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Burrell et al.

[11] **3,811,915**

[45] **May 21, 1974**

[54] **PRINTING METHOD FOR FORMING THREE DIMENSIONAL SIMULATED WOOD GRAIN, AND PRODUCT FORMED THEREBY**

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[73] Assignee: **Inmont Corporation,** New York, N.Y.

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[52] **U.S. Cl.** **117/45,** 117/72

[51] **Int. Cl.** **B41m 3/00**

[58] **Field of Search** ..... 117/45, 72, 76 P, 37 R

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[57] **ABSTRACT**

A printing method, the ink used therein and the product formed thereby.

The printing method is a method for producing simulated wood grain, or other patterned surfaces, preferably comprising the steps of

a. coating a substrate with a ground coat
b. applying to the dried ground coat a graining ink comprising a conventional graining ink but additionally containing from about 0.1 percent to about 3 percent by weight of a silicone fluid
c. coating the grain-printed, ground-coated substrate with a conventional protective top coat.

The silicone tends to repel the top coat, forming a three dimensional grained or patterned effect.

6 Claims, 5 Drawing Figures

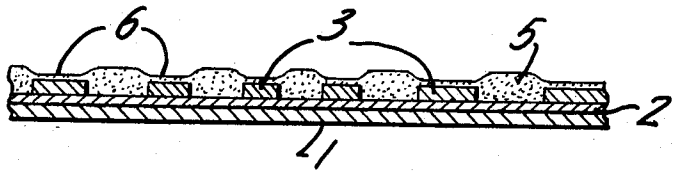


FIG. 1

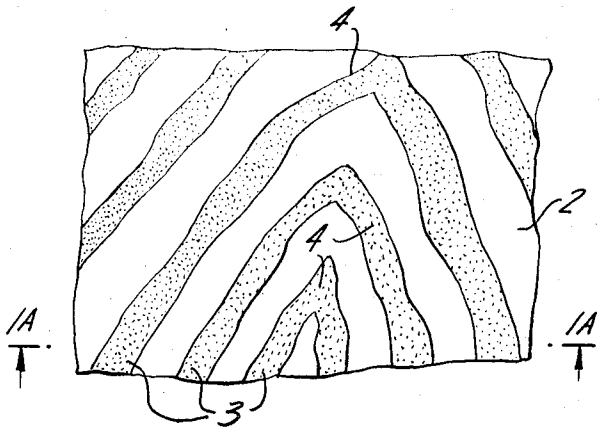


FIG. 1A

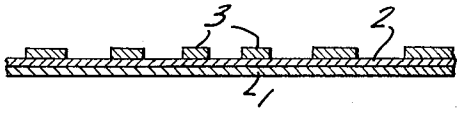


FIG. 2

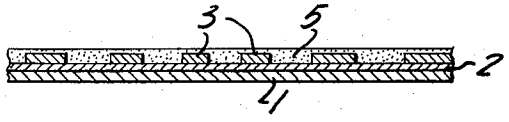
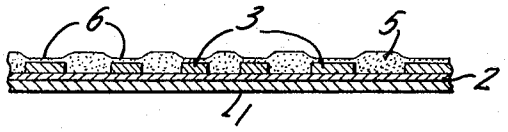


