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(54) Security document

(57) A component bearing an image is produced by printing the image (12) on a layer (11) of a high temperature glue which has been applied to a layer of a transparent medium (10). The image is printed on the glue layer using carbon or a carbon-containing compound that does not flow when applied to the glue surface. The component consisting of transparent medium, high temperature glue and image is then bonded to a substrate (13) using a thermal bonding process to produce a laminate of the transparent medium and the substrate. The image is not distorted by the thermal bonding process, but remains clearly visible through the transparent medium. Typically the transparent medium will be a polyester film or a sheet of glass beads dispersed in glue. One or more additional layers (27) may be bonded to the substrate (13) to increase the stiffness of the product laminate.

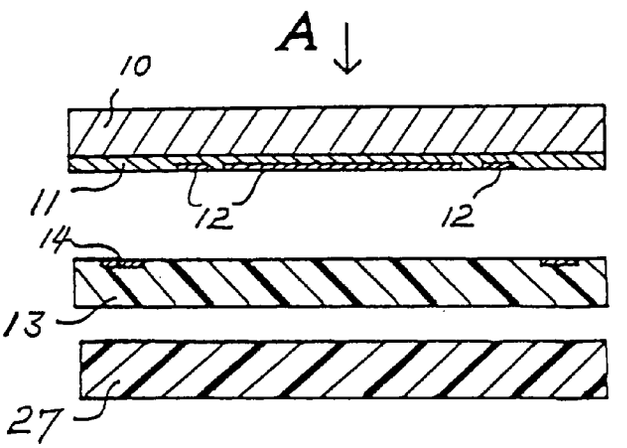

FIG. 1.

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Description

Technical Field

This invention concerns the production of security documents, such as passports, identity cards, identification badges and labels, driving licences and the like. More particularly, it concerns a technique for providing, within a laminated structure, a printed image that is significantly more secure than images obtained by conventional procedures.

Background

The most common method of producing identity cards, identification badges and the like involves the steps of (i) mounting a photograph on a backing sheet of light card, (ii) sandwiching the card (with the photograph attached) between two sheets of a transparent plastics material, then (iii) bonding (using heat) the transparent sheets together at their edges. Such cards and badges, however, do not possess the degree of security that is required for passports and for passes to regions containing secret and classified information, for it is possible to cut the cards and badges near the edges of the transparent sheets, remove the card, substitute a new photograph, and then seal the modified card between two new sheets of transparent plastics material.

Passports are still produced by a technique which involves bonding a photograph to a page of the passport, using a conventional paper glue, then covering at least part of that page (with the photograph affixed) with either a transparent strip of a polyester material having adhesive on one side or a glass bead laminate. In this way the photograph is covered by the transparent strip or the glass beads and its security is improved. However, it is possible for a determined person to separate the components of the passport page, then substitute a fresh photograph for the photograph that has been mounted in the passport using this technique.

To improve the security of passports and identity cards, it has been proposed to print photographic information (including an image of the holder of the passport or identity card) on the end sheet of a passport or on a sheet of card, rather than simply mount photographs on the sheets, and to cover the printed image to prevent the deliberate (or inadvertent) removal of that information. However, no reasonably economic and technically viable technique for implementing this approach has been put forward.

Disclosure of the Present Invention

It is an object of the present invention to provide a technique for producing an image within a laminate formed by a layer of a transparent medium and a sheet of paper, card or the like, which satisfies the requirements for the production of more secure passports, identity cards, security badges, identification labels and the like.

This objective is achievable using the surprising discovery that an image can be produced on (or in) a layer of a high temperature glue (that is, a glue having a melting point of about 95°C) at low temperature, and that image is not destroyed, if the toner or other carbon-containing material used to create the image has set, when the glue layer is heated to create a bond. Thus, if a sheet of a transparent medium (for example, a polyester material or a layer of glass beads) has one side coated with a high temperature glue, and an image is printed on the glue layer using (for example) a laser xerography technique or printing ink, and that transparent material is subsequently bonded to a sheet of paper or other substrate by a thermal process, the image is presented without deterioration within the laminate thus produced, provided the toner or ink used for the printing of the image has set on the glue before the thermal bonding is effected. When the image includes printing, that printing is machine readable.

It has also been found that compounds other than carbon or carbon-containing compounds can be used to produce machine-readable characters, provided those other compounds are highly absorbent of radiation having a wavelength in the visible spectrum or the near infra-red region.

Accordingly, the present invention provides a method of producing an image within a laminate which comprises the steps of

(a) coating one side of a sheet of transparent medium with a layer of a high temperature glue;
(b) producing an image on the glue layer using carbon or a carbon-containing or other radiation absorbent compound which does not flow when applied to the glue layer and, if necessary, allowing or causing the image-producing compound to set;
(c) applying a substrate to the high temperature glue layer on which the image has been produced; and
(d) bonding the transparent medium to the substrate using a known high temperature thermal bonding process, thus producing a laminate of the transparent material and the substrate.

