

Layered laminate suitable for use in producing printed security documents, and methods of production and use thereof.

#### Technical Field

The present invention relates to a layered laminate suitable for use in producing printed security documents, particularly passports, and to a method of producing the layered laminate. The present invention also encompasses a method of attaching the laminate to a portion of the printed security document, as well as to the final end-product: the printed security document itself produced using this method.

#### Background

Improvements in the security of printed security and identification documents is very important worldwide, in particular for passports but also for other documents such as driving licenses and ID cards. Security for these printed documents has evolved over time. Previously, identifying information about the document holder (such as their photograph) would be stuck to a page of their document (e.g. their passport page), and covered with a sealing layer typically comprising a varnished plastic sheet having an adhesive side (which may have additional security information or indicia printed on the adhesive side). This adhesive side would be protected by a waxed paper which could be peeled off when adhering the sealing layer to the desired passport page. However, such sealing layers start to peel off the page over time, making it possible to tamper with the information underlying it on the passport page. Now, the identifying information (ie. the photograph) is printed directly onto either the sealing layer or the passport page, and special inks may also be used to hide additional security indicia within the sealing layer for extra security. However, these special inks are easy to spot by counterfeiters as they are highly glossy compared to the passport page. It is therefore still possible for the sealing layer to be peeled off and the security information contained therein to be tampered with by counterfeiters.

It is an object of the present invention to overcome or at least substantially mitigate at least some of the problems encountered in the prior art.

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✓x1

✓x1

✓x2

Summary of Invention

According to an aspect of the present invention, there is provided a layered laminate suitable for use in producing security documents having the features of claim 1. Advantageously, the use of a varnish layer for applying the security indicia provides a hard, protective outer coat to prevent damage to the underlying indicia, making the final product much harder to tamper with than the plastic sheets that are current used for the application of security indicia. Furthermore, the use of a varnish layer rather than plastic ensures that the finished product has a consistent sheen, making it much more difficult to detect the presence of special inks hiding additional information which are also glossy.

✓x1

The reason that varnish is suitable for this laminate product is that it has different properties at different temperatures, and in particular is able to handle both the low 'printing' temperatures that are required for application of the security indicia, as well as the higher 'transfer' temperatures when the laminate is applied to the printed security document which allow the varnish to be cleanly separated from the carrier sheet base layer. The varnish layer is therefore ideally suited for printing as well as transferring.

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Preferably, the layered laminate has the features of claim 2, which ensures that an added layer of protection is provided to prevent wear and tear of the security varnish layer containing the security indicia.

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Preferably, the layered laminate has the features of claim 3, as acrylic copolymer is widely available, cheap and can be easily peeled from the carrier sheet.

✓x1

Preferably, the layered laminate has the features of claim 4, which enables a large amount of security information to be included. Preferably, the layered laminate has the features of claim 5, which allows for different properties of the varnish layers and therefore, with the features of claim 6, the number and type of security indicia may be varied to suit different government's requirements. In particular, where the features of claim 7 are utilised, visible security indicia in the form of optically-variable print for example that cannot be easily produced can be provided in combination with invisible security indicia.

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Preferably, the layered laminate has the features of claim 8, and or the features of claim 9. Having thin varnish layers facilitates ease of transfer from the carrier sheet and provides a more tamper evident surface, and the thinner the layer, the harder for a counterfeiter to lift and remove the varnish layer from the finished passport.

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Preferably, the layered laminate has the features of claim 10, as such paper is widely available, cheap and easily removed for recycling.

✓x½

Preferably, the layered laminate has the features of claim 11, and ideally those of claim 12. The adhesive needs to have a melting point suitable for use with the manufacturing process temperatures, and temperature-sensitive polyurethane is also ensured to not melt if additional, auxiliary indicia are applied to it, as set out in claim 13. These indicia provide a way to print additional information on the laminate without affecting the finish of the varnish layer(s).

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✓x½
✓x½
✓x½
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According to another aspect of the present invention, there is provided a method of producing a layered laminate according to claim 14. This method is advantageous due to its simplicity, and at least due to the advantages that are conferred by the laminate product as set out in respect of claim 1. The method may be performed on existing industrial print machines.