FIG. 3



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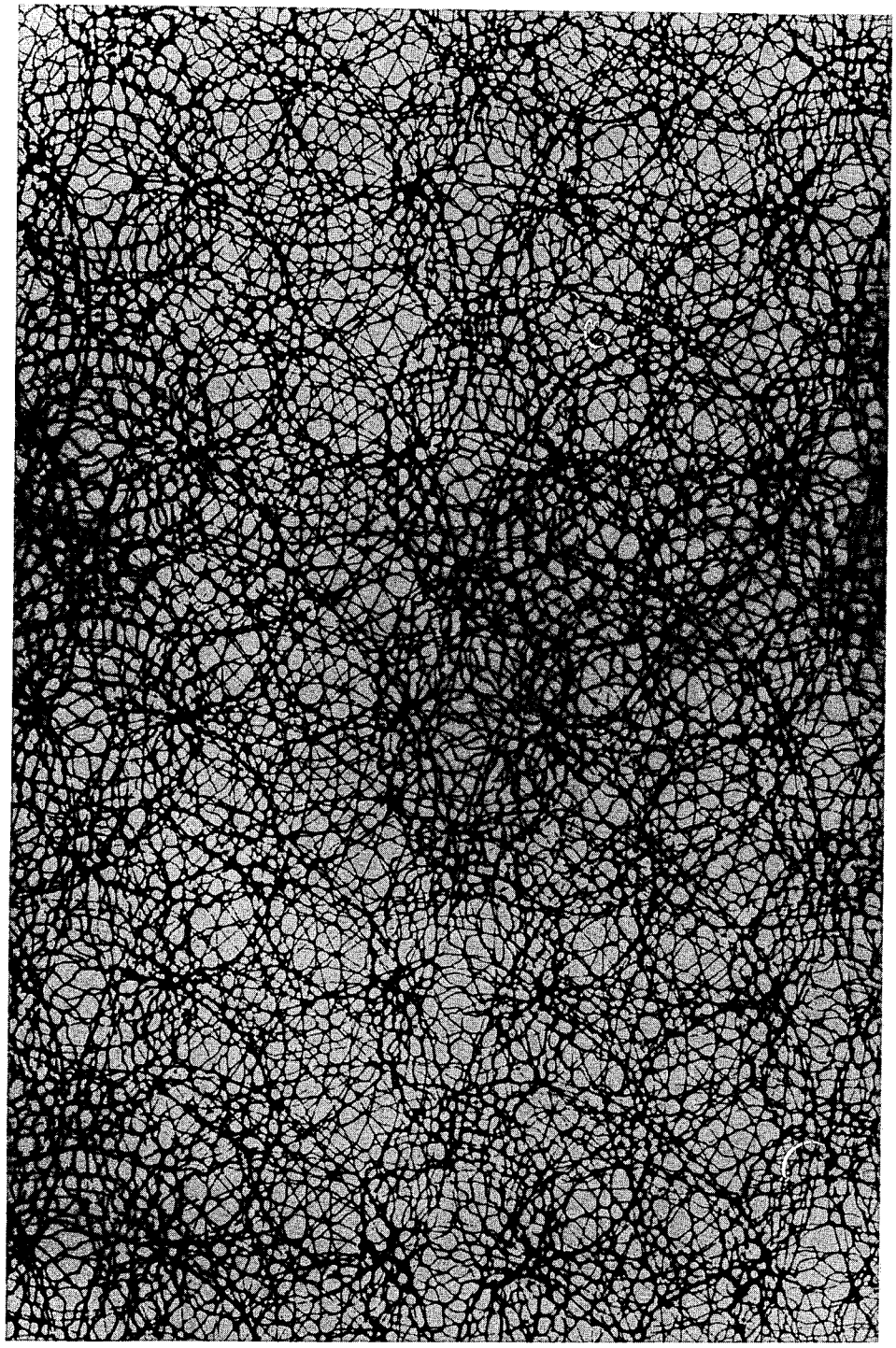

