

UNITED STATES PATENT OFFICE

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PROCESS OF EMBOSSING FABRICS AND ARTICLES CONTAINING ORGANIC DERIVATIVES OF CELLULOSE

No Drawing.

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This invention relates to a process for embossing fabrics made from or containing organic derivatives of cellulose. More especially it deals with embossing fabrics or textiles containing cellulose acetate yarn. It also includes within its scope the cellulose acetate fabrics having embossed surfaces or designs thereon.

The object of this invention is to devise a process for imparting to fabrics made of or containing organic derivatives of cellulose embossed effects which shall be permanent. Another object of this invention is to devise a process for embossing fabrics made from or containing cellulose acetate so that the designs imprinted upon the fabric will not disappear, even after long wear, washing or dry-cleaning. Still another object of this invention is to obtain fabrics made from or containing organic derivatives of cellulose having permanently embossed surfaces or designs thereon.

It is well known to emboss fabrics for instance by passing the fabric which it is desired to emboss between heated rolls under pressure over a pattern or by having the desired pattern engraved on the rolls or in any other suitable manner. This gives fairly good results but the embossing thus obtained is not permanent. When the fabric is used or worn the embossing gradually becomes very faint and finally disappears. Especially is this true when the fabric is used or worn in damp or humid atmospheric conditions. Upon subjecting such a fabric, embossed in the usual way, to washing or dry cleaning, only a faint outline of the embossed design remains. It has been suggested to increase the temperature and pressure of the rolls but not only are the results thus obtained not permanent but the fabric is so weakened by the use of the excessive pressure that it is well nigh useless.

The above objectionable features have greatly limited the use and manufacture of embossed textile materials. The applicant after considerable experimentation in seeking to overcome these difficulties discovered that embossings made on fabrics made from or containing organic derivatives of cellulose,

such as esters and ethers, were much more lasting than similar embossings on other fabrics. Thus embossed designs on cellulose acetate fabrics, embossed according to the usual methods, were semi-permanent, that is, the designs were much more lasting upon wear or dry cleaning than were similar designs upon other fabrics. However, when subjected to washing the embossing even on this type of fabric disappeared rather readily.

The applicant has now discovered that it is possible to obtain on cellulose acetate and similar fabrics embossed effects which are permanent. The new embossed fabric can be subjected to dry cleaning, washing and other conditions of use without any appreciable effect upon the embossed design.

The applicant's process can also be carried out on goods in the greige. The latter can then be dyed or subjected to any treatments usually applied to greige goods without the embossing being in any way affected. This affords another illustration of the permanence of the embossed effects obtained as a result of the applicant's invention.

My discovery consists in the use of dilute acetone or similar acting substances as an aid in the embossing operation. I have found that if a fabric made from or containing organic derivatives of cellulose is treated with a dilute solution of acetone and then subjected to the usual embossing operations the fabric will "take" the design very clearly. Not only when made is the design sharply defined and a faithful reproduction of the smallest detail of the design of the embossing device, but it remains so permanently.

A remarkable feature of this invention is the fact that the embossing can be effected by using comparatively low pressure and temperature in the embossing process. The pressure employed during the embossing process may, for example, be so low that in the absence of the acetone, it would cause no imprint to be made on the fabric. This is a very material advantage since the use of high pressure on the rolls serves to weaken the fabric being embossed.

Excellent results were obtained on a cellulose acetate fabric, satin weave, by spraying

the surface of the fabric with a 50% aqueous solution of acetone and then passing over the sprayed fabric a current of warm air. This enables the acetone solution to be evenly distributed over the fabric before the fabric is subjected to any of the usual embossing processes. The pressure and heat used for the embossing may be considerably lower than that usually applied. The employment of such lower temperatures is advantageous when the embossing is accomplished by passing the fabric between engraved rolls.

The above fabric after passing through the embossing process had the design clearly impressed upon itself, the minutest detail being accurately impressed on the fabric. The fabric was not weakened, however, at the impressed portions or at the portions which contained no part of the design.

In order to test the permanency of the design on the fabric, a portion of the latter was washed with soap and water for 1½ hours at ordinary temperatures. The design was not at all affected, at least not enough to be noticeable. Another portion of the fabric was dipped in gasoline under conditions similar to those met with in any dry cleaning operations. This treatment, too, had no noticeable effect on the design impressed on the fabric. The fabric was also exposed in a humid atmosphere for a considerable length of time with no deleterious effects to the embossed design.

Instead of spraying the fabric to be embossed with a solution of acetone the fabric can be passed through a bath containing a 40-50%, or less concentrated, aqueous solution of acetone. If this procedure is followed the excess of the acetone solution can be removed by passing the fabric between rolls or it may be removed in any other suitable manner which will leave enough of the acetone solution in the fabric to make the embossing permanent. The fabric, after the excess of the acetone solution has been removed, is then subjected to the usual embossing operations. The results obtained are very good, the design being very clear and distinct and also permanent in nature.

