agent.

Flocked pattern effects may be combined with parchmentized and shrinkage pattern effects, by first pattern printing in a desired registry with a water-soluble resist and with a flock varnish, followed by flocking, drying and treating in a parchmentizing bath as aforesaid to parchmentize the non-reserved areas, whereupon the fabric is washed to remove the water-soluble resist, and treated in a shrinking bath, whereby the areas reserved by the water-soluble resist against parchmentization in the parchmentizing bath, will now be shrunk. Also creped or embossed pattern effects may be produced in the non-parchmentized and non-flocked areas if, after removal of the water-soluble resist following the parchmentizing treatment, the fabric is again printed with a second resist prior to treatment in the shrinkage bath, whereby during the shrinkage treatment, the areas reserved by the second resist will be protected against shrinkage. Creped effects may be produced, for example, by printing the second resist in stripes, preferably relatively narrow and closely spaced; and pronounced embossed effects may be produced by printing the second resist in spaced rectangles, squares or other regularly recurring patterns whereby either the shrunk or unshrunk areas will be wholly separated from one another and by subjecting the so-printed fabric to a strong shrinkage treatment, for example, soda lye of 28° to 38° Bé. for about three minutes. The second resist may be water-soluble, in which case it is removed on subsequent washing, or it may be a water-insoluble lacquer resist, in which case a slight but permanent stiffness will be imparted to the creped or embossed areas. It is to be understood of course that creped or embossed effects may be combined with pattern effects, and without the presence of parchmentization, by printing the first resist in the manner aforesaid along with the flocking varnish, and thereupon subjecting the fabric only to a shrinking treatment.

Patterned genuine crepe effects combined with flocked pattern effects can also be obtained by employment of a fabric containing highly twisted yarns, which is pattern printed with the flock varnish and also with a resist in registry therewith, if desired, followed by flocking and, after treatment with a parchmentizing agent, treatment in a hot soap solution to crepe the non-parchmentized areas in the well-known manner as applied to such highly twisted yarn fabrics. Also in accordance with the invention, flock print effects may be combined with embroidery-like discharge or Devorant effects, the latter obtained for instance in accordance with German Patents 454,361 and 632,067, and U. S. Patent 2,145,858.

Further combined effects are possible in combination with transparent effects in connection with which, however, the transparentization is not effected by parchmentizing, but by pattern printing the fabric with viscose or cellulose ethers

or also gelatine, optionally after fixing of the imprint, followed by subsequent treatment of the fabric either wholly or locally, with lye or mercerizing strength and with or without tensioning. For fabrics treated with viscose or cellulose ethers, an increased transparent effect can be obtained in this connection by further treatment with sulfuric acid below 50.5° Bé.

A flock material which, due to its resistance to swelling agents, is particularly suitable for the production of the combined flock print effects above described can be produced as follows: Loose, short, previously bleached cotton fibers or rayon fibers made from regenerated cellulose, and dyed if desired with vat or naphthol dyes, are impregnated with an aqueous solution of

	cc.
40% formaldehyde	400
Aluminum thiocyanate solution of 17° Bé. per liter	40

are thereupon squeezed, pre-dried at about 60° C., and heated for about 20 minutes at about 120° C., rinsed and dried.

As varnishes for fixing the flock of the fabric, there may be used tacky drying varnishes, such as those having a drying oil or resin base, for example, synthetic resins, alkyd resins, etc., or also nitrocellulose varnishes, all of which are obtainable for this purpose on the market.

The following are examples of some of the processes and various novel pattern effects that may be secured in accordance with the procedures above outlined.

1. Mercerized cotton mousseline is printed with a varnish and thereupon flocked with a flock rendered insensitive as aforesaid; thereupon dried, parchmentized with sulfuric acid of 54° Bé. at 15° C. for 10 seconds, rinsed, washed, dried and optionally subjected to a remercerization treatment with caustic soda solution of 30° Bé. at 17° C. under tension; thereupon the lye is removed, the fabric acidulated, rinsed and dried on the tentering frame. The ornamental effect produced comprises a flocked pattern effect against a parchmentized background.

2. Apply the flock and parchmentize as in Example 1. Instead of tension-mercerization, shrink by 3-minute immersion in caustic soda solution of 30° Bé., then remove the lye, acidulate, rinse and dry. The ornamental effect produced is a flocked pattern effect against a parchmentized background whereby undulation effects are produced by the shrinking treatment more or less pronounced according to the pattern.

