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(54) **Security document with security feature on edge**

(57) A security document precursor including at least three lamellae A, B and C laminated together to form a security laminate having the at least three lamella in an order A-B-C, wherein the lamellae A and B have a different color; and wherein the lamellae B and C have a different color. A security document and a method of preparing the security document precursor are also disclosed.

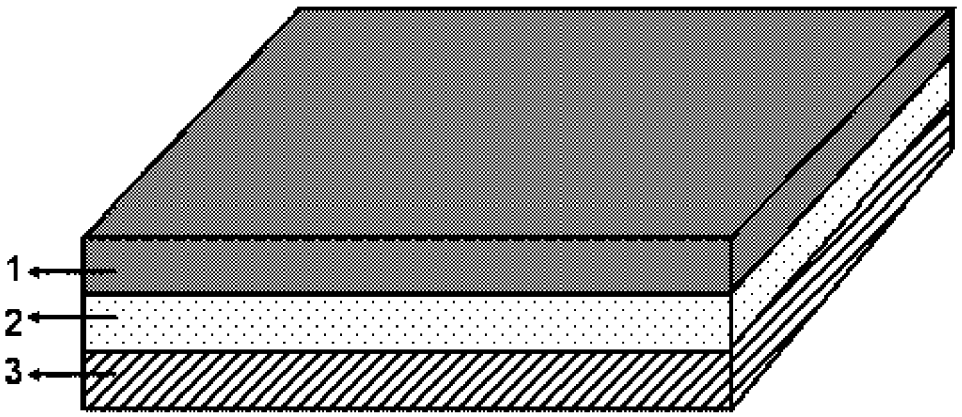

Fig. 1

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Description

Technical Field

[0001] This invention relates to security documents having security features visible from the perimeter edge surface of the document and methods for providing them.

Background Art

[0002] Security cards are widely used for various applications such as identification purposes (ID cards) or financial transfers (credit cards). Such cards typically consist of a laminated structure consisting of various plastic layers wherein one or more layers carry information, e.g. alphanumeric information, logos, a picture of the card holder, etc.

[0003] Writable cards wherein the user can store digital information are also known, e.g. cards comprising a magnetic strip, optically recordable cards or cards comprising an electronic chip usually called 'smart cards'.

[0004] A principal objective of security cards is that it cannot be easily modified or reproduced in such a way that the modification or reproduction is difficult to distinguish from the original. Security features, e.g. a hologram, are usually positioned on the front or the back of a security card, rather than on the thin edge.

[0005] WO 2008/110892 (SETEC) discloses an identification document comprising at least two constitution layers, wherein at least one edge of the identification document is marked with written data that are etched into the edge by means of a laser beam. The written data overlap with constitution layers, in order to prevent a fraudulent delamination of the document. Such laser marking involves the carbonization of material, e.g. polycarbonate, whereby the color of the written data is always black. Hence, it is not possible to provide data marked in a color different from black on the edge of the identification document.

[0006] Colored markings onto the edge of a security card can be provided by printing techniques such as, for example, inkjet printing. US 2005087606 A (DATACARD) discloses a card having non-visible or visible communication markings provided on the perimeter edge surface of the card using an ink-jet printer. The markings, e.g. lines of a barcode, are generally printed on the perimeter edge surface in a direction perpendicular on the longest side of the perimeter edge surface. It is very difficult to print a straight line parallel with the longest side of the perimeter edge surface. Printing several straight lines parallel with the longest side of the perimeter edge surface is a shear impossible task in an economically viable way. Inspection with a magnifying glass would reveal defects in the line shape or show bleeding of inkjet colors in the neighbouring line. Furthermore, printed lines on the perimeter edge surface tend to suffer from wear and tear.

[0007] Since methods for falsification and counterfeiting of security documents continue to develop and improve, it remains a constant battle to protect security documents against falsification and counterfeiting. Therefore a need exists to provide simple and cost-effective methods for securing documents. It would be desirable to be able to provide differently colored straight lines parallel with the longest side of the perimeter edge surface, which also do not suffer from wear and tear.

Summary of invention

[0008] In order to overcome the problems described above, preferred embodiments of the present invention provide a security document precursor as defined by Claim 1 which could be manufactured by a very simple method. The at least three lamellae A, B and C can be used to identify a genuine document.

[0009] Further advantages and embodiments of the present invention will become apparent from the following description.

