

PATENT SPECIFICATION

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(54) A SPRAY PRINTING PROCESS

(71) We, SANDOZ LTD., of 35 Lichtstrasse, 4002 Basle, Switzerland, a Swiss Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a printing process for voluminous textile substrates by the spray printing process.

According to the invention a printing process for voluminous textile substrates comprises spray printing onto said substrate a printing liquor containing a natural carbohydrate based thickener, said substrate having been pretreated by depositing thereon a coagulation agent for said thickener.

Spray printing is a known technique wherein a liquor is applied to the substrate through a plurality of nozzles or jets, the force with which the liquor is applied enabling good penetration of the substrate. As examples of such technique may be given the Millitron (Deering-Milliken) and Chromotronic (P. Zimmer) techniques. In general a bank of such nozzles or jets is employed, various, e.g. different coloured, liquors being fed to the various nozzles or jets in accordance with the pattern or design to be applied to the substrate.

The preferred natural carbohydrate based thickeners employed in the present invention in the printing liquor are flour and starch derivatives and alginates. Other natural carbohydrate based thickeners may, however, be used. Mixtures of natural carbohydrate-based thickeners may also be used.

As regards the coagulation agent deposited on the substrate prior to the printing liquor being applied, the choice and amount thereof depends on the nature of the thickener, the concentration of the thickener in, and the quantity of, the print liquor applied, and the desired degree of coagulation.

Where the thickener is a starch ether, the preferred coagulation agents are salts of tri-valent metals, particularly of

aluminium, the most preferred coagulation agent being aluminium sulphate. For flour derivative thickeners the preferred coagulation agents are alkali borates, particularly borax. For alginate thickeners the preferred coagulation agents are the above salts of tri-valent metals and alkali-metal hydroxides and carbonates, e.g. sodium hydroxide or carbonate.

Normally, full coagulation of the thickener is preferred, and therefore the coagulation agent is generally employed in excess. The following is given as a guide as to the general rate of use of coagulation agent to thickener:—

For 1 kg of a 1% by weight starch ether containing liquor, from 1 to 10 g, preferably 2 to 8 g, and most preferably about 4 g, of the salt of the trivalent metal.

For 1 kg of a 1% by weight flour derivative containing liquor, from 0.5 to 5 g, preferably 1 to 3 g, and most preferably about 2 g of the alkali borate.

For alginate thickeners, the above figures and coagulation agents for starch ether thickeners apply, although alternatively the same amounts of the alkali-metal hydroxide or carbonate may be used.

The coagulation agent may be deposited on the substrate by any convenient method, for example from a liquor, e.g. by padding, slop-padding or spraying, including electrostatic spraying, or in paste form, e.g. by printing. It may, of course, be applied along with a dyestuff, e.g. in a dye liquor or printing paste, the dye, for example, serving to impart to the substrate an overall ground colour for the pattern or design later to be applied by spray printing. Where, of course, it is applied from a paste containing a natural carbohydrate base thickener and serves to coagulate such thickener, an excess over that required to coagulate such thickener is employed in order to coagulate the natural carbohydrate based thickener in the spray print liquor later to be applied.

Intermediate full or partial drying of the substrate may be carried out prior to application of the spray print liquor. The

substrate is, however, normally left moist.

The print liquor sprayed onto the substrate may contain the usual additives in addition to the dye and thickener, the choice of additives and, of course, of class of dye, depending on the nature of the substrate. The liquor should, of course, be free from any agent causing coagulation of the thickener or contain such an agent in an amount insufficient to cause significant coagulation, in order to avoid problems in spraying the liquor through small jets.

When the print liquor is sprayed onto the coagulation agent treated substrate, the thickener therein rapidly coagulates on contact with the substrate. This hinders lateral migration of the dye in the liquor and is conducive to sharper prints. Also, frost effects are reduced. Where an acid salt or acid yielding salt, e.g. aluminium sulphate, is employed as the coagulation agent, this obviates the need for an acid or acid source being present in the print liquor, as would generally be the case in printing polyamide substrates with acid dyes. This improves the stability of the print liquor and enables dyes to be used which are sensitive, e.g. tend to salt out, to acids and acid salts.

After carrying out the process of the invention, the print applied to the substrate may be fixed in conventional manner, whereafter the substrate is generally washed.

The term "voluminous textile substrates", is defined herein to mean such substrates as carpet, felt and velvet materials, i.e. substrates having a significant thickness, the process being particularly suitable for printing carpets, e.g. having fine or elaborate prints of the oriental or persian type.

The invention is illustrated by the following Examples in which all parts and percentages are by weight and the temperatures are in degrees centigrade.