FIG. 4

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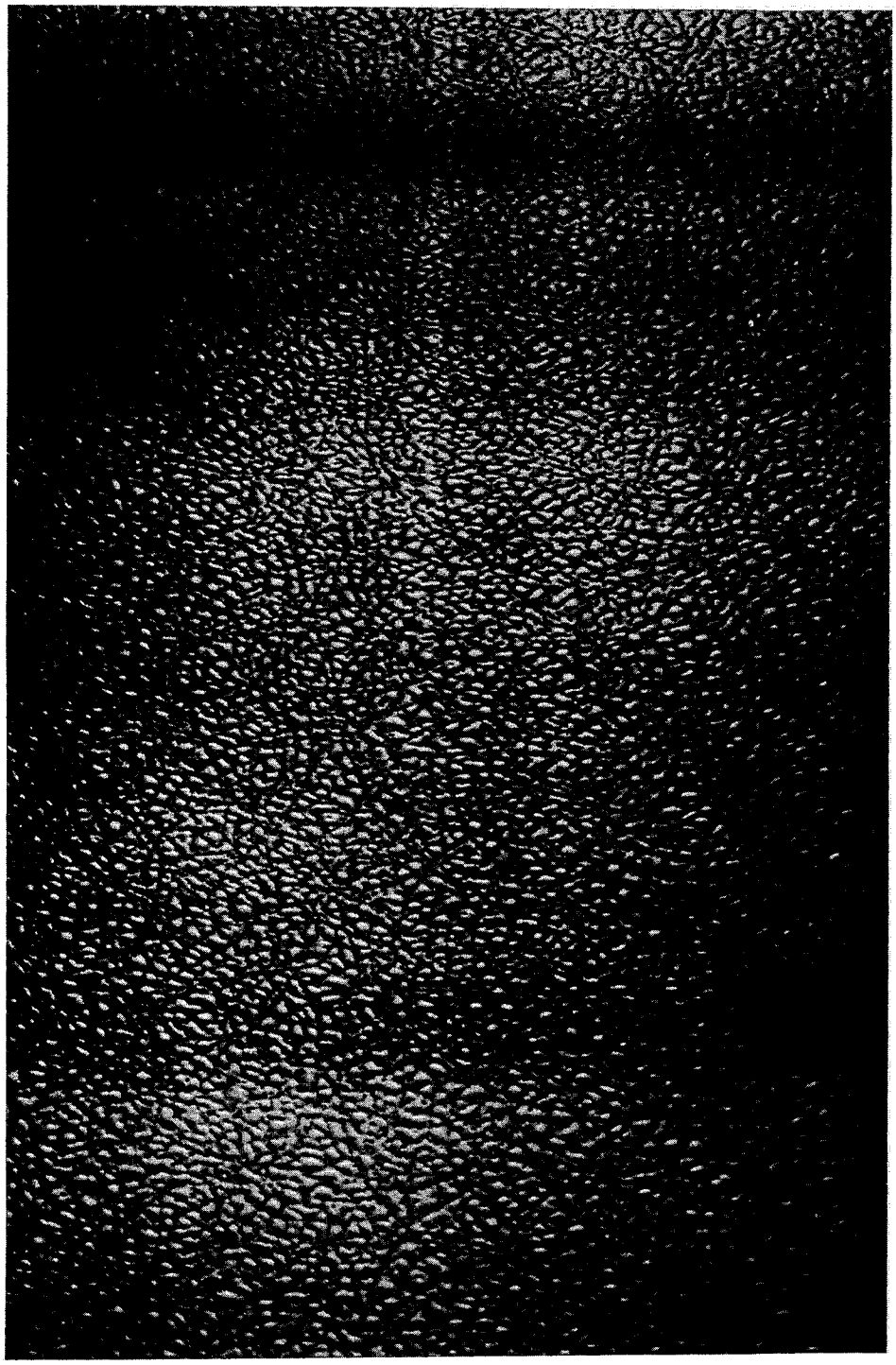

FIG. 5

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PRINTING METHOD FOR FORMING THREE DIMENSIONAL SIMULATED WOOD GRAIN, AND PRODUCT FORMED THEREBY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This application pertains to the field of forming simulated wood grains and other similar patterns. More particularly, this application pertains to the field of forming such wood grains and patterns so as to have a three dimensional effect.

1. Description of the Prior Art

Simulation of wood grains by printing on a substrate is, of course, known. A description of the conventional wood grain simulation techniques can be found at pages 76–84 of Interchemical Review, Vol. 15, No. 3 (Autumn 1956), the text of which is incorporated herein by reference. This was a publication of Interchemical Corporation, which is now, by change of name, Inmont Corporation of 1133 Avenue of the Americas, New York, N.Y. 10036.

