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(72) Inventor: **Somkhantee, Niwat**
13160 Phra Nakorn Si Ayutthaya (TH)

(74) Representative: **Grünecker Patent- und Rechtsanwälte PartG mbB**
Leopoldstraße 4
80802 München (DE)

(71) Applicant: **Linxens Holding**
78200 Mantes-la-Jolie (FR)

(54) **A DATAPAGE PREFORM WITH EMBEDDED FEATURES FOR A DATAPAGE OF A SECURITY DOCUMENT AND METHOD OF FORMING THE SAME**

(57) The present invention relates to a datapage pre-form that has implemented therein additional decorative features and/or security features and/or inserts with selected material characteristics, which may readily be combined with features to be implemented by the da-

tapage manufacturer. Consequently, superior robustness, enhanced external appearance in combination with overall reduced efforts in terms of time and costs may be accomplished.

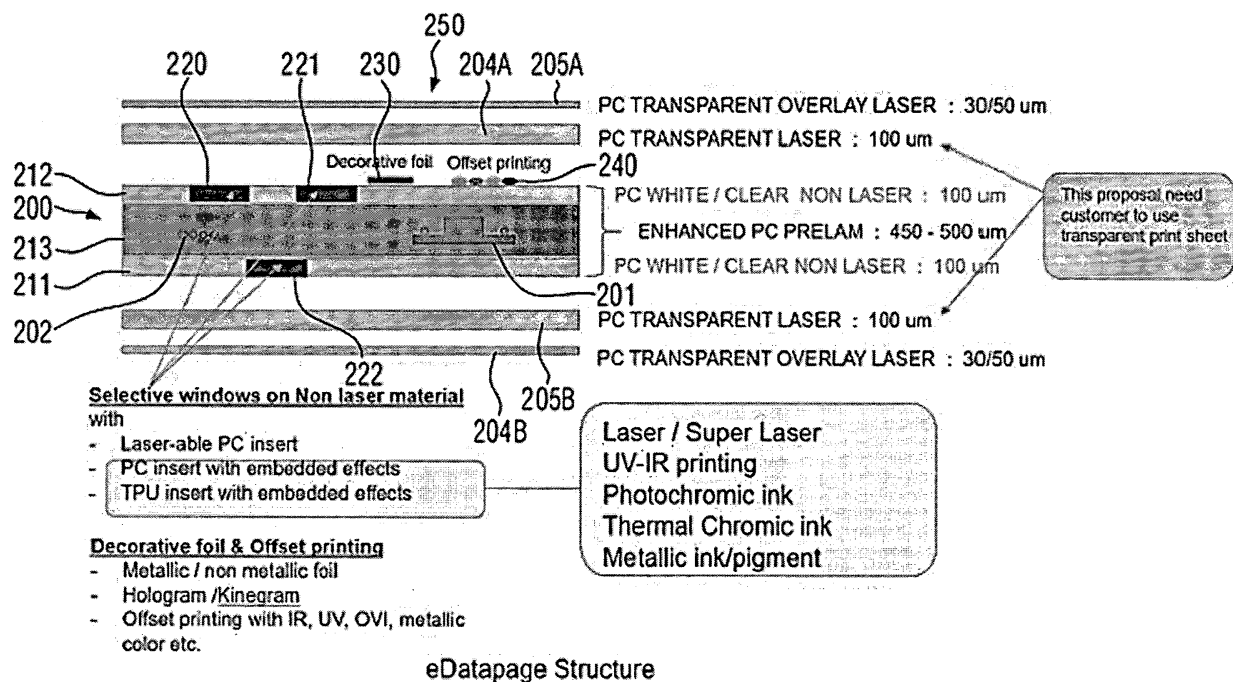


FIG. 2

Description

Technical Field

[0001] The present invention relates to security documents and the manufacturing thereof.