Example 1

A velvet fabric of polyamide 66, having a weight of 750g/m² is impregnated on a twin roller dye padder with a liquor (I) consisting of

30 parts aluminium sulphate (cryst.) and

970 parts water

1000 parts

55 at a 70% pick-up.

The thus treated substrate is then printed over a limited area, using a jet-patterning apparatus with a print liquor (II) consisting of

3 parts dyestuff C.I. Acid Red 151 60

7 parts sodium alginate powder

10 parts iso-octylphenol-poly(4-5)glycol ether

2 parts mineral oil based anti-foaming agent 65

978 parts water

1000 parts

followed by fixation in saturated steam for 10 minutes and conventional after treatment, including washing. The addition of a metal complex former to the washing water accelerates the washing.

A red print is obtained with notably sharp outlines.

Example 2

A polyester tufted loop fabric carpet with a weight of 550g/m² is impregnated with the liquor (I), given in Example 1, in accordance with the method described in Example 1.

The thus treated substrate is then printed over a limited area employing a jet-patterning apparatus with a print liquor (II) consisting of

5 parts dyestuff C.I. Disperse Red 60 85

5 parts sodium alginate powder

5 parts starch ether powder

30 parts orthophenyl-phenol and

955 parts water

1000 parts

90 followed by fixation and finishing as described in Example 1.

A brilliant red pattern of good quality is obtained.

Example 3

A tufted loop pile fabric carpet of polyamide 6, with a weight of 800g/m² is impregnated with a liquor consisting of

5 parts dyestuff C.I. Acid Yellow 151

5 parts locust bean flow ether. 100

30 parts aluminium sulphate (crystals) and

960 parts water

1000 parts

on a twin roller dye-padder at a pick-up of 80%.

The thus treated substrate is then printed with a jet patterning apparatus over a

limited area with a print liquor consisting of

- 10 parts dyestuff C.I. Acid Brown 298
- 7 parts sodium alginate powder
- 5 10 parts iso-octylphenol-poly(4-5)glycol ether
- 2 parts mineral oil based anti-foaming agent
- 971 parts water

- 10 1000 parts followed by fixation and finishing as described in Example 1.

A brown print on a gold background is obtained with notably sharp outlines.

- 15 WHAT WE CLAIM IS:—

- 1. A spray printing process for voluminous textile substrates as herein defined comprising spray printing onto said substrate a printing liquor containing a natural carbohydrate based thickener, said substrate having been pre-treated by depositing thereon a coagulation agent for said thickener.
- 20 2. A process according to Claim 1, wherein said natural thickener is a flour or starch derivative or an alginate.

- 25 3. A process according to Claim 2, wherein said natural thickener is a starch ether, the coagulation agent being a salt of a trivalent metal.

- 30 4. A process according to Claim 3, wherein said trivalent metal is aluminium.
- 5. A process according to Claim 4, wherein said coagulation agent is

- 35 aluminium sulphate.

6. A process according to Claim 2, wherein said natural thickener is a flour derivative thickener, the coagulation agent being an alkali borate.

7. A process according to Claim 6, 40 wherein said coagulation agent is borax.

8. A process according to Claim 2, wherein said natural thickener is an alginate, the coagulation agent being a salt of a trivalent metal or an alkali-metal hydroxide 45 or carbonate.

9. A process according to Claim 8, wherein said trivalent metal is aluminium.

10. A process according to Claim 9, wherein said coagulation agent is 50 aluminium sulphate or sodium hydroxide or carbonate.

11. A process according to any preceding claim, wherein the coagulation agent is deposited from a liquor or in paste form. 55

12. A process according to any preceding claim, wherein the substrate is a carpet material.

13. A process according to Claim 1, substantially as hereinbefore described with 60 reference to any one of Examples 1 to 3.

14. A voluminous textile substrate whenever printed by a process according to any preceding claim.

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2 parts mineral oil based anti-foaming agent
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- 10 1000 parts
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1. A spray printing process for voluminous textile substrates as herein defined comprising spray printing onto said substrate a printing liquor containing a natural carbohydrate based thickener, said substrate having been pre-treated by depositing thereon a coagulation agent for said thickener.

2. A process according to Claim 1, 25 wherein said natural thickener is a flour or starch derivative or an alginate.

3. A process according to Claim 2, wherein said natural thickener is a starch ether, the coagulation agent being a salt 30 of a trivalent metal.

4. A process according to Claim 3, wherein said trivalent metal is aluminium.

5. A process according to Claim 4, wherein said coagulation agent is 35 aluminium sulphate.

6. A process according to Claim 2, wherein said natural thickener is a flour derivative thickener, the coagulation agent being an alkali borate.

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