Brief description of drawings

[0010] Figure 1 shows an security document precursor comprising three lamellae 1, 2 and 3 laminated together to form a security laminate having the three lamellae in an order 1-2-3.

[0011] Figure 2 shows the security document precursor of Figure 1. wherein a recess 21 is foreseen capable of receiving a chip.

[0012] Figure 3 shows a security document containing the security document precursor of Figure 2, wherein a contact chip 33 has been positioned in the recess 21 and which is addressable from the front lamella 31 containing further information 34 for identification of the card owner. On the back of the card a back lamella 32 has been provided. The four edges formed by the lamellae 31, 1, 2, 3 and 32 are the four perimeter edge surfaces.

Definitions

[0013] The definitions of security features correspond with the normal definition as adhered to in the "Glossary of Security Documents - Security features and other related technical terms" as published by the Consilium of the Council of the European Union on August 31, 2009 (Version: v.09916.08.en) on its website:

http://www.consilium.europa.eu/prado/EN/glossaryPopup.html.

[0014] The term "edge" means the thin perimeter edge surface of a security document.

[0015] The term "lamella" , as used in disclosing the present invention, means a self-supporting polymeric sheet optionally provided with an adhesive system used in producing laminates using pressure optionally together with heat.

[0016] The term "layer" is considered not to be self-supporting and requires a lamella as a support.

[0017] "PET" is an abbreviation for polyethylene terephthalate.

[0018] "PETG" is an abbreviation for polyethylene terephthalate glycol, the glycol indicating glycol modifiers which are incorporated to minimize brittleness and premature aging that occur if unmodified amorphous polyethylene terephthalate (APET) is used in the production of cards.

[0019] "PET-C" is an abbreviation for crystalline PET, i.e. a biaxially stretched polyethylene terephthalate. Such a polyethylene terephthalate support has excellent properties of dimensional stability.

Security Document Precursors

[0020] A security document precursor according to the present invention includes at least three lamellae A, B and C laminated together to form a security laminate having the at least three lamellae in an order A-B-C, wherein the lamellae A and B have a different color; and wherein the lamellae B and C have a different color. Such a security document precursor has been exemplified in Figure 1 wherein the lamellae 1, 2 and 3 represent the lamellae A, B and C of the claimed invention.

[0021] The security document precursor may consist of the laminate having the at least three lamellae in an order A-B-C and one or more other lamellae and/or layers attached to the security laminate. Examples of the one or more other lamellae and/or layers include, e.g. an inkjet ink receiving layer or a polycarbonate lamella which can be laser marked.

[0022] The colors of the lamellae A, B and C can be chosen in such a manner to obtain an additional particular aesthetic effect. A preferred embodiment includes the case wherein the colors of the lamellae A, B and C reflect the colors of a national flag of a state. For identification cards used in a company, the colors of the lamellae A, B and C can reflect the company colors. For example, a security document precursor a shown in Figure 1 could have as colors for the lamellae 1, 2 and 3 respectively blue, white and red. This security document precursor could then be incorporated into a national identity card as shown by Figure 3 for the Netherlands exhibiting the Dutch flag on the edge of the identity card.

[0023] In another embodiment of the security document precursor according to the present invention, the lamella A and C have the same color. In this embodiment, the national flag of Austria and Spain can be reproduced on the edge of a security document. The printing of such national flags in a high image quality on the edge of a security by, for example, inkjet printing is a shear impossible task.

[0024] In a preferred embodiment of the security document precursor according to the present invention, at least one of the three lamellae A, B and C has blue, green or red color.

[0025] In a preferred embodiment of the security document precursor according to the present invention, the color of at least one of the three lamellae A, B is different from white or black.

[0026] The security document precursor can be used as the core support of a security card. It can also be advantageously used for incorporating a chip to produce smart cards. Smart cards include contact chips which can be read through physical contact in a card reader. Nowadays also contactless chips, known as RFID chips, are incorporated into smart cards. In the latter an antenna is connected with the chip.

[0027] In a preferred embodiment of the security document precursor according to the present invention, the precursor contains a recess in one or more lamellae of the security laminate ABC for containing a chip and/or antenna. This is exemplified by Figure 2 where a recess is shown protruding lamella 1 and partly lamella 2. Alternatively the security document may be completely perforated or punched out to have sufficient room to accommodate the thickness of the chip. In the latter case, an extra lamella (e.g. lamella 32 in Figure 3) is required in order that to prevent that the chip falls through the hole of the security document precursor.

