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UNITED STATES PATENT OFFICE

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PRODUCTION OF PATTERN EFFECTS UPON TEXTILE GOODS

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This invention relates to the production of pattern effects upon textile goods, and more particularly to a process for the production of pattern effects upon goods made of or containing vegetable fibres, by the action of swelling agents upon the goods, without the necessity of applying such agents by printing with same upon only localized portions of the goods to produce the pattern effects, or of printing upon only localized portions of the goods with a suitable resist composition before subjecting the goods to the swelling agent.

The objects of the invention are to obtain durable pattern effects in connection with the use of swelling agents in a quick and more economical manner, and to obtain improved color or tone variations in such pattern effects.

The invention consists in the novel features of the method which are herein described according to the preferred manner of carrying out same, and the invention will be more particularly pointed out in the appended claims.

It is known that cotton and other vegetable fabrics may be modified by means of the action of strong alkalis, certain mineral acids and other swelling agents which chemically structurally change one or more natural characteristics of such fabrics, and that advantage may be taken of this modification of such fabrics by swelling agents to produce pattern effects upon the fabrics by localizing the action of the swelling agents on such fabrics to various portions thereof. Many such swelling agents and different processes for producing durable pattern effects upon fabrics by localizing the actior of such swelling agents upon the fabrics, are now well known. For example, the following United States Letters Patent disclose various swelling agents and processes that may be used for producing pattern effects:

Patents to Georges Heberlein

Patent No. 1,141,872 granted June 1, 1915;
Patent No. 1,144,655, granted June 29, 1915;
Patent No. 1,201,961, granted Oct. 17, 1916;
Patent No. 1,288,884, granted Dec. 24, 1918;
Patent No. 1,288,885, granted Dec. 24, 1918;
Patent No. 1,392,264, granted Sept. 27, 1921;
Patent No. 1,392,265, granted Sept. 27, 1921;
Patent No. 1,439,513, granted Dec. 19, 1922;
Patent No. 1,439,515, granted Dec. 19, 1922;
Patent No. 1,439,518, granted Dec. 19, 1922; and

Patents to Eduard Heberlein

Patent No. 1,265,082, granted May 7, 1918;
Patent No. 1,439,517, granted Dec. 19, 1922;
Patent No. 1,439,519, granted Dec. 19, 1922.

According to these processes as heretofore practiced one may apply the swelling agent to the fabric by printing it directly upon the fabric according to the pattern to be produced, or else one may proceed in a more practical way by printing a resist upon the fabric, and subsequently subjecting the fabric to the swelling agents which will attack the portions not covered by the resist printing.

According to the present invention the resist printing may be replaced by the simpler means of localized pressing of the fabric according to the pattern to be produced, by substantial pressure at elevated temperatures (i. e., of at least 100° C. of the pressure surface) upon such portions of the fabric as are not to be modified or fully modified by the swelling agent, the fabric being subjected to a swelling agent after the localized pressure has been applied. It has been found that such portions of the fabric as have been subjected to this pressure at high temperature are either not affected at all by the subsequently applied swelling agent or are not affected to the extent that the unpressed portions are affected: so that by the simple method of first imprinting the pattern upon the fabric under substantial pressure at high temperature and then subjecting the fabric to the swelling agent, durable or permanent finish pattern effects are produced.

For example, if a cotton fabric is caused to run under pressure through a goffering calender exerting a pressure of approximately 700 pounds per square inch the imprint cylinder of which is heated to 140° C., there occurs at the pressed spots, in consequence of the effect of the pressure and the heat, such a change in

the state of the fabric that the swelling agent or agents which are subsequently applied either do not act on such pressed portions at all, or act only to a much slighter extent than upon the enlarged or unpressed portions of the fabric, according to the duration of the action of such swelling agents upon the fabric. Thus for example one may emboss the desired pattern upon the fabric by the heated roller and then subject the fabric to any well known swelling agent for vegetable fibres, such for example as sulphuric acid, phosphoric acid, nitric acid, caustic alkali and other well known swelling agents, which are allowed to act upon the fabric to produce the desired modification of the fabric upon the unpressed portions of the fabric.

The different characteristics of swelling agents to produce any particular modification of the vegetable fibres, as well as the strengths of such swelling agents, the temperatures at which they should be used to produce desired effects, and the duration of the action of such agents upon the fabrics, are now well known to those skilled in the art and therefore need not be given here in detail. The effects of such swelling agents upon the unpressed portion of various vegetable fibre fabrics according to this invention will be the same as their effect upon fabrics according to known processes for producing all over or pattern effects according to other prior inventions including those disclosed in the patents above mentioned. This invention contemplates the use of any and all suitable swelling agents in connection with the embossing at elevated temperature, depending upon the particular pattern effect desired. The fabric may be subjected to the swelling agents by immersion or otherwise. After the modification of the fabric has taken place in consequence of the pressing and immersion, the relief-like pressing is wholly or partially caused to disappear by a subsequent washing process, whereas the patterned effect that has resulted from the difference in the structural changes that have taken place in the unpressed portions of the fabric, as contrasted with the pressed portions, remains to define the pattern effect. The pressing itself may be effected in the customary manner by means which operate on the principle of roller printing or of the flat engraved plate.

