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(12) # EUROPEAN PATENT APPLICATION

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(54) **Decoration material for use in wet-transfer printing and its use in a process for wet-transfer printing.**

(57) The invention provides a decoration material for use in the wet transfer printing process and the method of using the material.

The decoration material comprises a flexible substrate, e.g. paper, on which is provided a coating of a lacquer. The pattern of dyes to be transferred from the decoration material to the material to be dyed is carried on the lacquer coating. Transfer is obtained by impregnating the material to be dyed with a pad liquor, then pressing the patterned face of the decoration material against it at a temperature of 80 to 120°C.

The invention enables more of the dye to be transferred from the flexible substrate to the material being dyed and hence reduces wastage of dye.

The lacquer consists of a polymer not dyed by the dyes being used, e.g. a resin such as chlorinated PVC or chlorinated natural rubber.

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TITLE MODIFIED
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Wet Transfer Printing

This invention relates to the wet transfer printing process and in particular to decoration materials for use therein.

In the wet transfer printing process, commercially known as "Aquatran" transfer printing process, the fabric to be printed is moistened with a pad liquor and then brought into contact, under heat and pressure, with a decoration material consisting of a flexible substrate, e.g. paper, on which a design has been printed with printing inks containing dyes substantive with the particular type of fabric. The dyes transfer from the substrate to the fabric during the application of heat and pressure in the presence of the pad liquor and the printed fabric may then be steamed or otherwise treated to fix the dyes if they have not been fully fixed by the transfer process. The fabric is then washed if necessary to remove residual pad liquor, printing ink and other undesirable residues. Generally the flexible substrate is paper of sufficient wet strength to avoid tearing during the transfer step.

The wet transfer printing process has been fully described elsewhere in, for example, UK Patent Specification Nos. 1,284,824, 1,388,220, 1,428,645, 1,452,153 and 1,450,951. These specifications disclose the various types of pad baths for dyeing particular types of fibres, conditions for transfer, suitable inks and dyes for particular fibres and apparatus for conducting the process. Generally,

the temperature of the transfer step is in the range 80 to 120°C. The pressure may vary, low pressures of the order of 50 KN/m^2 being useful, although higher pressure e.g. up to 700 KN/m^2 may be used. The pressure must be high enough to maintain the intimate contact needed for accurate print transfer, and must not be so high that the pad liquor is squeezed out of the fabric.

One disadvantage with the wet transfer process is that a certain amount of dye remains on the flexible substrate after transfer and this dye is wasted. This is particularly prevalent when using a paper with dyes suitable for printing cotton in that there is a chemical similarity between cotton and paper.

A further disadvantage of the process is that when paper is used as the substrate, a high wet strength must be used to avoid tearing: this is expensive and cannot be reused.

The invention has been made with the above points in mind.

Therefore according to the present invention there is provided a decoration material for use in the wet transfer printing process comprising a flexible substrate bearing a pattern of one or more non-sublimable dyes which are transferable under the transfer conditions in the wet transfer printing process, said substrate having a coating of a lacquer which is not dyed by said dyes and does not absorb said dyes, said pattern being carried on said coating.

The flexible substrate is preferably a paper.

It has been found that the use of a lacquer between a paper substrate and the dyes considerably increases the amount of dye transferred in the wet transfer process. This is particularly noticeable when dyeing pile fabrics and cotton fabrics. A further advantage is that ordinary paper may be provided with a waterproof lacquer and used

in the wet transfer process thus obviating the need to use the more expensive high wet strength paper. The lacquer will generally be a polymeric material, and should be one whose surface is wetted by the printing inks used in the wet transfer printing process.

Therefore also according to the invention there is provided a process for transferring dyes in which a material to be dyed is impregnated with a pad liquor and a decoration material comprising a flexible substrate having a coating of a lacquer which is not dyed by said dyes and does not absorb said dyes, and bearing on its lacquer coated face a pattern of one or more non-sublimable dyes, is placed with this face in contact with the impregnated material and heated to a temperature in the range 80 to 120°C under pressure whereby the dye pattern is transferred to the impregnated material.