[0028] In a preferred embodiment of the security document precursor according to the present invention, the precursor contains a chip and/or antenna.

[0029] The security document precursor according to the present invention includes at least three lamellae A, B and C laminated together to form a security laminate having the at least three lamellae in an order A-B-C. However, more than four, five, six or more lamellae may be used. These lamellae may have different colors, for example, to have in order the colors of a rainbow on the edge. However, it is also possible that some of the lamellae have the some color. For example, if a chip of a large thickness has to be incorporated and only thin lamellae of a certain color are available, it is possible to laminate two or more lamellae of the same color together to form a security laminate having lamellae in an order of e.g. A-B-B-C, A-A-B-B-C-C, A-A-B-C-C, A-B-B-C-C-C,···

Security Documents

[0030] A security document according to the present invention comprises the above described security document precursor.

[0031] The security document may contain any desired type of information, images and security features on its front and/or back side. The security document in Figure 3, bears on the front lamella 31 a photograph of the card owner as well as information 34 (name, date of birth, etc) and the conductive contact surface of the contact chip 33.

[0032] In a preferred embodiment, the security document according to the present invention includes at least one other security feature selected from the group con-

sisting of a biometric security feature, a watermark, a hologram, a guilloche pattern, a ghost image and a kinegram.

[0033] In one embodiment, the security document according to the present invention is an identification card of a state wherein the colors of the lamella A, B and C correspond with some or all of the colors of the national flag of that state.

[0034] In a preferred embodiment, the security document contains at least one lamella other than lamella B which differs in color from the lamellae A and C in the security document precursor. The advantage is that this increases the image contrast making the colored lines better visible.

[0035] The security document according to the present invention is preferably a card. The card is preferably selected from the group consisting of bank cards, credit cards, driving license cards, network access cards, employee ID cards, national ID cards, citizenship cards, social security cards, medical care cards, police ID cards and border crossing cards.

[0036] The security document preferably has a format as specified by ISO 7810. ISO 7810 specifies three formats for identity cards: ID-1 with the dimensions 85.60 mm x 53.98 mm, a thickness of 0.76 mm is specified in ISO 7813, as used for bank cards, credit cards, driving licences and smart cards; ID-2 with the dimensions 105 mm x 74 mm, as used in German identity cards, with typically a thickness of 0.76 mm; and ID-3 with the dimensions 125 mm x 88 mm, as used for passports and visa' s. When the security cards include one or more contactless integrated circuits then a larger thickness is tolerated, e.g. 3 mm according to ISO 14443-1.

Lamellae

[0037] There are no real restrictions on the at least three lamellae A, B and C of the security document precursors and the security documents according to the present invention except that the lamellae A and B should have a different color; and that the lamellae B and C should have a different color.

[0038] The color of a lamella is preferably visible by the naked eye, optionally using an optical instrument such as a microscope or a magnifier when observing it from the edge of a security document. The color may be black, white, cyan, magenta, yellow, red, orange, violet, blue, green, brown, mixtures thereof, and the like

[0039] In another embodiment, the color of the lamella is a non-visible color, for example because it absorbs light only in the infrared region of the spectrum, or requires an external stimulus to make it visible such a phosphorescent and fluorescent pigments or dyes incorporated in the lamella.

[0040] The colorants used in the lamellae may be dyes but are preferably pigments. Pigments have the advantage to be more lightstable than dyes and are more capable to be used, for example, in extrusion processes of a polymeric sheet at temperatures above 200° C.

[0041] The pigments can be organic color pigments and may be chosen from those disclosed by HERBST, Willy, et al. Industrial Organic Pigments, Production, Properties, Applications. 3rd edition. Wiley - VCH , 2004. ISBN 3527305769. The pigments may also be of an inorganic nature such as e.g. iron oxide to obtain a ref lamella or inorganic white pigments as titanium dioxide or calcium carbonate. Also mixtures of pigments may be used to color a lamella.

[0042] The lamellae of the security document precursor according to the present invention are preferably selected from the group consisting of polyester lamellae, polycarbonate lamellae, polyolefin lamellae and polyvinyl chloride lamellae.

[0043] In a preferred embodiment at least one of the lamellae A, B and C of the security document precursor according to the present invention is a polyester lamella. More preferably the at least three lamellae A, B and C are all polyester lamellae.