Background Art

[0002] Due to recent developments in society and industry, data processing and data handling require the obedience of increasingly restrictive regulations so as to reduce the possibility of tampering with sensitive data. In many applications, sensitive data or information has to be stored in a permanent and tamper resistant manner, in particular, when data or information in non-electronic form, possibly in combination with electronically stored data, has to be stored in certain carriers. For example, credit cards, respective cards for health insurance, passports and the like, represent respective "carriers" having stored therein a significant amount of non-electronic information, for instance, in the form of one or more images, symbols, text and the like. Typically, this information, possibly in combination with electronically stored data, such as RFID labels and the like, is provided on the basis of a respective carrier, hereinafter referred to as "security document," which may have to provide for resistance of the stored information with respect to environmental influences, while, nevertheless, allowing frequent and long term use of a respective security document. For example, a passport may have to be typically used for a time period of several years and may, thus, depending on the habits of the passport owner, require a more or less frequent opening and closing, storing in sometimes harsh environments and the like. Similarly, any type of cards to be used in financial transactions and the like, may have to withstand mechanical stress upon interaction with respective card readers and the like, while also providing for high robustness and reliability during a daily use of any such security documents.

[0003] Moreover, in addition to mechanical robustness, the information included in a corresponding security document, such as a datapage of a passport and the like, has to provide for high tamper resistance so as to make difficult any intentional manipulation of the information stored in the respective datapage of the security document, while, preferably, upon attempting to manipulate the datapage, any such attempt should become recognizable in a visible or any other appropriate manner.

[0004] Since the various requirements imposed on a security document, or at least a respective datapage carrying the very sensitive data of the security document, are frequently mutually contradictory, as, for instance, frequent use of a passport requires highly flexible materials, which typically offer reduced durability and the like, great efforts have been or are currently being made in order to provide appropriate materials and manufacturing techniques for fabricating datapages of security docu-

ments with high robustness against many types of influences and high durability, while also providing a high level of security with respect to the tampering of sensitive data. To this end, plastic materials, in particular, polycarbonate, have been identified as viable candidates for fabricating datapages of security documents.

[0005] Typically, a datapage is formed as a stack of individual plastic sheets, such as polycarbonate layers or sheets, which are stacked and cut into desired dimensions, thereby providing the possibility of inserting respective sensitive data carriers, such as an image and the like, and/or using one of the layers itself as a carrier of sensitive information. After having introduced at least a part of the sensitive data into the layer stack, the respective pre-form of the datapage may be heat treated so as to laminate the individual layers, thereby initiating a respective reaction between the individual surface areas, finally resulting in a more or less continuous piece of material or monoblock, which may substantially not be separated in a later stage without inducing significant damage and, thus, leaving behind recognizable traces of any sort of tampering attempt. In addition to the high tamper resistance of a laminated datapage formed of appropriate plastic material, a high degree of resistance against many environmental influences, such as mechanical impact, chemical substances and the like, is also achieved.

[0006] Despite the many advantages of datapages formed of plastic materials, such as polycarbonate, it turns out that optical appearance, surface texture and the like, frequently require a post-lamination procedure of the datapage perform to obtain desired customized results. A corresponding post-processing on the basis of the core of the datapage, i.e., the datapage perform, however, requires additional time at the side of the vendor of the finalized datapage, as will be described with reference to Figs. 1A and 1B in more detail.

[0007] Figure 1A schematically illustrates a perspective view of a security document 190, such as a passport, that may be provided in the form of a booklet having several pages, one of which is a datapage 150. As discussed above, the datapage 150 typically includes sensitive information, for instance in the form of text, images, artwork, symbols, and the like, wherein in many cases at least a portion of the sensitive information may be stored on the basis of an electronic device, such as on RFID device, and the like. The datapage 150 may be provided in the form of material block having a highly uniform composition so as to reduce the risk of manipulating the datapage in any undesired manner. Furthermore, the datapage 150 may include an appropriate connecting member (not shown) so as to mechanically connect to the remaining part of the security document 190.

[0008] Figure 1B schematically illustrates an exploded view of the datapage 150 in cross-section according to a typical configuration of datapages used in security documents. As shown, the datapage 150 includes a pre-form or pre-lam (pre-lamination) 100, which typically includes

specific components, for instance in the form of an electronic circuit 101, an antenna 102, and the like. Consequently, in this case the datapage 150 may represent an electronic datapage, which is able to respond to an external signal and may be read out by any known techniques. Basically, the pre-form 100 represents the core of the datapage 150 that has a more or less standard configuration, which may be used by a manufacturer of the security document to adapt the datapage 150 to the application under consideration.

