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(54) Titre : IMPRIME A EFFET D'INTAILLE REFLECHISSANTE
(54) Title: PRINTED MATTER PRODUCING REFLECTIVE INTAGLIO EFFECT

(57) Abrégé/Abstract:
A printed document or other device comprising a polymer substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer of ink applied directly to said surface by means of a printing process, and a printed image applied to the reflective or brightly coloured layer by an intaglio printing process.

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(57) Abstract

A printed document or other device comprising a polymer substrate having a surface to which printed matter is applied, a reflective or brightly coloured layer of ink applied directly to said surface by means of a printing process, and a printed image applied to the reflective or brightly coloured layer by an intaglio printing process.

PRINTED MATTER PRODUCING REFLECTIVE INTAGLIO EFFECT

Field of the Invention

This invention relates to printed matter, including banknotes, security documents and devices, and all other printed matter.

Background of the Invention

The printing industry is constantly looking for printing techniques which produce printed matter which offers additional security or which is visually appealing in various applications.

In the security printing industry, printed matter which exhibits an effect when visually inspected under various light conditions, but which is not capable of replication using known duplicating methods, such as photocopying or scanning, is highly advantageous.

A security document having some of these features is disclosed in U.S. Patent No. 4,420,515 - Amon et al, which includes a metallic film which is printed or embossed to produce a latent image which is viewed to verify the authenticity of the document. However, the process by which this document is produced requires a number of complex steps to apply the metallic film to the substrate before printing and embossing, and since it would be impractical to incorporate these application steps in the usual document printing process, difficulties will be experienced in making the process commercially attractive. Furthermore, the image produced by the printing and embossing of the metallic film is a latent image which may require specific conditions for viewing and verification.

The introduction of banknotes printed on polymer substrates has introduced a further dimension to the security printing industry, and the present invention seeks to provide a further improvement in banknotes and other security devices exhibiting the abovementioned desirable effect.

Summary of the Invention

The invention provides a printed document or other device comprising a substrate to which printed matter is applied, the substrate having a first side and a second side, a reflective or brightly coloured layer which is printed onto one side of the substrate without embossment, and a raised print image applied to said reflective or brightly coloured layer

by a printing process, at least part of said raised print image having a height of at least 5μm, said raised print image being enhanced by said reflective or brightly coloured print layer when viewed at different angles and under different lighting conditions.

By applying a raised print image on a reflective or brightly coloured print layer, the colour of the raised print image is intensified and becomes brighter and is thus enhanced, and an optically variable image is produced when the document is viewed under different lighting conditions or at different viewing angles thereby introducing an optically variable effect of benefit in security applications. Since the reflective or brightly coloured print layer is printed on said substrate, or is applied as part of a printing process, it is conveniently incorporated into the printing process to overcome the production shortcomings of the process described in U.S. Patent No. 4.420,515. Furthermore, the effect of the reflective or brightly coloured print layer is to enhance the visible image produced by the raised print regions, rather than to produce a latent image as in the U.S. Patent. The enhanced image is able to be directly viewed and does not require special lighting or other conditions.

The raised print image is most conveniently produced by an intaglio printing process, although acceptable raised images may be produced by other known printing processes or by a combination of embossing and printing on raised embossed surfaces.

The enhanced image effect referred to above is not achieved if the image is printed using the normal offset printing process, and unless the height of the raised print is at least 5μm, the enhancement produced by the underlying reflective or brightly coloured print layer may be insufficient.

In one form of the invention, the substrate is a polymer film and preferably a laminated film of the type used in the production of Australian banknotes. Alternatively, the substrate can be a paper substrate provided it has a smooth surface on which the reflective or brightly coloured print layer is applied.

In certain applications or areas of the document, the reflective or brightly coloured print layer can be applied directly to the substrate or film, which can have its own reflective effect, thereby intensifying the reflective properties of the reflective or brightly coloured print layer. In other applications, an opaque ink layer may be first applied to the surface of the substrate and the reflective or brightly coloured print layer applied to the opaque layer.

Both the reflective or brightly coloured print layer and the opaque layer are preferably applied to the substrate by the Gravure printing process, although the reflective or brightly coloured layer may comprise a metallised foil or a brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

The invention also provides a method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer to the substrate as part of a printing process, followed by the step of applying a raised image to the reflective or brightly coloured layer by a printing process so that at least part of said raised image has a height of at least 5μm and is visible form all angles of the document.

In one form of the invention, the reflective or brightly coloured layer is an ink layer applied by the Gravure printing process and the raised print is produced by an intaglio printing process. Alternatively, the reflective or brightly coloured layer comprises a reflective or brightly coloured foil which is laminated or adhesively applied to the surface of the substrate as part of the printing process.

In a particularly preferred form of the invention, the reflective or brightly coloured layer is applied to an opaque layer which has been applied to the substrate.

Description of Preferred Embodiment

In a presently preferred form of the invention, a thin polymer substrate comprising laminated polypropylene sheets of the type currently used to produce Australian polymer banknotes firstly has an opaque layer applied to both sides of the substrate by the Gravure printing process, following which a reflective or brightly coloured layer of ink is applied also by the Gravure process.

The ink can comprise any suitable ink which produces a reflective or brightly coloured effect. Suitable inks include the following pigments blended at a 30% to 70% w/w concentration in clear varnish suitable for Gravure application.

Product Name: Bronze Powder Resist Rotoflex Brilliant Rich Pale Gold

Product Description: Flake oxidation resistant metal powder based on a copper-zinc-alloy. (ca 85% Cu, 15% Zn)

Particle Size: <45 μm

Product Manufacturer: ECKART-WERKE GmbH & Co

and

Product Name: Aluminium Powder Super Lining GGT

Product Description: Aluminium Powder (Aluminium based on H-A1 99,5%)

Manufacturer as above.