The concentration of the acetone solution employed in accordance with this invention may be greater or less than that above set out. The only limitation is that the acetone solution must be sufficiently dilute so as to permit the embossing to be effected without dissolving or materially hardening the cellulose acetate or other organic derivative of cellulose present in the fabric. Aqueous solutions of acetone containing 40 to 50% of acetone have been used with excellent results. The temperature and pressure at which the embossing is effected will vary with the concentration of the acetone solution. Thus the more dilute the acetone solution the greater will be the pressure and the higher the tem-

perature which will have to be employed in the embossing operation.

The dilute acetone used above as an aid in the embossing can be replaced by other solvents or softening agents for the cellulose acetates or other organic derivatives of cellulose present in the fabric, for example, methyl acetate or other solvents. Where a solvent for the organic derivative of cellulose is used, it should be diluted to such a degree with water or any other diluent, which latter is not a solvent for the organic derivative of cellulose, that it will act as a slight softener only. Where solid softening agents or water insoluble solvents or softening agents are employed they should first be dissolved either in water or in an appropriate solvent, which latter solvent should not be a softener or solvent for the organic derivative of cellulose.

As a result of the applicant's invention it is now possible to obtain permanent effects on fabrics which have hitherto been obtainable only by the utilization of Jacquard looms. Jacquard weaving is a very costly operation whereas the present process is a low cost one, adding very little to the cost of the fabric.

Another decided advantage resulting from the applicant's invention is the marked improvement in the appearance of the embossed fabric. Due to the peculiar properties of the cellulose acetate or other organic derivatives of cellulose, when the acetone moistened fabric is subjected to the embossing operations those portions of the fabric which are subjected to the heat and pressure, that is the depressed portions of the fabric, assume a high degree of lustre. In view of the fact that the remaining portions of the fabric retain their usual lustre, this serves to greatly accentuate the design on the fabric and serves to give the fabric the appearance of a jacquard woven fabric.

It is possible as a result of this invention to produce permanent cire effects on fabrics made of or containing organic derivatives of cellulose such as, for example, cellulose acetate. This can be accomplished by spraying or otherwise treating the fabric with a solution of a softening agent such as, for example, an aqueous solution of acetone, and then passing the thus treated fabric between hot rolls or friction rolls. Cireing is in effect merely an embossing operation wherein a smooth surfaced roll or other device is substituted for a roll or other device containing a design thereon. The lustre or shine of the thus embossed fabric is greatly enhanced, giving a fabric with a cire effect. This is a decided improvement over present processes for producing cire effects which necessitate the use of wax etc., heat and pressure, and the results of which are not permanent. The present process not only renders it possible to obtain such effects by utilizing lower temperatures

and pressures but also makes it unnecessary to use wax etc., at the same time giving cre effects on fabrics, which effects are permanent even though the fabrics are subjected to washing. Where advantageous, however, wax or similar substances may be utilized in the present process also.

This invention is not to be considered as limited to the treatment of fabrics made wholly or partially of cellulose acetate but is also applicable to fabrics made from or containing cellulose formate, cellulose propionate, methyl cellulose, ethyl cellulose etc. The term organic derivative of cellulose as used in the description and claims is, therefore, to be interpreted as including organic esters and ethers of cellulose or mixtures thereof. Also the process is applicable to various types of fabrics, such as, for example, woven or knitted fabrics.

The applicant's invention also includes within its scope the treatment of articles, other than fabrics, made of or containing organic derivatives of cellulose. The term fabrics as used in the claims is, therefore, to be interpreted as including such other articles as can be embossed. The term embossing is used in the claims to include the modification of the process to obtain cre effects as above pointed out, since the latter is, in effect, an embossing operation.

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

1. A process of embossing fabrics containing organic derivatives of cellulose which consists in treating said fabric with a dilute solution of acetone, subjecting the thus treated fabric to a suitable embossing operation under heat and pressure.

2. A process of embossing fabrics containing organic derivatives of cellulose which consists in spraying said fabric with a dilute aqueous solution of acetone, subjecting the thus treated fabric to a suitable embossing operation under heat and pressure.

3. A process of embossing fabrics containing organic derivatives of cellulose which consists in spraying the said fabric with a dilute aqueous solution of acetone, passing a current of warm air over the thus treated fabric and then subjecting the fabric to a suitable embossing operation under heat and pressure.

4. A process of embossing fabrics containing cellulose acetate which consists in treating said fabric with a dilute solution of acetone, subjecting the thus treated fabric to a suitable embossing operation under heat and pressure.

5. A process of embossing fabrics containing cellulose acetate which consists in spraying said fabric with a dilute aqueous solution of acetone, subjecting the thus treated fabric

to a suitable embossing operation under heat and pressure.

6. A process of embossing fabrics containing cellulose acetate which consists in spraying the said fabric with a dilute solution of acetone, passing a current of warm air over the thus treated fabric and then subjecting the fabric to a suitable embossing operation under heat and pressure.

7. A process of treating fabrics containing organic derivatives of cellulose which consists in impregnating said fabric with a dilute aqueous solution of acetone, subjecting the thus treated fabric to a suitable embossing operation under heat and pressure and then dyeing the embossed fabric.

8. A process of treating fabrics containing cellulose acetate which consists in impregnating said fabric with a dilute aqueous solution of acetone, subjecting the thus treated fabric to a suitable embossing operation under heat and pressure and then dyeing the embossed fabric.

In testimony whereof, he has hereunto subscribed his name.

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