[0009] For example, the pre-form 100 may represent a plastic sheet made of polycarbonate with a thickness of approximately 310 μm . Furthermore, in order to implement customer specific features in the form of decorative features and/or security features, symbols, text, and the like, in a subsequent manufacturing stage, for instance performed by the manufacturer of the security document 190, the pre-form 100 may be supplemented by various further plastic sheets. For example, above and below the pre-form 100 the respective plastic sheets of polycarbonate with a thickness of approximately 100 μm may be attached to the pre-form 100 at any appropriate manufacturing stage, followed by a transparent laserable plastic sheet with a thickness of approximately 100 μm . Moreover, a transparent overlay in a laser-able form and made of polycarbonate may be attached so as to obtain the layer structure as shown in Figure 1B. The transparent overlay may have a thickness in the range of 30 to 50 μm . Consequently, on the basis of the standard pre-form or pre-lam 100 the manufacturer may adapt the various additional layers so as to implement the desired decorative features and/or security features in the form of images, text, symbols, and the like.

[0010] In an attempt to improve tamper resistance of the security document 190, in particular in view of reducing the risks caused by crime and terrorism, significant efforts are being made so as to increase the level of complexity of travel documents. To this end, most of the passport datapages have implemented therein many features, security elements, and the like formed by respective techniques in order to increase the level of security of the datapages, thereby achieving a higher degree of tamper resistance. Due to the limited area that is available for implementing any such features and elements by the manufacturer it is increasingly difficult to further improve overall tamper resistance. Therefore, perspective manufacturers of security documents may have to add more and more layers, such as layers 103A, 104A, 105A, 103B, 104B, 105B so as to provide therein features with increased complexity, thereby contributing to significant additional process steps, investment and time to market a corresponding security product. That is, after providing the standard pre-form 100 significant additional effort in terms of labour and material as well as process techniques is required for incorporating the desired decorative features and security elements for a specific application.

[0011] In view of the situation described above, it is an

object of the present invention to provide means for enabling superior tamper resistance and/or enhancing the external appearance and the functionality of a datapage of a security document, while at the same time reducing the effort required for adapting the core of the datapage, i.e., the pre-form of the datapage, to the specific application.

Disclosure of Invention

[0012] In order to solve the above-identified technical problem the present invention is based on the concept that an additional degree of freedom may be implemented so as to enhance overall security performance and/or appearance and/or functionality of a datapage. This may be accomplished by implementing additional capabilities into the core or pre-form or pre-lam of the datapage prior to having to adapt the datapage to a specific application by providing additional material sheets. The additional functionality may be achieved by producing the pre-form such that respective material inserts and/or additional material layers, such as foils, and/or print patterns, and the like may be implemented upon forming the pre-form, thereby confining the respective features and elements within the material of the pre-form, which, after heat-treatment, represents a substantially uniform mono-block of material. In this manner, the respective further process steps, typically to be performed by the manufacturer of the security document after receiving the pre-form, may significantly be reduced, since the overhead of handling a plurality of plastic sheets in order to implement a required number of features may be reduced.

[0013] According to one illustrative embodiment of the present invention the above-identified object is solved by a datapage pre-form for a datapage of a security document. The datapage pre-form comprises a central plastic sheet having a bottom surface and a top surface. Moreover, a top plastic sheet attached to the top surface and a bottom plastic sheet attached to the bottom surface are provided. The central plastic sheet, the top plastic sheet and the bottom plastic sheet form a stacked structure, wherein the top plastic sheet and/or the bottom plastic sheet comprises:

a first insert that differs in at least one characteristic from a material that laterally borders the first insert,

and/or a second insert having embedded therein a decorative feature and/or a security feature,

and/or foil/ink attached to a surface of the top plastic sheet and/or the bottom plastic sheet,

and/or a printed pattern.

[0014] Consequently, the inventive datapage pre-form represents an additional "platform" for implementing additional capabilities for enhancing appearance and/or se-

curity and/or functionality of a datapage by implementing at least the prerequisites for any such additional capabilities, thereby significantly reducing any post-pre-form efforts for establishing the required features of the datapage. For example, by implementing a first insert and/or a second insert in the top plastic sheet and/or the bottom plastic sheet there is obtained an opportunity for providing specific material characteristics in restricted areas of the pre-form, which may be operated on prior to heat-treating the stacked structure and/or in a later manufacturing process, thereby possibly avoiding the provision of any additional material sheets.

