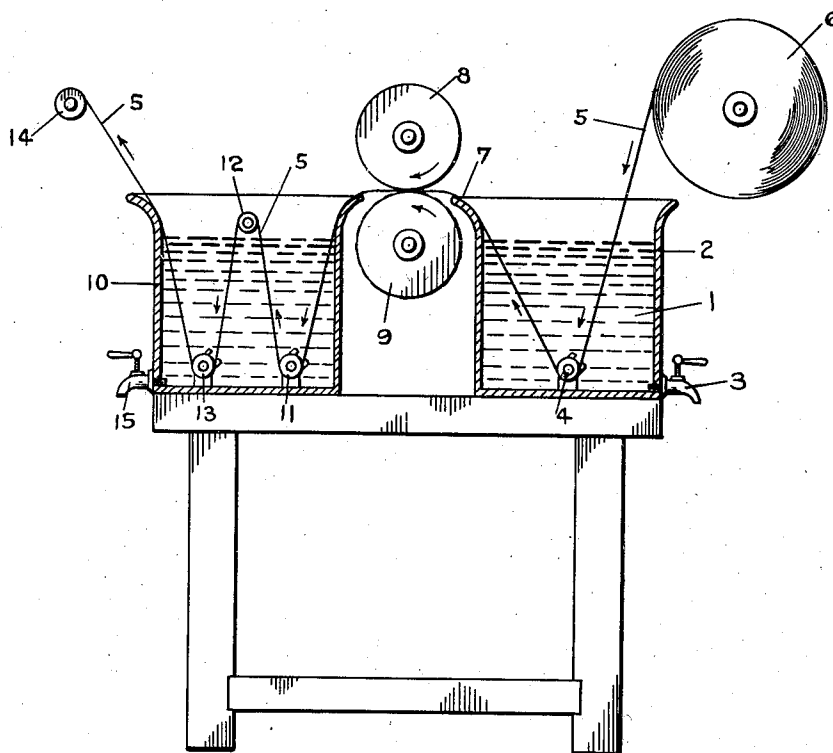


Feb. 15, 1949.

R. L. HUNTER ET AL
PATTERNED TEXTILE MATERIAL

2,461,603

Filed July 14, 1944



INVENTORS.

ROBERT LEE HUNTER
RALPH D. CRAMER.

BY

J. B. G. & C. W. W.
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,461,603

PATTERNED TEXTILE MATERIAL

Robert Lee Hunter and Ralph Denzel Cramer,
Cumberland, Md., assignors to Celanese Cor-
poration of America, a corporation of Delaware

Application July 14, 1944, Serial No. 544,948

1 Claim. (Cl. 8-17)

1

This invention relates to the production of decorative fabrics and relates more particularly to the production of ornamental or patterned fabrics made of or containing yarns having a basis of a thermoplastic organic material such as, for example, synthetic linear polyamide condensation products, polymerized vinyl compounds, or cellulose acetate or other organic derivative of cellulose.

An object of this invention is to provide an improved process for the production of patterned effects on thermoplastic materials, for example, cellulose acetate or other organic derivative of cellulose fabrics by printing processes.

Another object of this invention is the production of ornamental, printed cellulose acetate or other organic derivative of cellulose fabrics wherein the patterned effects are permanent and highly resistant to the effects of washing, dry-cleaning and ironing.

A further object of this invention is the provision of an improved process for the production of dyed, ornamental, patterned fabrics, especially fabrics of cellulose acetate or other organic derivative of cellulose material wherein the dyestuff is padded on to the fabric and the fabric ornamented in a single operation.

Other objects of this invention will appear from the following detailed description and the accompanying drawing.

In the drawing, the figure is a side elevational view of an apparatus for the production of patterned fabrics in accordance with our invention.

Patterned cellulose acetate fabrics or fabrics of other thermoplastic materials such as, synthetic linear polyamide condensation products or polymerized vinyl compounds, exhibiting ornamental and decorative effects have heretofore been produced by embossing operations employing heat and pressure. Usually, the patterned effect is obtained by passing the fabric between a pair of heated, engraved rollers, the design being present in relief and intaglio fashion and, under heat and pressure, the thermoplastic fabric is actually subjected to a molding operation. To aid this embossing or molding operation, it has been proposed to treat the fabrics with plasticizing or softening agents prior to embossing. Such embossing operations produce textured or sculptured three-dimensional designs on the fabric which, while attractive, are impractical since the fabrics cannot be ironed without injury to the design. Another disadvantage lies in the fact that these embossed fabrics do not drape and tailor as well as the usual types of fabrics since the embossed design

2

and the process for producing the same have a stiffening action on the fabric.