[0044] In a preferred embodiment of the invention, a linear polyester is employed. Such a material is well known to those skilled in the art and is obtained by condensing one or more dicarboxylic acids or their lower (up to 6 carbon atoms) diesters, e.g., terephthalic acid, isophthalic acid, phthalic acid, 2,5-, 2,6- or 2,7-naphthalenedicarboxylic acid, succinic acid, sebacic acid, adipic acid, azelaic acid, 4,4'-diphenyldicarboxylic acid, hexahydroterephthalic acid or 2-bis-p-carboxyphenoxyethane (optionally with a monocarboxylic acid, such as pivalic acid), the corresponding dicarboxylic acid dialkyl ester or lower alkyl ester with one or more glycols, e.g., ethylene glycol, 1,3-propanediol, 1,4-butanediol, neopentyl glycol and 1,4-cyclohexanedimethanol. In a preferred embodiment, the polyester polymer is obtained by condensing terephthalic acid or 2,6-naphthalenedicarboxylic acid or their dimethyl esters with ethylene glycol. In another preferred embodiment, the polymer is PET. The PET film prepared from the above-described composition must be oriented. In a preferred embodiment, the PET film is biaxially-oriented. Such a process is described in many patents, such as GB 838708 (ICI) , the disclosure of which is hereby incorporated by reference. These techniques are well known to those skilled in the art.

[0045] In a preferred embodiment of the invention, the polyester is an orientable polyester with polyesters comprising monomer units selected from the group consisting of terephthalate units, isophthalate units, naphthalate units, ethylene units, neopentylene units, 1,4-cyclohexane dimethylene units and $-CH_2CH_2OCH_2CH_2-$ units being preferred e.g. polyethylene terephthalate (PET), polyethylene naphthalate (PEN).

[0046] In a very preferred embodiment of the security document precursor according to present invention, the polyester lamella is an axially stretched, preferably a biaxially stretched polyethylene terephthalate lamella. PET lamellae have mechanical strength and dimensional sta-

bility and are chemically inert against many organic solvents contrary to e.g. polycarbonate lamellae.

[0047] The coloring and making of polyester lamellae, such as PET lamellae, is well known to the skilled person. Coloring of PET lamellae is preferably performed using dyes as colorants. A single dye or a mixture of dyes can be used to obtain colored polyester lamellae. For example, US 2008318073 discloses how to prepare a biaxially oriented polyester film containing a yellow anthraquinone dye and a red perinone dye.

[0048] The preparing of a blue lamella is exemplified in US 3918976 (FUJI PHOTO FILM) for obtaining blue colored X-ray photographic film supports by employing one or more anthraquinone dyes.

[0049] A black lamella can be prepared by inclusion of carbon black.

[0050] The thickness of the polymeric lamella employed in the present invention is preferably between 50 μm and 250 μm.

[0051] In a preferred embodiment, one or both sides of the lamella have been foreseen by an adhesion system. The adhesion system may consist out of a single layer. Adhesive materials that are currently in use are preferably formulations prepared on the basis of polyurethanes, polyesters or polyamides and/or their copolymers. In particular thermoplastic adhesive formulations are used. A cross-linking of these thermoplastic adhesive materials by way of subjecting them to high-energy radiation is a known method.

[0052] Particularly suitable adhesion systems are also disclosed US 2004007324 (SAGEM ORGA) and WO 2009/063058 (AGFA GEVAERT).

Layers

[0053] The lamellae used in the security document precursor or the security document according to the present invention may include one or more additional layers such as subbing layers, adhesion layers, magnetic layers, protective layers, layers containing an image or image receiving layers, e.g. inkjet receiving layers.

Methods of Preparing Security Document Precursors

[0054] A method of preparing a security document precursor according to the present invention includes the steps of:

a) providing at least three lamellae A, B and C;
b) laminating lamella A onto lamella B;
c) laminating lamella C onto lamella B;
wherein the lamellae A and B have a different color; and
wherein the lamellae B and C have a different color.
In a preferred embodiment of the method, the steps b) and c) are performed simultaneously.

[0055] Lamellae may be laminated together in a lamination press with the aid of pressure and heat.