[0015] Furthermore, in addition to or alternatively to the first and/or second insert the pre-form may also comprise a foil or any other layer-like component attached to a surface of the top plastic sheet and/or the bottom plastic sheet, which may be used for implementing additional features and elements, such as ornaments, symbols, images, and the like by appropriately patterning the foil or a portion thereof.

[0016] Alternatively or in addition to the foil and/or to the first and/or second insert the pre-form may also comprise a printed pattern, which may be formed on the basis of any appropriate process technique in order to meet the requirements of a specific application.

[0017] It should be appreciated that these additional capabilities or functionality for implementing features and elements into the core of a datapage prior to actually adding other application specific "levels" of the datapage, for instance by a datapage manufacturer, may be combined with respective features and elements formed in the additional layers, thereby, for instance, completing or enhancing respective features and elements after completing the datapage.

[0018] In a further illustrative embodiment the first insert comprises a laser-able polycarbonate material. In this context, a "laser-able" material is to be understood as a material that may effectively be processed by a laser beam of appropriate wavelength and intensity, for instance to engrave patterns into the material, and the like. Consequently, by providing the first insert as a laser-able polycarbonate material appropriate features or elements may be generated upon forming the pre-form and/or in a later manufacturing stage.

[0019] In a further advantageous embodiment, the first and/or the second insert is formed of a thermoplastic urethane material or a polycarbonate material. In this manner, perspective well-established materials may be used and may be provided in a locally restricted manner, wherein respective elements may be embedded in compliance with the requirements of a specific application.

[0020] In a further advantageous embodiment the decorative feature and/or the security feature is formed by one or more of the following techniques: laser techniques, super laser techniques, ultraviolet (UV) printing, infrared (IR) printing, photochromic ink based techniques, thermal-chromic ink based techniques, metallic ink based techniques, metallic pigments based tech-

niques, and the like. Consequently, a wide variety of efficient and established techniques may be applied so as to obtain the desired features and elements during the pre-form stage of the datapage.

5 **[0021]** In a further advantageous embodiment, the top plastic sheet comprises a white polycarbonate or a transparent polycarbonate.

[0022] In a further advantageous embodiment, the bottom plastic sheet comprises a white polycarbonate or a transparent polycarbonate.

10 **[0023]** Therefore, the top plastic sheet and the bottom plastic sheet may be formed on the basis of well-established polycarbonate materials with a desired optical appearance.

15 **[0024]** In a further advantageous embodiment the stacked structure including the central plastic sheet, the top plastic sheet and the bottom plastic sheet has a thickness in the range of 450 μm to 500 μm . Consequently, compared to standard pre-forms of a datapage an increased thickness may be provided, thereby also enabling additional flexibility in creating respective features, such as 3D images, and the like, due to the increased depth dimension of the datapage pre-form.

20 **[0025]** As discussed above, the pre-form may represent a mono-block of material due to the typical lamination process or heat-treatment, thereby confining the respective features, ornaments, and the like and also the capabilities of further enhancing such features in a later manufacturing stage within the material of the pre-form.

25 **[0026]** According to another aspect of the present invention the above-identified object is solved by a datapage pre-form for a datapage of a security document, wherein the pre-form comprises a stacked structure that includes an insert and/or a foil/ink attached to an internal surface of the stacked structure and/or a printed pattern formed on the internal surface. Similarly to the embodiments described above, the datapage pre-form of this aspect has implemented therein the capabilities of providing additional features and elements. For instance the insert, in which may be embedded respective elements, and/or which may be operated on in a later manufacturing stage, and/or the foil, and/or the printed pattern may result in additional complexity of the datapage in providing decorative features and/or security features.

30 **[0027]** According to a further aspect of the present invention the above-identified object is solved by a method of forming a pre-form of a datapage for a security document. The method comprises the step of performing a process for forming an insert in a cut-out portion of a plastic sheet and/or a step of performing a process for forming a decorative feature and/or a security feature on a surface of the plastic sheet. Moreover, the plastic sheet is attached to a surface of a central plastic sheet. Additionally, the plastic sheet and the central sheet are heat-treated so as to form a mono-block of material.

35 **[0028]** Consequently, as discussed above, the resulting pre-form provides for additional flexibility in designing respective datapages with a high degree of complexity,

while at the same time reducing any efforts in handling a plurality of additional material sheets after having formed the datapage pre-form.