Prior simulated grains made by printing have, however, had the disadvantage that they look flat and feel flat to the touch. By comparison, most natural wood surfaces when touched give a three dimensional sensation roughly corresponding to the pore structure in the grain pattern.

Applicants have now discovered a novel printing method for imparting a three dimensional appearance and feel to simulated wood grain and other patterned surfaces (such as abstract, floral, symmetrical and asymmetrical patterned surfaces) without need for recourse to such techniques as mechanical embossing.

SUMMARY OF THE INVENTION

The printing ink compositions of this invention are made up of a conventional graining ink comprising, for example, the following conventional ingredients:

a. a vehicle
b. a colorant
c. a solvent,

but additionally comprise

d. a silicone fluid

The colorant can be omitted if a transparent ink is desired.

Typical conventional graining inks are described in U.S. Pat. No. 2,352,810, the text of which is incorporated herein by reference.

The method of this invention comprises the conventional steps of

a. applying a conventional background-forming ground coat to a substrate and drying it
b. printing a wood grain or other desired pattern on the ground coat with graining ink, and
c. covering the printed ground coat with a conventional protective top coat and drying it, but additionally comprises the novel feature of
d. utilizing in the printing step a graining or patterning ink containing a silicone.

The silicone in the ink tends to repel the top coat from the printed grain areas and results in a three dimensional effect corresponding to the desired pattern.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a somewhat stylized plan view of a ground-coated substrate upon which has been printed a grain pattern.

FIG. 1A is a cross-section view of FIG. 1 showing, in slightly exaggerated form for purposes of easy illustration, the relative position of the substrate, ground coat and printed grain.

FIG. 2 is a view corresponding to FIG. 1A but after top coating, when a conventional graining ink has been employed for grain printing.

FIG. 3 is a view corresponding to FIG. 1A but after top coating, when the novel silicone-containing ink has been used for grain printing.

FIG. 4 is a photograph of a typical pattern, other than woodgrain, which can be made using this invention.

FIG. 5 is another view of the pattern of FIG. 4, showing the textured surface of the pattern. Because of the angle necessary to bring out the three-dimensional nature of the pattern, the black ink lines of FIG. 4 do not appear in FIG. 5. However, in FIG. 5, the depressed areas correspond to the ink lines.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the method of preparing simulated wood grain by printing, several passes of ink are commonly deposited on the ground coat. Each pass is a slightly different color or shade. The resulting printed product thus achieves the variation in shades of color which make up true wood grain.

One of the passes is normally used to deposit an ink which forms a pattern corresponding to the pores of the wood. In the natural wood, these pores are slightly indented, thus resulting in the three-dimensional sensation that natural wood gives when touched. When the method of this invention is used, the silicone-containing ink will normally be used only in the pass which deposits the pattern corresponding to the pore structure. The resultant top-coated print will have less top coat in the pore areas (although some small amount may still be present) than in the other grain areas due to the tendency of the silicone-containing ink to repel the top coat.

FIGS. 1 – 3 of the drawings have, for purposes of facilitating illustration of the invention, shown what would result if the entire grain were printed with silicone ink. However, as pointed out above, only the pore pattern is normally printed with such an ink.

Referring more particularly to the drawings, in FIG. 1 reference numeral 2 denotes the ground coat, reference numeral 3 denotes the printed grain areas on the ground coat and reference numeral 4 denotes the pore pattern in the printed grain.

In FIG. 1A, reference numeral 3 denotes the printed grain areas and reference numeral 1 the substrate on which ground coat 2 is deposited.

FIG. 2 shows what results when a conventional ink is used to print the grain and a top coat 5 is deposited over it. It will be apparent that the surface does not yield a three-dimensional "feel" when touched.

FIG. 3 shows what results when the ink compositions of this invention are employed to print the grain and then a top coat 5 is deposited thereon. Indentations 6 result in top coat 5, which give the resultant product a natural wood "feel." The indentations result from the

top coat tending to be repelled by the silicone in the ink.