Some manufacturers produce a laminate in the form of a sheet of a transparent medium to which a layer of a high temperature glue has been applied. Such a product can be used in the present invention, which then comprises the steps of

(a) producing an image on the glue layer of a first laminate comprising a sheet of a transparent medium to which is bonded a layer of a high temperature glue, using carbon or a carbon-containing or other radiation absorbent compound which does not flow when applied to the glue layer and, if nec-

essary, allowing or causing the carbon-containing compound to set; then

(b) applying a substrate to the high temperature glue layer on which the image has been printed; and

(c) bonding the transparent medium to the substrate using a known high temperature thermal bonding process, thus producing a second laminate within which the image has been included.

The transparent medium may, for example, be a sheet of polyester material, or comprise glass beads in glue.

The image may, for example, be applied to the glue layer by a xerographic process, the carbon or carbon-containing or other radiation absorbent compound being the toner used in the xerographic process, or be produced using a programmable printer which prints using a ribbon impregnated with, or carrying a layer of, carbon or a carbon-containing compound, or be applied to the glue layer by a jet printer, the ink of which is the carbon-containing compound.

The thermal bonding technique for high temperature glues that is, the bonding technique of step (d) of the first recitation above of the method of the present invention and step (c) of the second recitation of the present invention - is well known, so that detailed discussion of that technique in this specification is not necessary.

Since, in almost all uses of the present invention, the image (which may consist of or include printing) will be viewed through the transparent medium, the image will normally be printed on the glue as a reverse image.

Without limiting the generality of the carbon-containing or radiation absorbing compounds that may be used in the present invention, the image may be created by laser xerography or other photo-copying technique, by an ink-jet printer (provided the ink used is chosen - or thickened - so that it does not flow on contact with the glue layer), by a dot matrix printer using a typewriter ribbon (preferably a carbon typewriter ribbon), or by a typewriter adapted to print mirror images of the normal characters of the typewriter. Ink jet printers and dot matrix printers can be used to create the equivalent of photographic images by an appropriate printing of dots. The printing of the image is effected by programming the printer after scanning the image to determine the density of dots in the pixels which make up the image. Clearly, if a typewriter ribbon is the medium through which the carbon or carbon-containing compound is applied to the glue layer, there is no requirement to allow or cause the material of the image to set before proceeding to the thermal bonding step of the present invention.

If a programmable printer is used for the image-producing step of the present invention, an entire page of a passport, or an entire identification card or badge, comprising both a photographic image and lettering, may be printed by the printer.

If the printer used to produce the lettering cannot also produce a photographic image, then the passport page or identification card or badge may be produced with two printing steps. The first printing step will produce an image of the required lettering and the second printing step will provide the photographic image of the bearer of the passport or the holder of the identification card or badge. (Of course, the image may be printed before the lettering.) The glue layer containing the two printed images will then be brought into contact with the substrate, and the high temperature thermal process will be used to produce the completed passport page or identification card or badge.

The transparent sheet material is typically either a flexible, transparent polyester material, such as the material marketed under the trade mark "Mylar", or it may be a layer of glass beads in glue. Both such materials are available commercially with a layer of high temperature glue applied to one face of the transparent sheet.

If greater stiffness of the final product laminate is required, one or more additional layers of any suitable material may be bonded to the substrate of the product laminate of the present invention, preferably (but not necessarily) using the high temperature glue bonding technique.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a sectional view (partly schematic) through a sheet of transparent polyester material that is to be bonded to a backing sheet, using glue on which an image has been printed.

Figure 2 is a similar sectional view (partly schematic) through a sheet of a glass bead laminate with a high temperature glue layer, that is being bonded to a substrate.

Detailed Description of the Illustrated Embodiment

Figure 1 shows a sheet 10 of a transparent polyester material, such as "Mylar" (trade mark), or another known flexible, transparent polyester material that is available in sheet form, to one side of which a thin layer 11 of a known high temperature glue has been applied by the manufacturer. Thin layers of the high temperature glue are also transparent.

Figure 2 depicts a glass bead laminate comprising a layer 20 of glass beads in glue, to one side of which a thin layer 11 of a high temperature glue has been applied. An optional (but usually present) sheet 26 of backing paper is included to improve the stiffness of the laminate and to protect the glass beads at the face of layer 21.