[0029] In illustrative embodiments the decorative feature and/or the security feature is formed by at least one of the following processes: attaching a foil/ink to the plastic sheet, performing offset printing on the basis of UV ink and/or IR ink and/or optically variable ink and/or metallic colour and/or photochromic ink and/or thermal-chromic ink, and the like.

[0030] Thus, a plurality of process techniques may be used in this stage of the manufacturing process, thereby achieving high flexibility in adjusting the overall characteristics of a respective datapage, while relaxing the situation in the manufacturing phase following the phase of forming the datapage pre-form.

[0031] In one advantageous embodiment the method further comprises: a step of receiving application-specific information for a post-processing of the pre-form; and a step of adjusting a size and/or a shape and/or a colour and/or an external appearance and/or a process technique and/or a position of the insert and/or the decorative feature and/or the security feature on the basis of the application-specific information.

[0032] In this case, starting from the requirements of the final application of the datapage under consideration a respective "part" of the required features, elements and capabilities may already be established in the datapage pre-form based on the inventive concept by providing respective information, such as coordinates for the position of a respective image or elements, thereby enabling definition of at least a part of the external appearance, and the like, of the final datapage. In this manner, the overall complexity and sophistication of the overall datapage may be significantly enhanced by providing the capability of implementing such features or elements or portions thereof on the basis of respective design information that is specific for the application under consideration.

Brief Description of the Drawings

[0033]

Figure 1A schematically illustrates a perspective view of a security document in the form of a passport including a conventional datapage;

Figure 1B schematically illustrates an exploded cross-sectional view of the datapage of

Figure 1A, wherein a plurality of additional material sheets made of polycarbonate may have to be used in combination with a standard datapage pre-form so as to implant desired security features;

Figure 2 schematically illustrates a cross-sectional view of a datapage pre-form with superior function-

ality according to the present invention in combination with additional material sheets that may have to be processed by a manufacturer of a datapage;

Figure 3 schematically illustrates an exploded perspective view of a datapage having implemented a datapage pre-form according to illustrative embodiments;

Figure 4 schematically illustrates a perspective exploded view of a datapage and respective inserts provided in the datapage pre-form with a detailed enlarged view presented at the right-hand side of Figure 4;

Figure 5 schematically illustrates a datapage pre-form in combination with an additional material sheet for obtaining combined features of the pre-form and the additional material sheet according to illustrative embodiments;

Figure 6 illustrates a top surface of the datapage pre-form in combination with various printing techniques (left-hand side) and/or using a metallic foil/ink (right-hand side); and

Figure 7 illustrates an exploded perspective view of a datapage with a specific print pattern based on UV ink (left-hand side) and the respective external appearance of the datapage (right-hand side).

Best Mode(s) for Carrying Out the Invention

[0034] With reference to Figures 2 to 7 further illustrative embodiments will now be described in more detail, wherein also reference is made to Figures 1A and 1B, if appropriate.

[0035] Figure 2 schematically illustrates an exploded view as a cross-section of a datapage 250, which includes a datapage pre-form or pre-lam 200, also referred as inlay, that has superior functionality. In this embodiment, the pre-form 200 includes a first or top plastic sheet 212 that is formed on a top surface of a central plastic sheet 213. However, in another embodiment shown, a bottom plastic sheet 211 is formed on a bottom surface of the central plastic sheet 213. The central sheet 213, the top sheet 212 and the bottom sheet 211 form a stacked structure. The central plastic sheet 213 may include any appropriate elements or features, such as an electronic circuit 201, possibly in combination with additional circuitry 202, such as an antenna, and the like. It should be appreciated, however, that in other embodiments sensitive information may be stored on and in the datapage 250 without any electronic means, if considered appropriate.

[0036] The top plastic sheet 212 and/or the bottom plastic sheet 211 may have implemented therein the capability of significantly increasing the functionality of the

final datapage 250. To this end, the top plastic sheet 212, the bottom plastic sheet 211 or both may comprise appropriate elements or means for implementing any such additional functionality. For this purpose, the top plastic sheet 212 may include one or more inserts 220, 221, which may represent appropriate cut-out portions of the sheet 212, which are filled with any appropriate material, thereby imparting at least one material characteristic to the insert that differs from the material characteristic of the material bordering the inserts 220, 221. For example, the base material of the sheet 212 may comprise white or clear or transparent polycarbonate material that is not laser-able and may have a thickness of approximately 100 μm . Similarly, the bottom sheet 211 may comprise as a base material a white clear or transparent polycarbonate material that is non-laser-able with a thickness of approximately 100 μm . It should be appreciated, however, that the sheets 212, 211 may differ in thickness and material composition, if necessary. Also, the thickness values may be adapted to the application under consideration in any required manner.