Since it is normally undesirable to use the silicone ink in any grain areas other than the pores or other depressed areas, the silicone ink pass will normally be the last graining ink pass. This avoids contamination of other printing rollers with silicone ink.

The ground coat used in this invention can be any conventional ground coat. For example, conventional ground coats which can be used are air drying or bake-curing alkyds. These may also contain urea resins. The ground coat is normally pigmented to provide the desired contrast with the graining ink.

Any conventional graining ink with which the silicone does not react can be employed. A typical composition, which is an English Walnut graining ink, is set forth below.

EXAMPLE 1

%	Component
35.61	A 60% solution of a Tall Oil Benthal modified alkyd in Butyl Cellosolve
17.42	A 35% solids cut of 18–25 cps RS Nitrocellulose in Butyl Cello-solve
.55	Raybo 56 dispersing agent
.54	Bentone 34 gelling agent
19.67	Butyl Cello-solve
12.20	Imported Blanc Fixe
8.34	Burnt Umber J-4658 pigment
5.08	Lampblack No. 10 pigment
.59	Monastral Red B RT742D pigment
100.00	

The various components of this graining ink are more particularly described in the Appendix.

The vehicle of the ink is typically an alkyd, such as a tall oil or soya oil alkyd. The typical vehicle also often contains nitrocellulose.

From about 0.1 to about 3 percent, preferably 0.2 to 1.0 percent, by weight of silicone has been found to be effective when added to typical graining inks such as the one set forth in the above example. The silicone materials which are useful in this invention are lower alkyl silicones such as dimethyl and diethyl silicon. Examples of such silicones are General Electric's Dri-Film 1040 and Dow Corning's Silicone Fluid 1107. Predominately lower alkyl silicones containing some phenyl groups can also be used; the terminology "lower alkyl silicones" as used herein is meant to include these materials. The former has viscosity of 50 centistokes at 25°C. and a specific gravity of 0.98 – 0.99 at 20°C. The latter has a viscosity of 30 centistokes at 25°C. and a specific gravity of 0.995 – 1.015 at 25°C.

The silicone is preferably mixed with the graining ink just prior to use to prevent the possibility of reaction with any ink component.

After the silicone-containing graining ink is deposited on the ground coat it can be top coated either while wet or at any time up to about 20 hours after graining; however, preferably within about 1 – 10 minutes after graining. After about 20 hours the liquid silicone has dispersed sufficiently to lose its ability to repel the top coat.

Any conventional top coat which will tend to be repelled by the silicone can be used. Examples of such top coats are alkyd, epoxy, acrylic, polyester or alkyd-amine resins, or lacquers. Any conventional topcoat thickness can be applied; for example 1 mil to 2.5 mils, preferably 1.5 to 2.0 mils. For a more textured surface a thick topcoat and a larger amount of silicone are best; for a less textured surface a thinner topcoat and less silicone can be employed. The topcoated substrates are normally applied by conventional means and cured by conventional baking. However, roller coating is not normally used, since the silicone tends to contaminate the roller. The best top coats have been found to be those which remain wet for 20–30 seconds after deposition on the graining ink. This allows time for the silicone to function well.

Although the above description has largely been specifically directed to printing inks, it will be obvious to those skilled in the art that many other types of textured patterned surfaces can also be produced using the same technique. The following example, in which all parts and percents are by weight, illustrates such other uses.

EXAMPLE 2

The surface shown in FIGS. 4 and 5 was produced as follows:

A Masonite panel was coated with a conventional alkyd resin containing a green colorant. The coating was dried.

A purple graining ink was formed by mixing
58.39 parts component A (see Appendix)
20.44 parts component B (see Appendix)
21.17 parts component C (see Appendix)
100.00 TOTAL

The resulting purple ink was diluted by mixing four parts of transparent ink with one part of the purple ink. Two percent of Dow Corning Silicone DC–1107 was added to and mixed with the resultant ink mixture and the ink was printed by conventional techniques on the green-subcoated Masonite panel. The ink was allowed to dry for about 5 minutes. Then about a 2 mil clear topcoat was applied over the ink. The silicone tended to repel the topcoat from the patterned areas, resulting in a thinner topcoat over those areas. The panel was dried by conventional means and a noticeably textured surface resulted. The texture was apparent both visually and by touching the panel.