In each case, images - usually reverse images of a photographic impression and associated lettering to be

viewed, subseqently, through the transparent sheet 10 or 20 in the direction of the arrow A - are printed on the region 12 of the glue 11, using carbon or a carbon-containing compound. As indicated above, laser xerography is a convenient way of producing the images. This way of producing the images is preferred, but it is acknowledged that increased use of scanners and programmed printers, and developments in that technology, may result in programmable printers becoming the preferred equipment for the image production.

If, as in the example shown in the drawings, the images are in part lettering, the image of the lettering may be applied to the glue layer before, or after, the application of an image of a photographic impression.

When the image is produced by a xerographic process or with printing ink, the toner must be allowed (or caused) to set, or the ink must be dry, before the next step in the fabrication of the product laminate is taken. The setting or drying usually takes a very short time. Indeed, when laser xerography is used to produce the image, the heat required to set the toner is applied as part of the printing process. Surprisingly, although the heat applied to set the toner should be sufficient to melt the high temperature glue, the glue layer 11 is not softened during its passage through the printer.

When the toner of the image has set, or the ink used for printing the image has dried, the transparent sheet 10 or 20 is placed on a substrate 13 of paper or other suitable material with the glue layer 11 sandwiched between the transparent sheet 10 or 20 and the substrate 13. The substrate 13 may have information printed on it in regions 14 outside the area of the substrate which is covered by the image regions 12 of the glue layer 11.

The sandwich of sheet 10 or 20 with the substrate 13 is then heat treated in the conventional manner to bond the transparent sheet 10 or 20 to the substrate 13 and form a product laminate of the two sheets. Following this step it is very difficult to separate the sheet 10 (or 20) from the substrate 13. The surprising aspect of such a thermal treatment (during which the temperature of the components of the sandwich reaches at least about 95°C to enable the high temperature glue layer 11 to bond the sheet 10 or 20 and the substrate 13 together) is that the imprinted image on or in the glue is not destroyed or distorted, but retains its identity and clarity, despite the melting of the glue during the high temperature bonding treatment.

After the heat treatment step, the substrate 13 of the product laminate may be bonded to additional sheets 27 of paper or card or other suitable material to form a thicker, and therefore stiffer, laminate. It has been found that such additional bonding does not destroy or distort the original image on the region 12 of the basic laminate. Indeed, tests using images produced by the present invention have shown that when the images include alpha-numeric characters, those characters remain machine readable to the extent required by the International Civil Aviation Organisation's specification No 9303. Thus the present invention incorporates a stable machine-readability feature into passports and other travel documents.

If the glass bead laminate of Figure 2 is used, the protective backing sheet 26 is peeled off the product laminate after its formation, to expose the outer surface of the transparent layer 20.

It will be appreciated that using the technique of the present invention, it is possible to produce identity cards, passport pages, security passes, identification labels and the like, which are both durable and significantly more secure than those products made using the methods currently in use.

Those skilled in this field will acknowledge that although two specific realisations of the present invention have been illustrated and described above, modifications to the described embodiments can be made without departing from the present inventive concept.

Claims

1. A combination for the production of an image-containing laminate, the combination comprising:

   (a) a sheet (10,20) of transparent medium, one face of the sheet being coated with a layer (11) of a high temperature glue, and the glue layer having thereon an image (12) produced by carbon or carbon-containing or other radiation absorbent compound; and
   (b) a substrate (13).

2. An image-containing laminate comprising a combination according to claim 1, in which the transparent medium (10,20) is bonded to the substrate (13) by the layer (11) of a high temperature glue.

3. A laminate according to claim 2, in which the transparent medium is a polyester material.

4. A laminate according to claim 2, in which the transparent medium (20) comprises a layer of glass beads in glue.

5. A laminate according to claim 2 or 3 or 4, in which the carbon or carbon-containing or other radiation absorbent compound is the toner used in a xerographic process.

6. A laminate according to claim 2 or 3 or 4, in which the image is produced by carbon or a carbon-containing compound from a ribbon impregnated with, or carrying a layer of, carbon or the carbon-containing compound, and used in a programmable printer.

7. A laminate according to claim 2 or 3 or 4, in which the image is produced by a carbon-containing compound used as the ink of a jet printer.

8. A component for use in a combination according claim 1, comprising:

a sheet (10,20) of transparent medium having on a face thereof a layer (11) of a high temperature glue; and
an image (12) on the glue layer (12), the image (12) being formed of carbon or a compound which is absorptive of visible and infra-red radiation and does not flow on the glue layer (11).

9. An image-bearing component for a security laminate, comprising a sheet (10,20) of transparent medium having on a face thereof a layer (11) of a high temperature glue; and an image (12) on the glue layer (11), the image (12) being formed of carbon or a compound which is absorptive of visible and infra-red radiation and does not flow on the glue layer (11).