Printed matter is then applied to the surface of the reflective or brightly coloured layer by the intaglio process to produce a print having raised regions having a height of at least 5μm. The maximum height of the raised region will be determined by the intaglio or other printing/embossing process, but enhanced effects have been observed with raised regions of about 50μm in height. In the present example, the intaglio print can comprise the same prints which are currently applied to Australian polymer banknotes, and these prints are significantly enhanced by the reflective or brightly coloured background and an optically variable image is produced when the intaglio print is viewed under different lighting conditions and viewing angles.

Most printed images will have regions in which substantially parallel lines of raised ink are present. When these lines are viewed at an angle other than directly above the lines, significant enhancement of the image is produced by the reflective or brightly coloured layer. Of course, even if there are no parallel lines, some enhancement of the image is still produced by the underlying reflective or brightly coloured layer.

The reflective effect of the reflective or brightly coloured layer complements the image applied by the intaglio process since the intaglio process transfers a raised print to the substrate, and when such a print is applied to the reflective surface, a novel effect is achieved. An image can be observed by viewing the intaglio image at different angles. If the same intaglio image is printed on a non-reflective substrate, the same effect will not be achieved. The novel image effect may be explained by the following factors:

- When the raised intaglio print is viewed at a specific angle the walls of the intaglio lines hide the background print. The reflective or brightly coloured nature of the substrate intensifies the distinction between the intaglio and reflective substrate revealing and enhancing the raised image.
- The flat/smooth nature of polymer substrate enhanced by a reflective or brightly coloured printed surface, in addition to the raised surface of the intaglio image intensifies both of these properties.

As mentioned above, the reflective or brightly coloured ink can be applied directly to the surface of the polymer substrate since the substrate has its own reflective effect, and this intensifies the reflective effect produced by the reflective or brightly coloured ink layer. If the reflective or brightly coloured ink is applied without an opaque layer, the image will still provide a beneficial effect. Alternatively, if the reflective or brightly coloured ink layer is applied in a region which has been printed on the other side, the printed image will still be enhanced by the underlying reflective layer.

As mentioned above, the reflective ink layer can be replaced by a reflective foil or other film which is laminated or adhesively applied to the substrate and a similar effect is achieved in either case. Suitable reflective foils include those that are applied onto the substrate by hot stamping techniques. These foils typically comprise of a carrier film, a release layer, a metallised layer and an adhesive. Application of the foils is achieved by the hot stamping technique where the foil is adhered onto the substrate at a temperature of, but not limited to, 130°C and high compressive pressure, so that the adhesive is activated and the carrier film is released.

By applying an intaglio print to a reflective or brightly coloured substrate, the security features of the intaglio image are substantially enhanced, resulting in greater distinction of a security image. Both the optically variable intaglio effect and the reflective/glossy nature of the substrate are difficult to replicate by standard duplicating methods, such as colour photocopying or scanning, and the effect produced is aesthetically pleasing.

WHAT IS CLAIMED IS:

1. A printed document or other device comprising a substrate to which printed matter is applied, the substrate having a first side and a second side, a reflective or brightly coloured print layer which is printed onto one side of the substrate without embossment, and a raised print image applied to said reflective or brightly coloured layer by a printing process, at least part of said raised print image having height of at least 5μm and being visible from all angles of the document, said raised print image being enhanced by said reflective or brightly coloured print layer when viewed at different angles and under different lighting conditions.

2. The document or other device of claim 1, wherein the raised print image is produced by an intaglio printing process.

3. The document or other device of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured print layer being printed directly on the substrate to utilize any reflective effect in the film to intensify the reflective properties of the reflective or brightly coloured print layer.

4. The document or other device of claim 1 or 2, wherein the substrate is a plastics film capable of use to form a banknote, said reflective or brightly coloured print layer being printed over an opaque ink layer applied to one side of the substrate.

5. The document or other device of claim 1 or 2, wherein the substrate is a paper film having a smooth surface to which said reflective or brightly coloured print layer is applied.

6. The document or other device of any one of claims 1 to 5, wherein the reflective or brightly coloured print layer is applied by a Gravure printing process.

7. The document or other device of claim 4, wherein the reflective or brightly coloured print layer and the opaque layer are applied to the substrate by a Gravure printing process.

8. The printed document or other device as claimed in any one of claims 1 to 7, wherein said raised print image is a pattern having regions of substantially parallel lines.

9. A method of producing a printed document or other device on a substrate, comprising the step of applying a reflective or brightly coloured layer to the substrate as part of a printing process, followed by the step of printing a raised image on the reflective or brightly coloured layer by a printing process so that at least part of said raised image has a height of 5μm and is visible from all angles of the document, said raised printed image being enhanced by said reflective or brightly coloured print layer when viewed at different angles and under different lighting conditions.

10. The method of claim 9, wherein the raised image is produced by an intaglio printing process.

11. The method of claim 9 or 10, wherein the substrate is a plastics film capable of use to form a banknote and having a surface reflective effect which intensifies the reflective properties of the reflective or brightly coloured layer.

12. The method of claim 9 or 10, wherein the substrate is a plastics film capable of use to form a banknote further including the step of printing an opaque layer on the substrate, on which the reflective or brightly coloured layer is printed.

13. The method of claim 9 or 10, wherein the substrate is paper having a smooth surface to which the reflective or brightly coloured layer is applied.

14. The method of any one of claims 9 to 13, wherein the reflective or brightly coloured layer is applied by a Gravure printing process.

15. The method of any one of claims 9 to 13, wherein the opaque layer and the reflective or brightly coloured layer are applied by a Gravure printing process.

16. The method as claimed in any one of claims 9 to 15, wherein the raised image is a pattern having regions of substantially parallel lines.