Preferably, the method involves the features of claim 15, where the varnish layers to which security indicia are applied are subsequently added to the base layer, and the varnish layer already provided forms a protective layer. Conversely, if no additional varnish layer is applied, the use of pre-varnished paper simplifies the overall process.

It will be appreciated that the features and advantages associated with the laminate apply equally to its method of production.

According to a further aspect of the present invention, there is provided a method of producing a printed security document according to claim 16. This is advantageous as the printed documents that result look the same as existing security documents, but are harder to tamper with due to the afore-mentioned advantages associated with the varnish layers and hence the layered laminate.

Preferably, the method comprises the features of claim 17 and/or claim 18, to ensure that the components of the laminate properly adhere to the document substrate and the carrier sheet may be removed cleanly.

Preferably, the method of claim 19, ideally in combination with the features of claim 20, ensure that if the document is provided with secure information already provided thereon, the method will ensure that the laminate and the document form a completely smooth finish.

According to another aspect of the present invention, there is provided a printed security document according to claim 21.

#### List of Figures

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the attached drawings, in which:

Figure 1 shows a cross-sectional view of the components that are used, according to an embodiment of the present invention, to produce a printed security document; and

Figure 2 shows a finished printed security document produced from the components in Figure 1.

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Like features are indicated in the figures by the use of like reference numerals.

#### Detailed Description

Figures 1 and 2 illustrate cross-sectional views of a laminate and printed security document in exploded (ie. also prior to final production) and compact (ie. also finished) views respectively. It will be appreciated by the skilled person that, as set out subsequently, not all features in the figures need be present in every embodiment.

There is shown a laminate 1 that is used to provide a sealing layer when it is attached to a printed security document 3 such as a passport. The laminate 1 comprises a series of layers, on to some of which are printed/applied security information (not all shown, also referred to as security indicia). The layers are assembled in an appropriate order and then heat-transferred to the printed security document 3.

The laminate 1 comprises a base layer carrier sheet 5 upon which all of the other layers are built up on, and this comprises for example an ordinary 80 gsm A4 paper (typically used in homes/offices) which is easily accessible and may be easily removed from the finished product. The laminate further comprises at least one security varnish layer 7 to which the security indicia are applied, as well as an adhesive layer 9 to adhere the laminate 1 to the printed security document 3. An additional varnish layer (not shown) may be provided between the security varnish layer 7 and the carrier sheet 5 to provide additional protection to the security indicia.

The use of varnish to contain the security indicia is advantageous as it ensures that a protective layer for the security indicia is formed that is harder to tamper with than the usual plastic sheet used these days. The varnish also provides a consistent sheen so any glossy special inks that are used will not be visible, as they are with an ordinary plastic sheet. The use of varnish is also particularly advantageous in conjunction with the method of manufacture of the laminate 1 that will now be described, as well as the method of application to produce the finished security document 3.

The laminate 1 is produced by provided the base layer carrier sheet 5, and coating it with the varnish layer 7 (although a pre-varnished paper base layer would also be usable for simplicity). The security indicia are then applied to the varnish layer 7 using low temperature printing methods to ensure clarity of the indicia. A layer of adhesive 9 is then added to the top of the varnish layer 7. The varnish layer 7 is, in this preferred embodiment acrylic copolymer and the

adhesive layer 9 is a temperature-sensitive polyurethane (although in principle any glue that melts at or above the final 'transfer' temperatures could be used). However, use of the polyurethane ensures that, as an additional step, auxiliary indicia 11a, b, c may be applied to the adhesive layer using, for example, toner printers, without melting the adhesive. The provision of the auxiliary indicia 11a, b, c ensure that images (e.g. photos, personal data etc.) can be printed on the laminate 1 in colour, which is helpful where there are stringent requirements for certain documents by their issuing government bodies.

With regard to the security varnish layer 7, it is noted that multiple varnish layers may be applied prior to application of the adhesive layer 9. This means that multiple different types of security indicia having different properties may be incorporated into the laminate to increase its security – any type of security indicia would be applicable provided it can be screen printed and therefore indicia relying on visible light properties (eg. lustrous or optically-variable print that cannot be reproduced by toner or lithographic printing); as well as indicia that are invisible under normal light can be incorporated into the same laminate 1.