The composition of the various ink components and the topcoat is set forth in the Appendix.

APPENDIX

The tall oil benthal modified alkyd of Example 1 is composed of:

30%	refined tall oil (Aconew)
21%	glycerol
36%	phthalic anhydride
13%	benzoic acid
100%	

These materials are cooked at about 450°F by conventional procedures to produce an alkyd having a Gardner viscosity of L to M at 60 percent solids in butyl Cello-Solve. The material has an acid number of 8 – 17 and a color of 4 – 7 on the Gardner scale.

Raybo 56 is a cationic oleophylic dispersing agent from Raybo Chemical Company (80 percent concentration).

Bentone 34 is dimethyl dioctadecyl ammonium bentonite (National Lead Company).

Component A of Example 2 is made up of:

35% alkyd of Example 1 (60% solids in dimethyl phthalate)
DB imported blanc fixe
1 sulfonated red oil (50%)
22 dimethyl phthalate
100%

Component B is:

54% alkyd of Example 1 (60% solids in dimethyl phthalate)
36 dimethyl phthalate)
10 Excelsior carbon
100%

Component C is:

46% alkyd of Example 1 (60% solids in dimethyl phthalate)
31 dimethyl phthalate
23 Monastral red pigment
100%

The composition of the transparent ink is:

18% alkyd of Example 1 (60% solids in butyl cellosolve)
1 Raybo 56 (80% in mineral spirits)
1 Bentone 34
22 Imported Blanc Fixe
32 50% butyl Cello-Solve
50% Nitrocellulose RS
18-25CPS; 30% in
isophthalic acid
26 Butyl cellosolve
100%

The composition of the top coat is:

35% Component D
6 Solvesso 100
7 Syloid 161 (W. R. Grace & Company)
40 Urox 606 (Allied Chemical Company)
6 alcohol (mixed butyl 0.85 N, 0.15 isopropanol 85%)
5 xylol
1 butyl Cello-Solve
100%

Gloss should be adjusted to 10° with additional traces of Syloid 161 and xylol

The composition of Component D is:

34% Vegacid 120 Soya Fatty Acid
24 pentaerythritol
27 phthalic anhydride
15 benzoic acid
100%

(70% solids in 33.4% xylol and 66.6% of the alcohol mixture used in the top coat)

We claim:

1. A method of forming a three dimensional surface comprising the steps of:

a. applying to a portion of a substrate a conventional graining or patterning ink composition containing additionally from about 0.1 to 3.0 percent by weight of a lower alkyl silicone, based on the total weight of the ink,

b. allowing said ink compositions to dry for up to about 20 hours,

c. subsequently covering the ink-carrying substrate with a conventional top coat composition, the silicone-containing ink composition repelling the top coat means to form a thinner top coat over the grained areas than over the ungrained areas, and

d. drying the coated substrate.

2. The method of claim **1** wherein the substrate is coated with a ground coat prior to application of the graining ink composition.

3. The method of claim **2** wherein the conventional graining or patterning ink composition comprises an alkyd resin vehicle, a solvent for said vehicle, and a colorant and wherein the three dimensional surface is a simulated wood grain, and the ground coat contrasts with the graining ink.

4. The method of claim **3** wherein the silicone in the ink composition is dimethyl silicone and wherein the silicone-containing graining ink is used only to simulate the pore pattern of the wood grain.

5. A three dimensional surface comprising

a. a substrate,

b. a silicone-containing graining or patterning ink covering portions of the substrate, and

c. a top coating covering the ink-coated substrate, wherein the top coating is thinner over the ink-portions than over the other top coated areas of the substrate.

6. The three dimensional surface of claim **5** wherein the surface is a simulated wood, the thinner areas of top-coating correspond to the pore pattern of the wood, and the silicone-containing coating is a graining ink.

* * * * *