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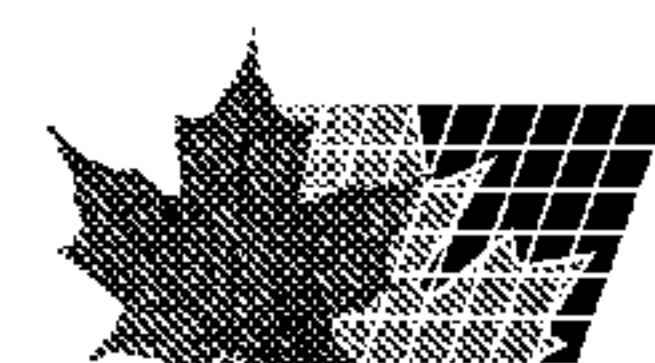
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(54) Title: VACUUM METALIZED PIGMENT PATTERNS AND METHOD OF MAKING SAME

(57) **Abrégé/Abstract:**

A method of transferring in pattern or image form a thin film of vacuum metalized pigment (VMP) from a carrier to a substrate is disclosed. The pattern or image as a thin film adhesive is applied to the substrate and when in contact with the carrier, causes an identical image or pattern of VMP to be removed from the carrier. The VMP itself is itself optically and/or conductively continuous and thus can be used in producing decorative metallic images or conductive electrical circuits including RFID antennae.



ABSTRACT

A method of transferring in pattern or image form a thin film of vacuum metalized pigment (VMP) from a carrier to a substrate is disclosed. The pattern or image as a thin film adhesive is applied to the substrate and when in contact with the carrier, causes an identical image or pattern of VMP to be removed from the carrier. The VMP itself is itself optically and/or conductively continuous and thus can be used in producing decorative metallic images or conductive electrical circuits including RFID antennae.

VACUUM METALIZED PIGMENT PATTERNS
AND METHOD OF MAKING SAME

This invention relates to the use of vacuum metalized pigment in the creation of patterns and the method of making same.

5 The production of vacuum metalized pigment employing a vapor deposition process which produces thin metal flake is well known in the art and is frequently used in the production of paints and inks.

10 Attempts have also been made to produce a conductive ink composition employing conductive flake material capable of providing sufficient conductivity for RFID tag antenna and other printed conductive and semi-conductive structures as disclosed, for example, in U.S. Patent publication 2003/0151028, Lawrence et al., published August 14, 2003.

15 This invention relates to a method of laying down on a substrate a suitable image or pattern made up from vacuum metalized pigment and which has the added advantage of also being suitable as a conductor which advantageously can be employed in producing metal circuit patterns and also other designs where a metalized appearance is desired.

The metal flakes as employed in this invention are derived from metal vacuum deposition whereby the deposited metal is washed or stripped into a suitable solvent to produce a passive, stable and substantially pure metallic flake before being processed into an optimized particle size. Sized vacuum metalized pigment (VMP) typically have an aspect ratio of 1:5.

In accordance with this invention, the VMP while in suspension or slurry form is applied as a thin coating to the surface of a carrier. Preferably, the slurry is of a predetermined thickness and is applied to the exterior surface of a rotating cylinder. This can be achieved by employing any suitable application means such as a duct in which the rotating cylinder is partially immersed, or from an enclosed applicator blade as currently used in flexographic and gravure printing presses.

The VMP slurry coating as applied to a carrier, such as the exterior surface of a rotating cylinder, is permitted to dry so as to form, in a transfer area on the carrier, a thin layer of optically and/or conductively continuous VMP on the surface thereof.

The substrate itself is provided with a thin film adhesive thereon which is in the shape of the image or pattern of the thin layer of optically conductively continuous VMP to be transferred from the carrier to the substrate. The adhesive on the substrate, upon contact with the thin metal flake on the carrier, causes the

predetermined image or pattern to be removed from the thin film VMP in the transfer area. The remainder of the VMP after the removal of the patterned VMP therefrom, is subsequently removed from the carrier by solvent washing or the like.