Many resins are suitable for use as lacquers including chlorinated rubber resins e.g. Alloprene a chlorinated natural rubber commercially available from Imperial Chemical Industries Limited (I.C.I.), chlorinated polyvinyl chloride e.g. Genclor, also commercially available from I.C.I., cellulose derivatives, particularly mixed esters e.g. acetate-propionate and acetate-butyrate, cellulose ethers e.g. ethyl cellulose, hydroxypropyl cellulose and hydrocarbon resins e.g. Piccovar AB180 commercially available from Cole Chemicals Ltd. and Hercures resins commercially available from Hercules. Particularly good results are achieved with chlorinated rubber or PVC resins plasticised with chlorinated paraffin wax e.g. Cereclor, (commercially available from Imperial Chemical Industries Ltd.)

The lacquer may be coated onto the paper as a solution, either in water or solvent, or as a dispersion or emulsion, or as a hot melt coating. It may be applied by any method which will give a continuous film of the lacquer e.g. by spraying, knife coating or roller coating. The coating weight may vary from about 3 grams per square metre up to about 25 grams per square metre, the normal coating

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weight being in the range 5 to 12 grams per square metre.

Preferably the lacquer is applied as a solution of a resin, plus any plasticisers, pigments, stabilizers etc. which may be needed in the particular instances, in a rapid drying organic solvent such as toluene.

In addition, it has been found that the performance of the lacquers may be improved by the incorporation of leafing pigments e.g. aluminium and mica powder. The leafing pigment may be used in amounts in the range about 5 to 20% by weight of the resin or resin plus plasticiser. Normally the leafing pigment is used in an amount about 10% by weight of the resin or resins plus plasticiser.

The dyes used in the preparation of the decoration materials are chosen to be substantive to the particular fibre to be dyed. The dyes are non-sublimable i.e. they do not sublime to a commercial extent at temperatures below 220°C and are transferable under the wet transfer printing conditions. Some suitable dyes are exemplified in the above listed UK patents specifications.

The invention will now be illustrated by means of the following example.

EXAMPLE

A roll of paper is coated by a roller coating technique with a lacquer of the following composition

Chlorinated Natural Rubber (ALLOPRENE R5)*	300 g
Chlorinated Paraffin Wax (CERECLOR C42)*	100 g
Toluene	600 g

(* = commercially available from ICI)

and dried to give a dry coated weight of 6g/m^2.

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It is then printed in a multicolour design, using inks of the following composition

Ethyl Cellulose	100 g
Dye	50 - 300 g
Toluene	600 g
Methylated Spirits	200 g

Amount and colour of the dye is chosen according to the shade required, from the cotton reactive dyes marketed by ICI under the name "PROCION".

This lacquered and printed paper can then be stored indefinitely

For use, a cotton fabric is wetted with a pad liquor of the following formulation

Sodium Alginate (MANUTEX F)	15 g
Sodium Carbonate	25 g
Water to make up 1 litre of solution	

The wetted fabric is pressed into contact with the printed side of the paper, for 50 seconds at 100°C and 138 KN/m^2.

The paper is removed and the fabric steamed for 2 minutes to fix the dye and then washed and dried. (Other procedures may be used to fix the dye as required).

The fabric is printed with the design in fast, bright, colours.

Two examples B and C of alternative lacquer formulations which can be used in the above Example are as follows

B. Cellulose acetate - butyrate	200 g
Methyl ethyl ketone	250 g
Toluene	550 g

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In this formulation the cellulose acetate - butyrate (CAB) may be replaced by other cellulose derivatives, such as cellulose acetate-propionate, or ethyl cellulose.