10. A component according to claim 8 or 9, wherein the sheet of transparent medium is a sheet (10) of a transparent polyester.

11. A component according to claim 8 or 9, wherein the sheet of transparent medium comprises a layer of glass beads in glue.

12. A component according to any one of claims 9 to 11, wherein the said compound comprises xerographic toner.

13. A component according to any one of claims 9 to 11, wherein the said compound comprises ink from an ink jet printer.

14. A component according to any one of claims 9 to 13, wherein the image (12) includes a photographic image.

15. A component according to any one of claims 9 to 14, wherein the image (12) includes alpha-numeric characters.

16. A component according to any one of claims 9 to 15, wherein the image (12) is machine readable.

17. A method of producing an image-bearing component for a security laminate, comprising the steps of:

(a) providing a sheet (10,20) of transparent medium having on a face thereof a layer (11) of a high temperature glue; and
(b) producing an image (12) on the glue layer (11) using carbon or a compound which does not flow when applied to the glue layer (11) and which is absorptive of visible and infra-red radiation; and, if necessary, allowing or causing the compound to set.

18. A method according to claim 17, wherein step (a) comprises coating the said face of the sheet (10,20) of transparent medium with the layer (11) of high temperature glue.

19. A method according to claim 17 or 18, wherein the image (12) is applied to the glue layer (11) by a xerographic process and the said compound is toner used in the xerographic process.

20. A method according to claim 17 or 18, wherein the image (12) is applied to the glue layer (11) by using a programmable printer and the carbon or the said compound is provided by a ribbon employed in the printer.

21. A method according to claim 17 or 18, wherein the image (12) is applied to the glue layer (11) by using an ink jet printer and the said compound is the ink employed by the printer.

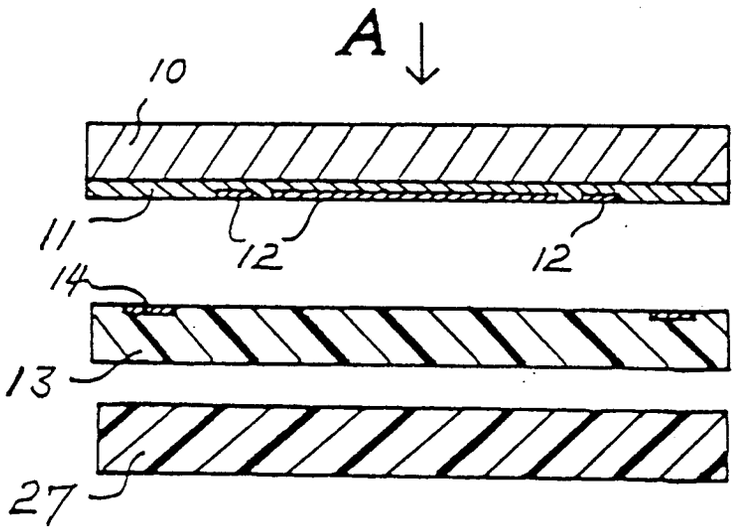

FIG. 1.

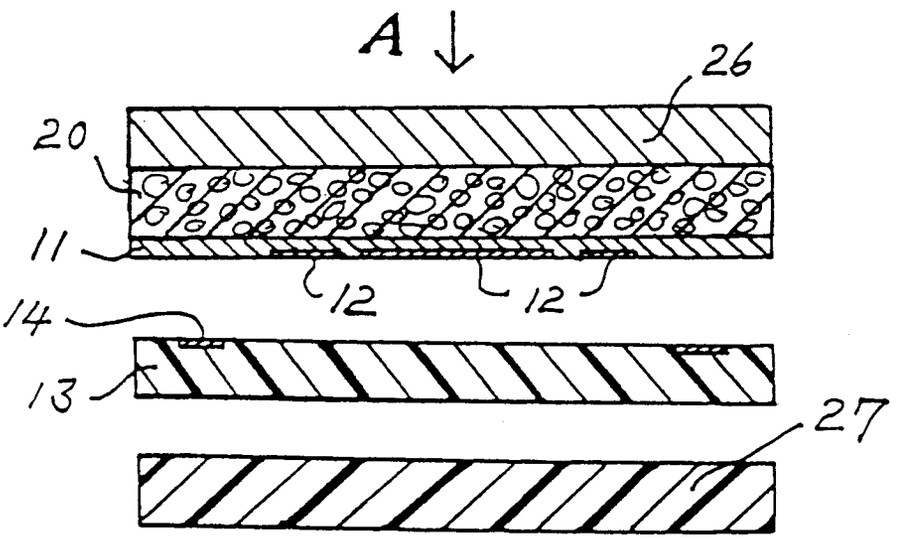

FIG. 2.