3. A rayon viscose fabric is printed with a varnish and thereupon rayon flock which has been made insensitive as aforesaid, is applied; it is thereupon dried and parchmentized with sulfuric acid of 47° Bé. for 10 seconds, then rinsed and dried on the tentering frame. The ornamental effect produced is a flocked pattern against a parchmentized background.

4. A mercerized warp sateen is printed on the back with a varnish of a medium viscosity nitrocellulose; it is then dried and a flock varnish is applied on the right side; then flock which has been rendered insensitive is applied; the fabric is dried and thereupon impregnated on the slop padding machine with caustic soda solution of 38° Bé., then squeezed, left to lie for 3 minutes, the liquor is removed, the fabric is acidulated, rinsed and dried. Flocked pattern effects combined with shrinkage effects are obtained.

5. Mercerized cotton mousseline is printed with a pigment varnish consisting of:

	Grams
Acetyl cellulose	50
Acetone	450
Ethyl alcohol	100
Amyl acetate	100
Titanium white	300

and thereupon in the same printing operation, varnish is applied prior to the fixing on of the flock. After the applying of the flock with swelling-resistant flock material, the fabric is dried and treated further as in Example 1. The ornamental effect produced comprises opaque flocked and lacquer protected pattern areas against a parchmentized or transparentized background.

6. Print a mercerized cotton mousseline fabric in the same printing process with (1) a vat dye paste, (2) a water-soluble gum arabic resist 1:1, (3) a water-insoluble pigment varnish consisting of

	Grams
Acetyl cellulose	50
Acetone	450
Ethyl alcohol	100
Amyl acetate	100
Titanium white	300

and (4) a varnish for the fixing of the flock, in connection with which care must be taken that the flock is printed on last as above explained. After flocking, dry, steam, parchmentize with sulfuric acid of 54° Bé. at 15° C. for 10 seconds, rinse and wash to remove the water-soluble resist; dry and remercerize with caustic soda solution of 30° Bé. at 17° C. under tension, remove the lye, acidulate, rinse and dry on a tentering frame. The ornamental effects produced comprise flocked and opaque lacquer pigmented areas, parchmentized or transparentized areas, and smooth mercerized areas, colored and uncolored.

7. A pre-bleached, cotton crepe fabric (i. e. containing highly twisted yarns) is dried under sharp tension on a tentering frame; is printed with a water-soluble gum arabic resist 1:1, and in registry to same with a varnish; it is then provided with flock, dried and parchmentized with sulfuric acid of 54° Bé. for 10 seconds, washed to remove the water-soluble resist, and thereupon creped in a slightly alkaline, boiling crepe bath. The ornamental effects produced comprise opaque flocked pattern areas, parchmentized areas, and creped areas.

8. A fabric containing in the warp and weft, a filler of slightly nitrated cotton yarn, in addition to natural cotton yarn, is printed with a resist of:

	Grams
British gum (dextrin)	200
Sodium hydroxide solution of 36° Bé	800

and thereupon printed in registry with varnish. Thereupon the flock is applied, the fabric is dried and steamed for 7 minutes at above 100° C. whereby the resist burns out the nitrated yarns in the resist areas. After washing out of the burnt out or discharged yarns, the fabric is denitrated in the customary manner by treating for 1½ hours at 35–40° C. with an aqueous solution of 20 grams of sodium sulfhydrate per liter. The fabric is thereupon washed out and then completed in the customary manner. Combined flock and embroidery pattern effects are produced against a background of the untreated material. The patterns are preferably so ar-

ranged that the flocked areas border the discharged areas, whereby eyelet embroidery and like effects are produced.

9. A mercerized, bleached, cotton voile fabric is printed with a cellulose xanthogenate solution of 6% cellulose content and about 8% sodium hydroxide content and in registry to same with a varnish; thereupon the flock is applied and the fabric is dried, followed by mercerization under tensioning. The ornamental effects produced comprise transparent pattern combined with flock printed pattern.

I claim:

1. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: pattern printing the fabric with an adhesive varnish, applying to the varnished areas a coating of cellulosic flock material resistant to the action of strong swelling agents, impregnating the so-treated fabric with a swelling agent to swell the fibers in the exposed areas, and washing to remove said agent.

2. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: pattern printing the fabric with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of parachmentizing agents, impregnating the fabric with a parchmentizing agent to parchmentize the fibers in the exposed areas, and washing to remove said agent.

3. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: pattern printing the fabric with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of shrinking agents, impregnating the fabric with a shrinking agent, and thereafter washing to remove said agent.

4. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with a resist against the action of swelling agents and with an adhesive varnish, applying a flock material to the varnished areas and drying, impregnating the so-treated fabric with a swelling agent to swell the fibers in the exposed areas, and washing to remove said agent.

5. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with a resist against the action of swelling agents and with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of swelling agents and drying, impregnating the so-treated fabric with a swelling agent to swell the fibers in the exposed areas, and washing to remove said agent.

6. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with, successively, a resist against the action of swelling agents and with an adhesive varnish, applying a flock material to the varnished areas and drying, impregnating the so-treated fabric with a swelling agent to swell the fibers in the exposed areas, and washing to remove said agent.

7. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with, successively, a resist against the action of swelling agents and with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of swelling agents and drying, impregnating the so-treated fabric with a swelling agent to swell the fibers in the exposed areas, and washing to remove said agent.

8. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with, successively, a resist against the action of parchmentizing swelling agents and with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of swelling agents, impregnating the so-treated fabric with a parchmentizing agent to parchmentize the fibers in the exposed areas, and washing to remove said agent.

9. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with, successively, a water-soluble resist against the action of parchmentizing swelling agents and with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of swelling agents and drying, impregnating the so-treated fabric with a parchmentizing agent to parchmentize the fibers in the exposed areas, washing to remove said agent and said resist, impregnating the fabric with a shrinking swelling agent, and thereafter washing to remove said agent.

10. Process for producing ornamental pattern effects in cellulosic fabrics, which comprises: printing the fabric in different patterns and in registered relation with, successively, a water-soluble resist against the action of parchmentizing swelling agents and with an adhesive varnish, applying to the varnished areas, a cellulosic flock material resistant to the action of swelling agents and drying, impregnating the so-treated fabric with a parchmentizing agent to parchmentize the fibers in the exposed areas, washing to remove said agent and said resist, printing the fabric in a different pattern with a second resist, impregnating with a shrinking swelling agent, and thereafter washing.

11. Process for producing ornamental effects in cotton fabrics containing natural fiber yarns and nitrated yarns, which comprises: printing the fabric in different patterns and in registered relation with a discharge resist for removing said nitrated fibers in the resist areas, and with an adhesive varnish, applying a flock material to the varnished areas, drying, thereafter steaming and washing the fabric to remove said nitrated fibers in the resist areas, denitrating the remaining nitrated fibers, and washing.

12. A cellulosic textile fabric, at least a portion of which embodies an adherent coating of cellulosic flock fiber treated to resist moisture and the action of swelling agents.

13. A cellulosic textile fabric, at least a portion of which embodies an adherent coating of flock material resistant to moisture and the action of swelling agents, said material being selected from the group consisting of etherized, esterified and formaldehyde-treated cellulosic fiber.

14. A cellulosic textile fabric embodying areas treated with a swelling agent and areas having an adherent coating of a flock material.

15. A cellulosic textile fabric embodying areas treated with a swelling agent and areas having

an adherent coating of a cellulosic flock material resistant to moisture and the action of swelling agents.

16. A cellulosic textile fabric embodying parchmentized areas and areas having an adherent coating of cellulosic flock material resistant to moisture and the action of swelling agents.

17. A cellulosic textile fabric embodying areas treated with a shrinking agent and areas having an adherent coating of flock material resistant to moisture and the action of swelling agents.

18. A cellulosic textile fabric embodying areas treated with a shrinking agent and areas having an adherent coating of a cellulosic flock material resistant to moisture and the action of swelling agents.

19. A cellulosic fabric embodying parchmentized areas, areas treated with a swelling agent, and areas having a coating of a cellulosic flock material resistant to moisture and the action of swelling agents.

20. A cellulosic textile fabric embodying lacquer pigmented areas, areas treated with a swelling agent, and areas having an adherent coating of a flock material.

21. A cotton fabric embodying open-work areas resulting from treatment of nitrated yarns with a discharge agent, and areas having an adherent coating of flock material.

22. Process for producing ornamental pattern effects in cellulosic textile fabrics, which comprises: printing the fabric in different patterns and in registered relation with a dye-containing, water-soluble resist against the action of swelling agents and with an adhesive varnish, applying to the varnished areas a cellulosic flock material resistant to the action of swelling agents and drying, impregnating the so-treated fabric with a swelling agent to swell the fibers in the exposed areas, and washing to remove the said agent and said resist.

23. A cellulosic textile fabric embodying dyed and otherwise untreated areas, areas treated with a swelling agent, and areas having an adherent coating of a cellulosic flock material resistant to the action of swelling agents.

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