In this embodiment, the varnish layer 7 has a thickness of not more than  $12\mu\text{m}$ , each individual sub-layer not being thicker than  $3\mu\text{m}$ , to ensure that the laminate 1 is difficult to tamper with once applied yet easy to apply to the printed security document 3.

When adhering the laminate 1 to the printed security document 3, the document 3 is located in a desired position relative to the laminate 1, and the entire assembly is heated, for example to between  $120^{\circ}\text{C}$  to  $140^{\circ}\text{C}$ , along with the application of pressure in the range 10 to 50 psi (or 69-345 kPa). This heating and pressure is applied for around 10 seconds in an existing commercial press machine using standard thermal transfer settings. This ensures that the adhesive layer 9 melts and sticks to the printed security document 3 such that the indicia are sealed to the document 3 and the carrier sheet 5 may be easily and cleanly removed. It is noted that if matt-finished paper is used, a matt top surface will result for the finished product.

As shown in the figures, in some cases (eg. where the passport contains security information pre-printed by a particular government), the printed security document 3 has protruding indicia 13a, b that form a raised template pattern on its surface. In this case, and particularly where the adhesive layer 9 has been provided with auxiliary indicia 11a, b, c, it is important to ensure that the protruding indicia 11a-c & 13a-b fit in gaps between one another so as to provide a smooth finish to the surface of the finished product 15.

Various modifications may be made depending on requirements for existing government bodies as to type of security indicia to be provided. For example, it may be necessary to apply the security indicia as a mirror image to the varnish or adhesive in order to ensure that when transferred to the printed document, it is viewed in the desired orientation.

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Intro + Desc 34

**MARKS AWARDED 34/56**

### Claims

1. A layered laminate suitable for use in producing printed security documents, the laminate comprising:
  - a carrier sheet providing a base layer for receiving additional layers of the laminate;
  - at least one security varnish layer removably provided on the carrier sheet and comprising security indicia; and
  - an adhesive layer provided on the at least one security varnish layer and configured to enable the laminate to be attached to a printed security document;
  - wherein the at least one security varnish layer is configured to allow application of the security indicia at a first temperature, and to enable removal of the at least one security varnish layer from the carrier sheet at a second temperature, the second temperature being higher than the first temperature.
2. A layered laminate according to claim 1, further comprising an additional protective varnish layer located between the carrier sheet and the at least one security varnish layer that is configured to receive the security indicia.
3. A layered laminate according to claim 1 or claim 2, wherein the varnish comprises an acrylic copolymer material.
4. A layered laminate according to any preceding claim, wherein different types of security indicia are provided on the at least one security varnish layer.
5. A layered laminate according to any preceding claim, wherein the at least one security varnish layer comprises a plurality of different varnish layers.
6. A layered laminate according to claim 5, wherein the plurality of different varnish layers are suitable for the application of different types of security indicia.

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7. A layered laminate according to claim 6, wherein one of the plurality of varnish layers is suitable for receiving security indicia visible in normal light, while another one of the plurality of varnish layers is suitable for receiving security indicia invisible in normal light.
8. A layered laminate according to any preceding claim, wherein the or each varnish layer has a thickness of no more than 3µm.
9. A layered laminate according to any preceding claim, wherein the total thickness of varnish layer(s) in the laminate is no more than 12µm.
10. A layered laminate according to any preceding claim, wherein the carrier sheet comprises 80 gsm paper.
11. A layered laminate according to any preceding claim, wherein the adhesive is a glue having a melting point of greater than 120°C.
12. A layered laminate according to any preceding claim, wherein the adhesive is a temperature-sensitive polyurethane.
13. A layered laminate according to claim 12, wherein the adhesive layer comprise auxiliary indicia applied thereon.
14. A method of producing a layered laminate suitable for use with printed security documents, the method comprising:
  - providing a base layer comprising a carrier sheet having at least one security varnish layer removably provided thereon;
  - applying security indicia to the at least one security varnish layer at a first temperature; and
  - applying an adhesive layer to the at least one security varnish layer; wherein the at least one security varnish layer is configured to be removable from the carrier sheet at a second temperature higher than the first temperature.
15. A method according to claim 14, further comprising applying the at least one security varnish layer to the carrier sheet.
16. A method of producing a printed security document comprising:
  - providing a portion of the printed security document to form a substrate;
  - locating a layered laminate in a desired position relative to the substrate, the layered laminate comprising a carrier sheet; at least one security varnish layer removably provided on the carrier sheet and having security indicia applied thereon; and an adhesive layer provided on the at least one security varnish layer;