[0056] In manufacturing security documents, hot lamination is the most common lamination method used and is generally preferred over cold lamination. Hot laminators use a heat-activated adhesive that is heated as it passes through the laminator. The downside to hot laminators is that a thermosensitive layer may not be capable to handle the heat required to apply the lamination. Cold laminators use a pressure-sensitive adhesive that does not need to be heated. The laminator uses rollers that push the sheets of lamination together. Cold laminators are faster and easier to use than hot laminators, and do not cause discoloration of thermosensitive layers. A combination of pressure-sensitive and thermo sensitive adhesive layers and foils may also be used in the security document precursors according to the present invention.

[0057] Suitable compositions for these pressure-sensitive and thermo sensitive adhesive layers and foils in the security films and security documents according to the present invention are well-known to one skilled in the art.

[0058] A preferred hot melt foil is a polyurethane foil.

[0059] Contrary to biaxially oriented polyethylene terephthalate, a non-oriented PETG layer or foil softens rapidly near the glass transition temperature and can thus also be used for adhesive purposes as illustrated, for example, in US 2009032602 (TOYO BOSEKI) .

[0060] Suitable thermo adhesive compositions are also disclosed in WO 2009/063058 (AGFA).

[0061] A preferred thermo adhesive layer is based on a hydroxyl-functional, partially-hydrolyzed vinyl chloride/vinyl acetate resin available under the trade name of UCAR™ VAGD Solution vinyl resin from Dow Chemical Company.

[0062] In case a chip is to be positioned in the security document precursor, the at least three lamellae A, B and C are preferably first laminated together to form a security laminate having the at least three lamellae in an order A-B-C, where after the recess (see 21 in Figure 2) is created by e.g. drilling or laser ablation. In another embodiment, the at least three lamellae A, B and C are preferably first laminated together to form a security laminate having the at least three lamellae in an order A-B-C, where after a hole is punched out of the security laminate A-B-C. In still another embodiment, the security laminate consists of the lamellae A and B laminated together to form a security laminate A-B, punching a hole in the security laminate A-B to receive the chip and laminating the unpunched lamella C onto the lamella B of the punched security laminate A-B. Alternatively, for thick memory chips the punched security laminate A-B-C can be laminated onto an extra lamella 32 as shown in Figure 3.

[0063] In a preferred embodiment, the at least three lamellae A, B and C are not pre-cut from three sheets A' , B' and C' , but first the three sheets A' , B' and C' are laminated together where after the security laminate having the three lamellae in an order A-B-C is cut out or

punched out in the desired shape and size. For example, a security card precursor often has a front view of 54.5 mm x 86 mm. The thickness of the security card precursor is preferably less than about 0.8 mm.

EXAMPLES

1. Materials

[0064] **PETG200** is a 200 μm white foil of PETG foil available from Folienwerk Wolfen GmbH under the trade name of Pet-G **Black PE** is 180 μm black polyethylene lamella available from Bischof und Klein under the trade name Monaks.
Blue PET is 168 μm blue PETC foil having on both sides permanent antistatic subbing layers and available as Polyester Base Type N° 222 from Agfa-Gevaert NV.
HM is a 35 μm hot melt foil available from Epurex under the trade name of Platilon ID5051.

Example 1

[0065] This example illustrates how a security document precursor in accordance with the present invention can be prepared. The security document precursor is based on the national flag of Estonia: blue, black and white stripes.

Preparation of Security Document Precursor SDP-1

[0066] The security document precursor SDP-1 was prepared by stacking a set of lamellae according to Table 1 and then laminating in an Oasys OLA6/7 laminator at a temperature setting of 160° C (Settings LPT:160 ° C / LP: 40 / Hold: 150 sec / HPT 130° C / HP: 40 / ECT: 50° C). A silicon based paper (Codor-carrier N° 57001310 from CODOR) was used on top of the outermost PETG200 lamellae to prevent sticking to laminator rolls.

Table 1

PETG200
HM
Black PE
HM
PETG200
HM
Blue PET
HM
PETG200

Preparation of Security Document SD-1

[0067] The security document SD-1 was prepared by printing personal identification data on the top of the outermost PETG200 lamellae using a custom built ink-jet printer equipped with a :UPH print head from Agfa Graphics NV. A resolution of 360x360dpi was used to print at 4 dpd (droplets per dot), wherein 1 dpd is equal to a droplet volume of 3 pL. The UV curable ink used was Anapurna ™ XLS Black Ink G1 from Agfa Graphics NV.

