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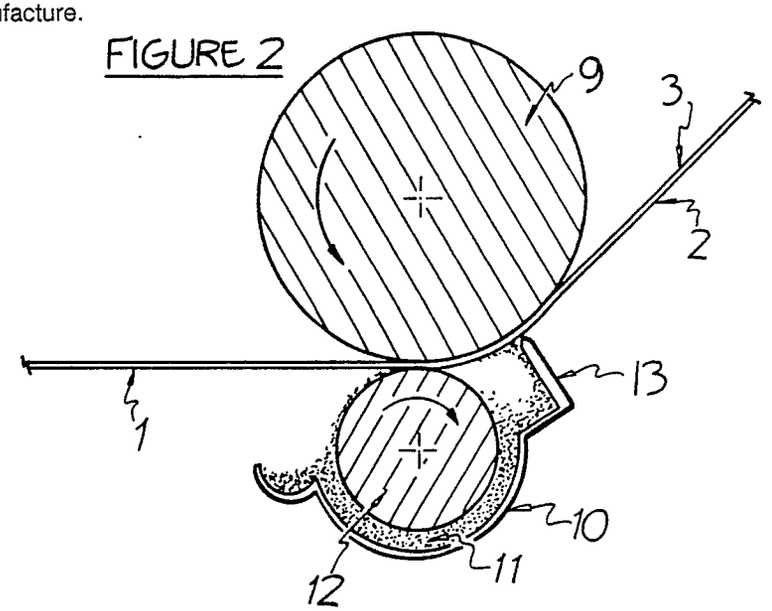
(54) Coating process.

(57) A method and apparatus for producing a non uniform coating or a printed pattern where one surface 3 of a substrate 1 is passed over an intaglio roll 9 and a coating fluid 11 is spread on to the other surface 2 with a doctor blade 13. The areas on the substrate corresponding to the depressions on the roll acquire a denser coating. The process is particularly applicable for unbleached paperboard for use in box and carton manufacture.

FIGURE 2



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COATING PROCESS

This invention relates to a process and apparatus for producing non uniform coatings in a predetermined controlled process and the products so produced.

Conventionally film or sheet like surfaces are coated uniformly by application of a coating composition which is spread onto a surface by an applicator roller or doctor blade. When a non uniform coating is required it is usual to adopt one of four printing techniques namely:

1) relief or letterpress,

2) intaglio or gravure,

3) planography or lithography, and

4) stencil, porous membrane or screen processes.

In each case the coating or ink usually a liquid is applied to the surface of the sheet to be coated from or through the plate or screen containing the desired pattern which is brought into contact with that surface.

Printing images are generally well defined as reduced definition is not considered aesthetically desirable.

It is an object of this invention to provide a predetermined patterned coated surface.

To this end the present invention provides a method for producing non uniform coatings on a substrate such as board, sheet or film in which a coating composition is applied to first surface of the substrate and the substrate is passed over a patterned surface wherein the second surface of the substrate contacts the patterned surface while a line of pressure is applied laterally to the said first surface.

This invention also provides apparatus for producing non uniform coating comprising a coating applicator and a spreading device adapted to apply a coating material to one surface of a substrate and a patterned surface juxtaposed to make contact on the second surface of said substrate. The spreading device may be a rod, knife or doctor blade.

By patterned surface is meant a surface having portions raised or depressed to form an image in the lower or depressed surface portions.

By applying a patterned surface to the back surface, those areas of the substrate corresponding to depressed areas on the patterned surface retain more coating. Clearly the substrate needs to be flexible to conform to the support surface under pressure. The patterned surface corresponds to an intaglio plate or roll the difference being the application of the coating to the substrate surface not in contact with the intaglio plate or roll. This produces a defined pattern or a non uniform coating which has a number of advantages to uniform coatings used as printing surfaces. The non uniform background is aesthetically pleasing while hiding any minor blemishes or traces of dirt which would be easily discerned with a uniform backing. This may be a decided advantage for packaging materials which are to bear printed designs or lettering.

These initial preparation/printing steps provide opportunity to enhance the paper or paperboard quality for any of those properties where surface application during or after the papermaking process is used for such purposes by existing art. Some properties in this category are surface strength; hold out of ink, varnish and other liquids; permeance to air, water vapour and other gases; coefficient of friction; scuff resistance.

In one aspect this invention provides a new method of printing in which the intaglio plate or roll does not come into contact with the printing ink or fluid. The definition of the printing or pattern on the substrate depends primarily on the following factors:

a) The depth of the depressions in the intaglio support roll or plate.

b) The hardness of the intaglio support surface.

c) The flexibility and deformability of the substrate.

d) The pressure applied by the rod, kinfe or doctor blade.

e) The rheology of the ink or coating material in conjunction with running speed.

The operating parameters of the process are similar to those of conventional printing or coating processes. The selection of ink type, blade pressure intaglio surface hardness and roll speed will be determined according to the substrate to be printed and the aesthetic appearance and functional charactistics which it is desired to achieve and the information which it is desired to impart.

A feature of the process is its directionality with respect to spreading the coating in development of the image. This has the effect for example of depositing a greater coating thickness in an ellipse having major axis in running direction than in an ellipse of the same size having minor axis in running direction. Thus the design of the depressions in the patterned backing surface needs to take account of orientation of the pattern in achieving the required effect.

A particularly advantageous application of the present invention is in the printing of unbleached paper and paperboard packaging materials. As mentioned above the flexibility of the paperboard is

a factor in the method of this invention and paperboards having weights of up to 210 grams per square metre have been successfully coated by this method of the invention.