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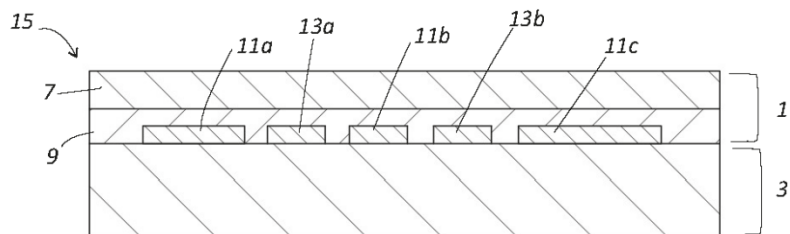
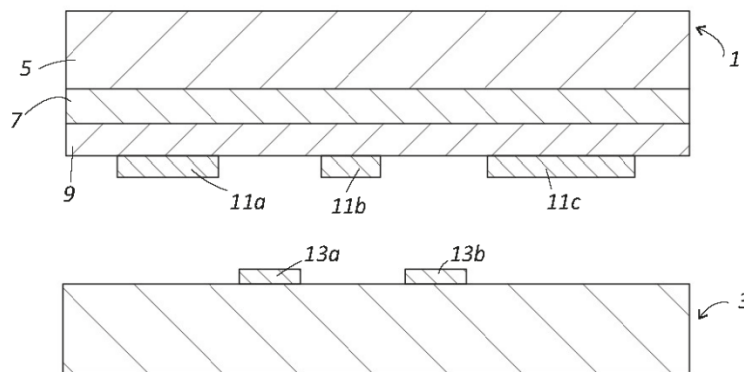
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<p>applying a heat and pressure to cause the adhesive layer to adhere to the substrate and the at least one security varnish layer to be removable from the carrier sheet; and</p> <p>removing the carrier sheet.</p> <p>17. A method according to claim 15, wherein the heat temperature applied is in the range of 120°C to 140°C.</p> <p>18. A method according to claim 15 or claim 16, wherein the pressure applied is in the range of 10psi to 50psi.</p> <p>19. A method according to any of claims 15 to 17, wherein the adhesive layer comprises auxiliary indicia that protrude therefrom.</p> <p>20. A method according to claim 18, wherein the substrate comprises a protruding template pattern, and locating the laminate in the desired position comprises locating the auxiliary indicia in gaps within the protruding template pattern of the substrate.</p> <p>21. A printed security document comprising the layered laminate of any one of claims 1 to 13, and/or produced using the method of any of claims 16 to 20.</p>	<p>✓9</p> <p>✓x1</p> <p>✓1½</p> <p>Claims 37½</p> <p><b>MARKS AWARDED 37.5/60</b></p>
<p><u>Abstract</u></p> <p>Layered laminate suitable for use in producing printed security documents, and methods of production and use thereof.</p> <p>There is provided a layered laminate 1 comprising a carrier sheet base layer 5, at least one security varnish layer 7 removably attached to the carrier sheet and having security indicia applied to it, and an adhesive layer 9 for attaching the laminate to a printed security document 3. The varnish layer 7 provides a protective coat and prevents damage to the indicia making it hard to tamper with. The varnish layer 7 is also able to work well when applying the security indicia at one temperature, and removing the varnish layer 7 from the carrier sheet 5 at a higher temperature. This therefore provides an improved method of producing security documents 15 that may be performed on existing print machines.</p> <p>[To be published with Figure 1].</p>	<p>✓x½</p> <p>✓3</p> <p>✓x½</p> <p>Abstract 4</p> <p><b>MARKS AWARDED 4/4</b></p>



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