Results

[0068] Using a magnifier, the national flag of Estonia was clearly visible on all four edges of the security document SD-1, wherein the blue, black and white stripes appear as thin straight lines without any visible defects. Furthermore it was observed that is not possible to remove the color on the edge by scratching with a razor blade, contrary to a comparative sample wherein markings were printed by inkjet using UV curable inkjet inks.

Claims

1. A security document precursor including at least three lamellae A, B and C laminated together to form a security laminate having the at least three lamellae in an order A-B-C,
wherein the lamellae A and B have a different color; and
wherein the lamellae B and C have a different color.

2. The security document precursor according to claim 1 wherein the lamella A and C have the same color.

3. The security document precursor according to claim 1 wherein the lamella A, B and C all have a different color.

4. The security document precursor according to any one claims 1 to 3, wherein the color of at least one of the three lamellae A, B is different from white or black.

5. The security document precursor according to any one of claims 1 to 4 containing a recess in one or more lamellae of the security laminate ABC for containing a chip and/or antenna.

6. The security document precursor according to claim 5 containing a chip and/or antenna.

7. The security document precursor according to any one of claims 1 to 6 wherein at least one of the lamellae A, B and C is a polyester lamella.

8. The security document precursor according to claim7 wherein the polyester lamella is a biaxially stretched polyethylene terephthalate lamella

9. The security document precursor according to any one of claims 1 to 8 wherein at least one of the three lamellae A, B and C has a blue, green or red color.

10. A security document comprising the security document precursor according to any one of claims 1 to 9.

11. The security document according to claim 10 being an identification card of a state wherein the colors of the lamella A, B and C correspond with some or all of the colors of the national flag of that state.

12. The security document according to claim 10 or 11 wherein the security document contains at least one lamella other than lamella B which differs in color from the lamellae A and C in the security document precursor.

13. Method of preparing a security document precursor as defined by any one of claims 1 to 9 comprising the steps of:

a) providing at least three lamellae A, B and C;
b) laminating lamella A onto lamella B;
c) laminating lamella C onto lamella B;
wherein the lamellae A and B have a different color; and
wherein the lamellae B and C have a different color.

14. The method according to claim 13 wherein the steps b) and c) are performed simultaneously.

15. Use of a security document precursor as defined by anyone of claims 1 to 9 to verify the authenticity of a security document.