In the manufacture of paperboard for boxes it is conventional for appearance to use either a bleached layer in a multiply board or a coated unbleached board. The thus prepared board is then printed with the required indicia. By the process of the present invention unbleached board can be coated and printed in one operation. If desired a further layer of printing can be applied as in a multicolour printing process but the initial preparation step is combined with the initial printing step.

In one aspect of this invention the process is inoorporated as a final stage of the manufacture of paperboard so that a coated or printed board is produced.

Because the coating produced by this invention is suitable as a patterned background it may carry messages or bear indicia in a similar manner to the use of watermarks in paper making.

Because the intaglio of patterned plate or roll has no contact with the ink or coating fluid the roll needs less cleaning and is not affected by ink retention as in conventional processes.

Preferred forms of this invention will now be described with reference to the drawings in which figure 1 is a schematic view of a first embodiment and figure 2 is a schematic view of a second embodiment.

In figure 1 the substrate 1 to be coated is passed over a belt containing a perforated or embossed pattern. The belt 6 is supported on a roller 5. The underneath surface 3 of the substrate 1 contacts the patterned belt 6. A coating or ink formulation is spread on to the surface 2 of substrate 1 by a doctor blade 7 which spreads the composition over the surface 2 and applies pressure to the substrate 1. This results in the belt pattern being produced on the upper surface 2 of substrate 1. A patterned or intaglio roller could be used instead of roller 5 which would mean that the belt 6 is not needed. The quality of the definition of the pattern or printing depends on the factors mentioned above.

In figure 2 the substrate 1 is passed between an intaglio roll 9 and a coating applicator roll 12 suspended in a coating or ink formulation or ink 11 within bath 10. Roll 12 applies the composition 11 to the surface 2 of substrate 1. The doctor blade 13 spreads the composition 11 non uniformly, (due to the recessed pattern on roll 9) onto substrate surface 2 and removes excess composition 11.

The degree of contrast achieved depends on the flexibility of the substrate 2, the depth of the recesses on roll 9, the pressure of the blade 11 on the substrate. The hardness of the surface of roll 9 rheology of the ink composition of the coating or ink formulation and coating speed are also factors to be considered.

When utilising a perforated pattern it may be advantageous to increase or reduce the deflection of the substrate over the cavities by controlled application of vacuum or pressure with the objective of increasing or decreasing the liquid thickness carried forward on the substrate at areas corresponding with these cavities.

The apparatus of this invention can be easily adapted from conventional coating apparatus which utilises rollers by placing an intaglio cover on the roll.

From the above it can be seen that this invention provides a unique non uniform coating and an apparatus and a method of producing it.

Claims

1. A method for producing non uniform coatings on a substrate such as board, sheet or film in which a coating composition is applied to first surface of the substrate and the substrate is passed over a patterned surface wherein the second surface of the substrate contacts the patterned surface while a line of pressure is applied laterally to the said first surface.

2. A method as claimed in claim 1 in which the patterned surface is on a roller and the line of pressure is produced by a rod, knife or doctor blade.

3. A method as claimed in claims 1 or 2 wherein the substrate is unbleached paper or paperboard.

4. Apparatus for producing non uniform coating comprising a coating applicator and a spreading device adapted to apply a coating material to one surface of a substrate and a patterned surface juxtaposed to make contact on the second surface of said substrate.

5. Apparatus as claimed in claim 4 wherein the substrate is passed onto a roll having an intaglio surface and ink or coating fluid is spread over the substrate surface not in contact with the intaglio surface by a rod, knife or doctor blade.

6. A method as claimed in claims 1 or 2 wherein the substrate is a sheet or roll of textile.

FIGURE.1

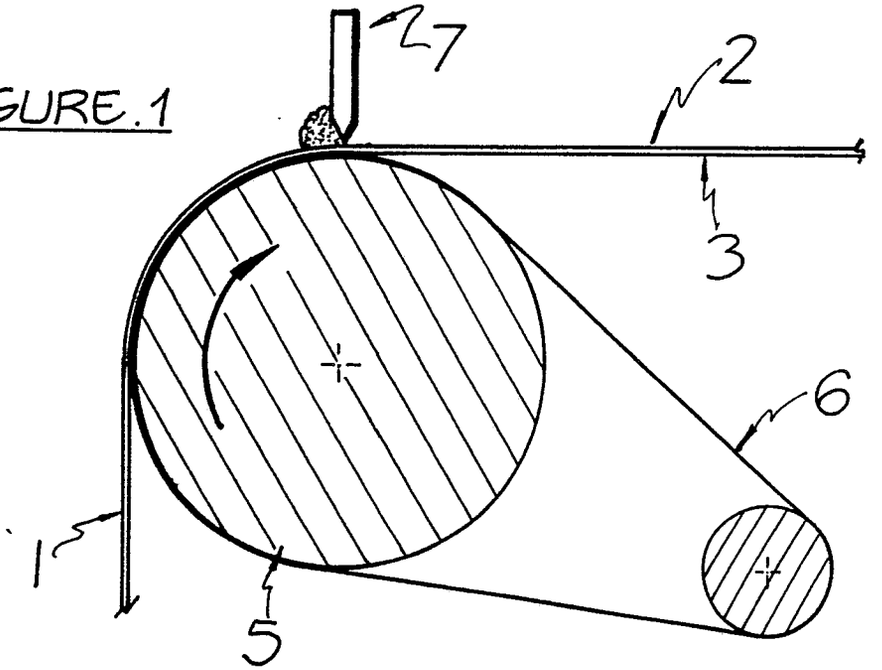

FIGURE 2