The material that is to be treated according to this process may be subjected to the pressure either dry or moistened, in the raw, previously bleached, or otherwise previously treated state. After the production of the patterned effect all of the customary subsequent or improvement processes, such as bleaching, dyeing, printing, etc., may be applied to the fabric. By dyeing the goods before the pressed condition of the embossed portions of the fabric has been eliminated, there are produced, in consequence of the partially changed condition of the fibres that have been altered at such portions or spots, the well known tone-in-tone effect, i. e., patterns which are formed in different tones of the same color merely by brighter and darker effects of such general color.

The invention may be applied to all fabrics composed of natural vegetable fibres or of artificial fibres containing cellulose such as the artificial silks, or of mixtures of such natural or artificial fibres, or of mixtures of one or both of such fibres with animal fibres. Not only spun yarns but also any arrangement of fibres, and all forms of fabrics knitted, woven and embroidered goods or the like may have this process applied thereto.

It will be understood that when there are present in a fabric, fibres that are not normally susceptible to the swelling agent or agents used, these will not have their characteristic altered in the portions subjected to pressure, from the characteristic of such fibres in the unpressed portions, in the same manner as the vegetable fibres in such pressed portions will have their characteristic altered with respect to such vegetable fibres in the unpressed portions, and this fact will add to the variety of effects that may be produced in such mixed fabrics by the application of this invention.

According to this invention, printing by pressure at elevated temperature and the subsequent treatment of the goods by a swelling agent may be applied to goods which have already been subjected to the action of one or more swelling agents. For example, one may mercerize fabric or treat it with one or more swelling agents to produce a wool, organdie or other effect in known manner, and thereafter apply the printing of the pattern under pressure at elevated temperature to eliminate or modify the action of a subsequently applied swelling agent or agents upon such pressed portions. It is now well known that after a fabric has been treated with one or more swelling agents to produce a certain desired effect, such fabric may be additionally treated with one or more swelling agents to enhance, modify or alter the previously attained finish, and according to this invention the embossing with heat may be applied between any two treatments of the fabric with swelling agents, in which case the pressed or embossed portions will retain more or less of the effect produced at such portions prior to the embossing, whereas the unpressed portions will acquire the effect or finish naturally expected as a result of the subsequent swelling treatment or treatments to which the fabric is subjected. According to this latter phase of the invention, after the treatment of the fabric with the first swelling agent or set of swelling agents, and the washing out of the same from the fabric, the fabric is, before or after drying, subjected

to the hot pressure, and thereafter further treated with one or more swelling agents as above set forth. It will be understood that, as is known in the art, the treatment of the fabric with the swelling agent either before or after the hot pressing, may be accomplished with or without stretching of the fabric.

While I have described my invention in connection with the preferred manner of practicing the same, and have cited certain particular patents in the prior art describing certain particular swelling agents and methods of utilizing same to produce permanent finishes upon fabrics, it will be understood by those skilled in the art, after understanding my invention, that these are given merely by way of illustration, and that there may be various changes, modifications and substitutions made without departing from the spirit and scope of my invention, and I aim in the appended claims to cover all such changes and modifications as come within the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. Process for the production of durable pattern effects upon goods comprising vegetable fibres, which comprises altering the susceptibility of such fibres to swelling agents at certain portions of the goods by subjecting such portions to substantial pressure at a temperature of at least 100° C. and thereafter subjecting the goods to a swelling agent for vegetable fibres.

2. Process for the production of durable pattern effects upon goods comprising vegetable fibres, which comprises altering the susceptibility of such fibres to swelling agents at certain portions of the goods by subjecting such portions to substantial pressure at a temperature of at least 100° C., subjecting the goods to a swelling agent for vegetable fibres, and then washing the goods to eliminate at least in part the compressed portions due to the pressure.

3. Process for the production of durable pattern effects upon goods comprising vegetable fibres, which comprises altering the susceptibility of such fibres to swelling agents at certain portions of the goods by subjecting such portions to substantial pressure at a temperature of at least 100° C., subjecting the goods to a swelling agent for vegetable fibres, and thereafter dyeing the goods.

4. Process for the production of durable pattern effects upon goods comprising vegetable fibres, which comprises altering the susceptibility of such fibres to swelling agents at certain portions of the goods by subjecting such portions to substantial pressure at a temperature of at least 100° C., subjecting the goods to a swelling agent for vegetable fibres, washing the goods to eliminate at least in part the compressed portions due to the pressure, and then dyeing the goods.

5. Process for the production of durable pattern effects upon goods comprising vegetable fibres, which comprises subjecting the goods to a swelling agent for vegetable fibres and after such fibres have been acted upon by the swelling agent altering the susceptibility of such fibres to a subsequent treatment with a swelling agent at certain portions of the goods, by subjecting such portions to substantial pressure at a temperature of at least 100° C. and thereafter subjecting the goods to said subsequent treatment with a swelling agent for vegetable fibres.

6. Process for the production of durable pattern effects upon goods comprising vegetable fibres, which comprises subjecting the goods to a swelling agent for vegetable fibres and after the swelling of the goods and the washing out of the swelling agent, altering the susceptibility of such fibres to a subsequent treatment with a swelling agent at certain portions of the goods, by subjecting such portions to substantial pressure at a temperature of at least 100° C. and thereafter subjecting the goods to said subsequent treatment with a swelling agent for vegetable fibres.

In testimony whereof I have signed my name to this specification.

GEORGES HEBERLEIN