We have now discovered that patterned, ornamental fabrics of excellent draping qualities and in which the design is permanently resistant to washing and cleaning may be produced by a novel printing process. In accordance with our invention these patterned fabrics are produced by immersing a fabric of yarns of a synthetic linear polyamide condensation product, polymerized vinyl compounds, or cellulose acetate or other organic derivative of cellulose in a bath containing an organic agent having at least a softening and swelling action on said material, and, while said fabric is in a partially swollen condition, passing the fabric between a pair of unheated or cold rolls, one of which is smooth and the other of which is engraved intaglio fashion with the desired design. The fabric becomes locally delustered on the surface at those areas within the borders of the engraved design where obviously the rolls exert little or no pressure on the fabric. A pleasing, permanently patterned fabric is produced by this novel operation which forms on the fabric a delustered design at those areas of relatively little pressure reproducing the engraved intaglio pattern of the roller.

The bath employed in surface printing the fabrics in accordance with our invention may contain any suitable agent having at least a swelling or softening action on the thermoplastic materials. As examples of suitable agents having a swelling or softening action on cellulose acetate or other organic derivative of cellulose materials there may be mentioned the lower aliphatic alcohols, such as ethyl alcohol, methyl alcohol, propyl alcohol, isopropyl alcohol, butyl alcohol, amyl alcohol, and the various secondary and tertiary isomers of butyl and amyl alcohol. Other agents which may be employed are aliphatic acids, such as, acetic acid and propionic acid, ketones, such as acetone or methyl ethyl ketone which are also softening or swelling agents for polymerized vinyl derivatives. Mixtures of these various alcohols, acids, and ketones are also suitable. Halogenated hydrocarbons such as chloroform, methyl chloride, ethylene dichloride and mixtures of these halogenated hydrocarbons with methyl or ethyl alcohols are also satisfactory. Suitable softening agents for the treatment of synthetic linear polyamide condensation products are, for example, phenol, meta-cresol, o-toluidine and benzidine. These swelling or softening agents may be employed in aqueous solution where water-soluble, or in solution in

any other inert organic liquid having no appreciable swelling or solvent action on the cellulose acetate or other thermoplastic materials. The amount of the organic swelling or softening agents in the bath employed will vary, depending upon the degree of swelling or softening action desired. Preferably, when treating cellulose acetate materials, we employ as a swelling or softening agent, aqueous solutions of ethyl alcohol containing 33.5 to 90% of alcohol or aqueous solutions of acetic acid containing from 33.5 up to 60 or 70% of acetic acid. The treating bath may be employed at temperatures of 0° to 78° C., depending on the freezing point of the swelling agent but room temperatures are usually preferred.

Our novel printing process is not only suitable for the production of patterned fabrics made of or containing any textile yarns or filaments but especially advantageous results are obtained where it is employed for simultaneously dyeing and printing cellulose acetate or other organic derivative of cellulose fabrics. By dissolving a suitable dyestuff in the bath and then passing the liquor-laden fabric between a smooth roller and an engraved roller, the fabric is not only dyed rapidly but is printed as well.

The dyestuffs employed may be acid dyes which are used for the dyeing of wool and normally show little or no affinity for organic derivatives of cellulose or the dyes may be those relatively water-insoluble dyes which are normally applied to organic derivative of cellulose materials in solubilized, dispersed form. Vat dyestuffs in the form of their leuco sulphuric acid esters are also satisfactory. Preferably, we employ direct dyeing dyestuffs which yield their ultimate shade on the material being dyed directly, without any pre-treatment or after-treatment designed to effect a chemical change in the structure of the dyestuff or in the material being dyed. The dye bath may contain from 0.1 to 25% of dyestuff based on the weight of the material depending upon the shade desired in the material being dyed and printed.

Our novel process may be carried out in a continuous manner, the fabric being passed into a suitable vessel containing the desired treating liquid and then passed directly to the rollers, one of which is smooth and the other of which is engraved. The usual type of padding mangle may be employed, one of the padding rollers being removed and replaced by a roller engraved with the desired pattern. Either the upper or the lower roller of the padding mangle may be replaced. In lieu of an engraved roller, a sand-blasted roller may be employed to yield an all-over delustered effect, or a pair of smooth rollers may be employed and an all-over effect achieved by a sheet of paper or a textured fabric or other such web of textured material carried by one of the rollers, the web contacting the surface of the fabric being processed and effecting a delustering on those areas in contact with the web. After the fabric passes through the solvent bath and is subjected to the nipping action or the pressure of the rollers, the fabric is then passed through a vessel containing water or other solvent for the swelling or softening agent present on the material. During its passage through the latter vessel, the organic swelling or softening agent is extracted from the fabric and the dyed and printed patterned fabric is then washed and finished as desired. Our novel process may be carried out rapidly and the fabric may be dyed

and printed at speeds ranging up to 60 yards per minute. The fabrics are dyed in full, level, deep shades and do not suffer any wash down in shade during subsequent scouring and finishing operations.