C. Post - chlorinated polyvinyl chloride (GENCLOR S)*	300 g
Chlorinated Paraffin Wax (CERECLOR C42)*	50 g
Methyl ethyl ketone	350 g
Toluene	300 g

(* = commercially available from ICI)

WHAT WE CLAIM IS:-

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1. A decoration material for use in the wet transfer printing process, comprising a flexible substrate bearing a pattern of one or more non-sublimable dyes which are transferable under the transfer conditions in the wet transfer printing process, said substrate having a coating of a lacquer which is not dyed by said dyes and does not absorb said dyes, said pattern being carried on said coating.

2. A decoration material according to Claim 1 in which the flexible substrate is paper.

3. A decoration material according to Claim 1 or 2 in which said lacquer comprises a resin selected from chlorinated rubber resins, chlorinated polyvinyl chloride, cellulose derivatives and hydrocarbon resins.

4. A decoration material according to Claim 3 in which the lacquer comprises a resin selected from chlorinated natural rubber resin, chlorinated polyvinyl chloride, ethyl cellulose, cellulose acetate-butyrate, and cellulose acetate-propionate.

5. A decoration material according to Claim 4 in which the lacquer comprises a chlorinated rubber resin or chlorinated polyvinyl chloride resin and, as plasticizer, a chlorinated paraffin-wax.

6. A decoration material according to any one of claims 1 to 5 in which the lacquer also includes a leafing pigment.

7. A decoration material according to Claim 6 in which the leafing pigment is present in an amount of 5 to 20% by weight based on total resin plus any plasticizer for the resin.

8. A process for transferring dyes in which a material to be dyed is impregnated with a pad liquor and

a decoration material comprising a flexible substrate having a coating of a lacquer, which is not dyed by said dyes and does not absorb said dyes, bearing a pattern of one or more non-sublimable dyes, is placed with its lacquer coated face in contact with the impregnated material and heated to a temperature in the range 80°C to 120°C under pressure whereby the dye pattern is transferred to the impregnated material.

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EUROPEAN SEARCH REPORT

Application number
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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	FR - A - 2 229 554 (FUJIIKEORI) * Claims 1-3; examples 1-3; page 1, line 40 - page 2, line 7; page 3, lines 11-18 * --	1-3,8
X	DE - C - 817 749 (COLOMBO) * Claims 1-7; page 2, lines 33-40, 125-126 * --	1,2,8
X	LU - A - 57 285 (TEINTURERIE DE LA TURDINE) * Claims 1-5, 14-17, 20-22; example 4; page 5, lines 14-18 * --	1,2,8
	CHEMICAL ABSTRACTS,vol. 81, no. 24 december 16, 1974.(Toppan Printing Co. Ltd.) ref. 154469u. Kokai, Japan MASAHIKO ONO; MASAO NAKAJIMA: "Transfer printing of cotton fabrics". --	1,2,6-8
A	US - A - 1 993 523 (POESCHEL) * Claims 1-12; page 1, left-hand column, line 1 - page 5, left-hand column, line 44 * --	1,2
A	FR - A - 2 222 223 (DAI NIPPON PRINTING) * Figures 2 and 4; examples 3 and 7; page 12, lines 4-27 * -- ./.	1,2

CLASSIFICATION OF THE APPLICATION (Int. Cl.²)

D 06 P 5/00
B 41 M 5/02
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B 44 C 1/16
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C 08 F 14/06
C 08 C 19/12

TECHNICAL FIELDS SEARCHED (Int.Cl.²)

D 06 P 5/00
B 41 M 5/02
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B 44 C 1/16

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11-12-1978	DEKEIREL

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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.²)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
P	FR - A - 2 375 388 (CIBA-GEIGY) * Claim 18; page 1, line 35 * --	1,2,8	
P	FR - A - 2 371 298 (UGINE KUHLMANN) * Claims 1 and 6; page 5, line 20 * ----	1,2,8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.²)