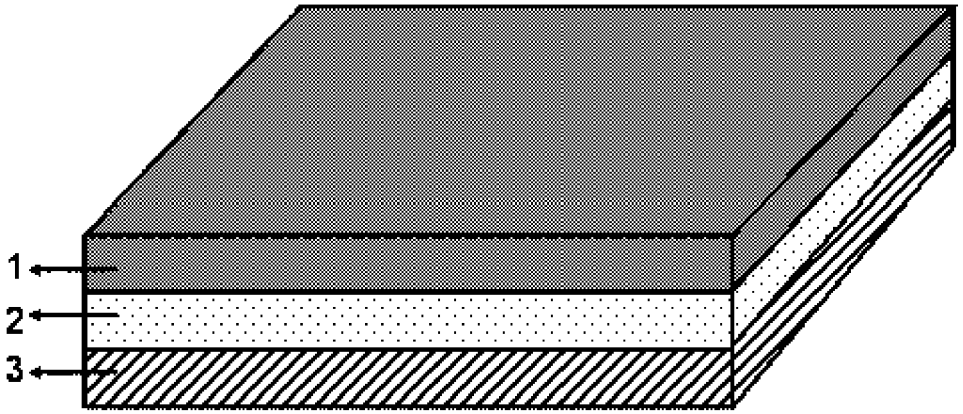

Fig. 1

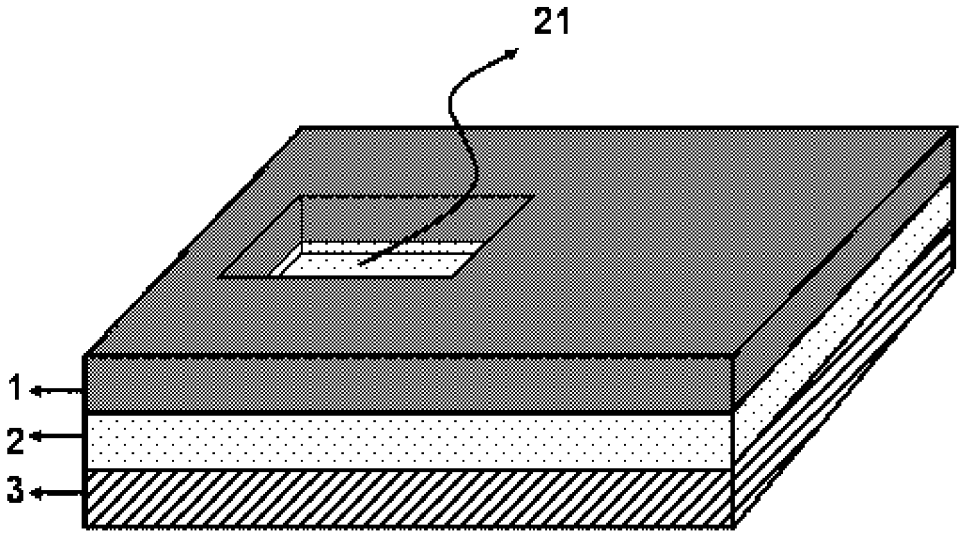

Fig. 2

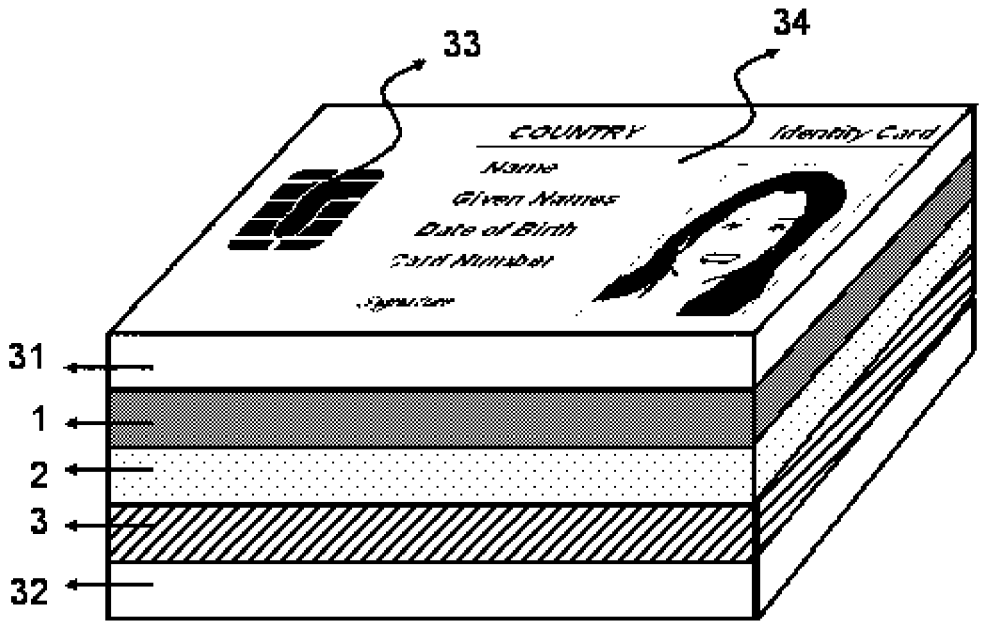
33
34
COUNTRY
Identity Card
Name
Given Names
Date of Birth
Card Number
31
1
2
3
32

Fig. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 17 8641

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 223 918 A (SMOCZYNSKI FRANK E) 23 September 1980 (1980-09-23) * column 2, line 33 - line 52; figures 3-7 *	1-6,9-15	INV. B42D15/10
X	WO 2007/070969 A1 (SECURENCY PTY LTD [AU]; NEMETH JOSHUA ROBERT [AU]; TIERNEY CHRISTOPHER) 28 June 2007 (2007-06-28) * page 5 - page 6, line 2 *	1,5-10, 12-15	
X	EP 0 185 807 A1 (COMPUTER IDENTIFICATION SYST [US]) 2 July 1986 (1986-07-02) * page 6 *	1,3-6,9, 10,12-15	

TECHNICAL FIELDS SEARCHED (IPC)

B42D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 May 2010	Langbroek, Arjen

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 17 8641

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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11-05-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4223918 A	23-09-1980	NONE	
WO 2007070969 A1	28-06-2007	NONE	
EP 0185807 A1	02-07-1986	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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