[0037] Similarly, the bottom sheet 211 may include an insert 222 that is filled with an appropriate material so as to impart the desired material characteristics to the insert 222, thereby providing for different characteristics of the base material and the insert, as discussed above. It should be appreciated that also the sheet 211 may comprise two or more inserts, or one or both of the sheets 212, 211 may have no inserts formed therein. Moreover, various inserts, if a plurality of inserts is provided in one or both of the sheets 212, 211, may also differ in the type of material that is used in the respective inserts.

[0038] Additionally or alternatively to the one or more inserts 220, 221, 222 the sheet 212 and/or the sheet 211 may include additional features formed on a surface thereof, such as images provided in the form of a patterned foil 230, which may be patterned upon being attached to the respective surface of the sheet 212 and/or the sheet 211.

[0039] Alternatively or additionally to the component 230 and alternatively or additionally to the one or more inserts 220, 221, 222 one or both of the sheets 212, 211 may comprise a print pattern 240 so as to provide for additional capabilities of adjusting overall external appearance and implementing decorative features and/or security features, and the like.

[0040] Consequently, irrespective of the fact which of the various functionality increasing means, such as the one or more inserts 220, 221, 222, the component 230, for instance in the form of a foil/ink, and the print pattern 240 is actually provided in and on the sheet 212 and/or the sheet 211, by providing at least one of these components, the functionality of the pre-form 200 may significantly be increased. Consequently, the effort for handling additional material layers for operating thereon so as to provide the desired decorative features and/or security features on the side of the datapage manufacturer may be significantly reduced. For example, sheets 204A and

205A for the front side and sheets 204B and 205B for the rear side may be provided by the datapage manufacturer upon further processing the pre-form 200. For instance, these sheets may have a thickness of approximately 100 μm and approximately 30 to 50 μm , respectively.

[0041] As a result, by providing the inserts 220, 221, 222 in the form of a laser-able material, such as a polycarbonate material, respective laser-able areas may be provided in a basically non-laser-able material, thereby significantly reducing overall material costs. Furthermore, the insert(s) may be provided with embedded effects by generating respective images or modified portions within a polycarbonate material or a thermoplastic urethane material, depending on the overall requirements. Such effects may be obtained by laser processing/super laser processing, by UV or IR printing, by using photochromic ink, by using thermal-chromic ink, by using metallic ink or pigments, or by a combination of one or more of these techniques.

[0042] The component 230, for instance provided in the form of foil/ink, may be attached in the form of a metallic foil or a non-metallic foil, the patterning of which may be performed prior to applying the component 230 to a surface of the sheets 212, 211, and/or the component 230 may be patterned after having attached the same to the pre-form 200. Furthermore, by means of the component 230 and/or the print pattern 240 a hologram/kinegram may be implemented. Also, in combination with the inserts and/or the print pattern 240 offset printing processes may be used, such as IR, UV, OVI (optically variable ink), metallic colour, and the like, or any combination thereof.

[0043] Basically, the inserts 220, 221, 222 may be formed by forming a cut-out portion in the base material of the sheets 212, 211 and inserting an appropriate plastic material, such as polycarbonate, thermoplastic urethane, the like. To this end, respective techniques for implementing desired features, if to be formed in this manufacturing stage, may be applied. In other cases, the material in one or more of the inserts 220, 221, 222 may be operated on in a later manufacturing stage, for instance after having delivered the pre-form 200 to a datapage manufacturer.

[0044] Upon forming the pre-form 200 any appropriate position, size and shape as well as image contents for the components 220, 221, 222 in the form of inserts and the foil/ink 230 and the print pattern 240 may be selected, in advantageous embodiment, on the basis of design criteria for the final datapage 250. To this end, respective application-specific information may be received from the datapage manufacturer in order to establish the respective features and elements of the pre-form 200, for instance adapting the size and shape and optical appearance to the application under consideration, thereby obtaining a combined feature with superior optical and/or functional effect. Furthermore, respective images may be obtained, which may combined with additional image

portions to be established on the basis of the further material sheets 204A, 204B.