The organic derivative of cellulose fabrics treated in accordance with our process may have a basis for yarns or filament of any cellulose ester or cellulose ether. Examples of cellulose esters are cellulose acetate, cellulose propionate, cellulose butyrate, mixed esters, such as, cellulose acetate-propionate, and cellulose acetate-butyrate while examples of cellulose ethers are, ethyl cellulose and benzyl cellulose. The polymerized vinyl compounds which may be printed in accordance with our novel process are, for example, polymerized vinyl chloride, polymerized vinyl acetate or copolymers of vinyl chloride and vinyl acetate. Synthetic linear polyamide condensation products which may be so treated are those derived from the condensation products of diamines with dicarboxylic acids known generically as nylon. The fabrics may contain yarns or filaments of other textile materials which are not affected by the solvent or swelling action of the dye bath, and novel and decorative effects may be produced, wherein only the organic derivative of cellulose materials are patterned by the action of the engraved roller. By the incorporation of dyestuffs, having an affinity for the other textile materials, solid or cross-dyed effects may be produced.

In order to illustrate our invention, but without being limited thereto, the following examples are given:

Example I

A dye bath is prepared by dissolving 2 parts by weight of Celliton Fast Navy Blue B (methylated tetra-amino-anthraquinone) in 68 parts by weight of alcohol and 30 parts by weight of water. The dye bath, indicated by reference numeral 1 in the drawing, is contained in a suitable vessel 2, provided with a spigot 3 and having a guide roller 4 fastened to the base of said vessel 2 at a point below the surface of the dye liquor. A cellulose acetate fabric 5, taken from a roll 6, is passed into the dye bath and led beneath roller 4. The fabric moves in the direction shown by the arrows. After leaving the vessel 2, the fabric is partly drained as it moves along lip 7 of vessel 2 and is then passed between smooth roller 8 and engraved roller 9. Roller 9 is substituted for the bottom roller of the usual padding mangle. Rollers 8 and 9 are driven by suitable means (not shown) and the fabric 5 after leaving the nip of rollers 8 and 9 is passed into a second vessel 10 containing water. The fabric is passed under guide roller 11, over a guide roller 12 and then under guide roller 13 before leaving the vessel. The alcohol is extracted from the fabric by the water in the vessel 10 and the fabric is then taken up in the form of a roll or bolt 14. Vessel 10 is provided with a spigot 15 by means of which the water may be circulated continuously or intermittently to insure proper extraction and recovery of the alcohol. While the fabric may be taken up in the form of roll or bolt 14 as shown, it may, of course, be passed directly to a suitable scouring or finishing treatment. The operation effects a simultaneous dyeing and printing of the fabric and the effect produced is substantially similar to that obtained in fabrics woven on a Jacquard-type of loom. The patterned effect is permanently resistant to

5

washing and ironing and may be produced at only a fraction of the cost of fabric woven on the Jacquard loom.

Example II

Employing an aqueous bath comprising 50% by weight of acetone and treating a cellulose acetate fabric of a twill weave in accordance with the process of Example I, an attractively patterned fabric is obtained.

While our invention produces the most striking and attractive results when treating fabrics of a satin weave, fabrics of other weaves such as for example, ninon, tricot or twill weaves may be printed in similar fashion and very attractive results may be produced, particularly where said fabrics contain bright or lustrous yarns.

The terms "unheated" and "cold," as applied to the cylindrical surface referred to in the specification and claims for applying pattern effects to the fabrics, are to be construed as meaning surfaces which are at room or atmospheric temperature, i. e. about 20° C.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention what we desire to secure by Letters Patent is:

Process for the production of dyed and patterned fabrics, the pattern of which is delineated

6

by lustrous and substantially lusterless areas, which comprises immersing a fabric having a basis of a cellulose acetate material in a solution consisting of 2 parts by weight of a dyestuff for the cellulose acetate material 68 parts by weight of a lower aliphatic alcohol and 30 parts by weight of water, and subjecting the wetted material while in a swollen condition to pressure between a pair of unheated rotating, cylindrical surfaces, one of which surfaces is smooth and the other of which is engraved in the desired pattern.

ROBERT LEE HUNTER.

RALPH DENZEL CRAMER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,716,255	Woodman	June 4, 1929
1,744,829	Dreyfus	Jan. 28, 1930
1,839,045	Dreyfus	Nov. 29, 1932
1,839,061	Dickie	Nov. 29, 1932
1,839,062	Dreyfus	Nov. 29, 1932
1,947,923	Beck	Feb. 20, 1934

FOREIGN PATENTS

Number	Country	Date
407,137	Great Britain	Mar. 15, 1934
467,665	France	Apr. 3, 1914