5 It will be appreciated that the thin metal VMP that has been transferred and applied to the substrate is relatively pure, being free of polymers or binders which interfere with its conductivity. The purity of the metal and the extremely thin nature of the flake combine to produce a cohesive metal surface which is secured to the substrate by the patterned adhesive.

10 In accordance with my invention, there is provided a method of transferring an image or pattern made up from vacuum metalized pigment (VMP) which comprises the steps of (a) providing a thin film adhesive in the shape of the image or pattern to be transferred on a surface of a substrate; (b) applying a thin coating of VMP while in suspension or slurry form to a surface of a carrier; (c)
15 drying said thin coating on said carrier in a transfer area to produce a thin layer of optically and/or conductively continuous VMP on the surface of said carrier; and (d) transferring the image or pattern from the carrier to the substrate by contacting the dry VMP in the transfer area with said thin film adhesive on the substrate to thereby remove dry VMP in image or pattern form from said transfer
20 area.

The VMP typically is one of aluminum, copper, nickel, silver and chrome. The weight of the applied thin coating of VMP on the surface of the substrate can range from 1.0 to 10.0 grams per square meter with the thickness of the transferred thin layer image or film being in the range of from 100 to 600 Angstroms.

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In keeping with this invention, it will be appreciated that the transferred thin film VMP can be applied to any suitable substrate for decorative purposes or where desired, employed as a conductor as used in printed circuit boards or the like or as an antenna in RFID applications.

I CLAIM:

1. A method of transferring an image made up from a vacuum metalized pigment (VMP), comprising the steps of:

5 (a) providing a thin film adhesive in the shape of the image or pattern to be transferred on a surface of a substrate;

(b) applying a thin coating of VMP while in suspension or slurry form to a surface of a carrier;

10 (c) drying said thin coating on said carrier to form in a transfer area a thin layer of dry optically and/or conductively continuous VMP on the surface of said carrier;

(d) transferring said image or pattern from said carrier to said substrate by contacting dry VMP in the transfer area with said thin film adhesive on said substrate to thereby remove dry VMP in image or pattern form from said transfer area.

15 2. The method as claimed in claim 1, wherein the VMP is one of aluminum, copper, nickel, silver and chrome.

3. The method as claimed in claims 1 or 2, wherein the weight of said coating is in the range from 1.0 to 10.0 grams per square meter.

4. The method as claimed in claims 1, 2 or 3, wherein the thickness of the transferred thin layer image or pattern is from 100 to 600 Angstroms.

5 5. The method as claimed in claims 1-4, wherein the carrier is the exterior circumference of a rotating cylinder.

6. The method as claimed in claim 5, wherein said substrate comprises an elongated web which is in synchronous movement with said carrier comprising the outer surface of a rotating cylinder and which contacts the outer surface of said cylinder at said transfer area.

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7. The method as claimed in claims 1-6, wherein the remainder of said VMP in said transfer area is removed from said carrier for recycling.

8. The method as claimed in claims 1-7, wherein said thin film adhesive is a pressure sensitive adhesive.

15 9. The method as claimed in claims 1-7, wherein said thin film adhesive is a temperature sensitive adhesive.

10. The method as claimed in claims 1-9 wherein the transferred image or pattern is an electrical conductor pattern applied to and forming part of a printed circuit board.

11. The method as claimed in claims 1-9 wherein the transferred image is an electrical conductor having a RFID pattern.

12. A metalized pattern applied to a substrate, wherein the pattern is formed from a thin film of optically or conductively continuous vacuum metalized pigment (VMP) and is bonded to said substrate by means of an adhesive having a pattern which corresponds to that of said metalized pattern.

13. The metalized pattern as claimed in claim 12, wherein the VMP is in the form of metal flakes which have an aspect ratio of 5:1.

14. The metalized pattern as claimed in claim 12 or 13 comprising a metalized electrical circuit pattern.

15. The metalized pattern as claimed in claim 14, wherein the metalized electrical circuit pattern is a RFID antenna pattern.

16. The metalized pattern as claimed in claims 12-15, wherein said VMP is selected from the group consisting of silver, gold, aluminum, chrome and copper.