[0045] The respective materials for the inserts 220, 221, 222 may be fit into the corresponding cutouts by appropriate methods, such as normal welding, ultrasonic welding, glue, adhesive, adhesive tape, and the like. After having formed the inserts 220, 221, 222 and/or after having applied the foil 230 and/or after having formed the print pattern 240 the respective stacked structure including the top sheet 212, the central sheet 213 and the bottom sheet 211 the heat-treatment or lamination process may be performed, thereby obtaining a substantially homogeneous material in the form of a mono-block of material.

[0046] Figure 3 schematically illustrates an exploded perspective view of a datapage 350 including a datapage pre-form 300. The datapage 350 and the pre-form 300 may have a configuration as discussed above in the context of the datapage 250 and the pre-form 200. In particular, the pre-form 300 may include a first insert 320, formed of any appropriate material, as discussed above, and having an appropriate size and shape, while a second insert 321 may have a size and shape, and possibly a material composition, that differ from those of the first insert 320. Furthermore, the decorative component 330, for instance in the form of a patterned foil/ink, and the like, may be provided on the pre-form 300, i.e. on a surface of a sheet 312. As previously discussed, one or more of the components for increasing functionality of the pre-form 300 may also be provided on a bottom sheet 311, or one or more of these components may be provided on both of the sheet 312, 311, depending on the application under consideration.

[0047] For example, upon providing the one or more inserts 320, 321 in the form of a laser-able material respective images may be obtained in a later manufacturing stage, for instance by laser engraving techniques. Therefore, the customer does not need to use a whole laser-able polycarbonate sheet that covers the entire area of the pre-form 350 and may instead efficiently use laser-able material in the respective insert 320 and/or 321 or any other insert only. In this manner, any features on the inventive pre-form 300 may be "retrofitted" or complemented with respective features by a laser engraving process, while additionally providing for increased depth/laser-able thickness of the respective area of the datapage 350. That is, based on the respective insert increased space is available for a 3D laser engraving image. Furthermore, a latent image/combined image may be obtained by appropriately "preparing" respective inserts or enabling respective laser processing after the pre-form manufacturing process. As will be discussed later in more detail, the features implemented in the pre-form may represent a part of a combined image, the main part of which may be provided in a layer outside the pre-form that is attached in a later stage.

[0048] In other cases, one or more of the inserts 320, 321 may carry features based on thermal-chromic pig-

ments, photochromic dye, laser-able layer, and the like. Therefore, for example, the laser engraving image/text would be hidden under room temperature or ambient light. On the other hand, the feature could be revealed under UV or a change of temperature.

[0049] As discussed in the context of the print pattern 240 of the pre-form 200 in Figure 2 (not shown in Figure 3) a respective print pattern may be "synchronized" with any feature that is to be formed at a later manufacturing stage, for instance in and on a layer 304A, thereby creating an exceptional effect of a latent image under UV or IR light. Accordingly, the final datapage 350 may have superior functionality in terms of exclusiveness, complexity, and the like for a specific application.

[0050] Furthermore, the decorative or security foil/ink 330 may be provided so as to also provide for superior functionality, as discussed above. In particular, the foil 330 may represent a component for complementing or enhancing the image quality of any image for instance formed on or in the layer 304A. For example, overall image quality may be enhanced and/or luxurious ornaments may be formed in combination with a respective image or an insert formed on the basis of transparent laser-able material.

[0051] As a further example, it is to be noted that the type of printing on two different layers may create a latent image. In this manner, finally a hidden image of an historic event, an icon in the form of a person, a national flower/landscape, may be revealed. In other cases such a technique may even create a picture representing a season change. Therefore, special effects may be effectively implemented into a passport datapage.

[0052] With continued reference to Figure 3 and with reference to Figures 4 to 7 respective process techniques will now be described, when forming the datapage 350.

[0053] By providing a cut-out portion 325 in the sheet 312 and/or 311 and filling the same with an appropriate fill material, such as laser-able, super laser-able polycarbonate in an area with appropriate size and shape for supplying a laser engraving technique, the required amount of a laser/super laser-able material will be reduced due to the selectively sized and positioned cut-out portion 325. Providing the insert with a respective laser/super laser polycarbonate material may provide for increased thickness for the engraving process. Also, a technique for combining images may be applied, for instance by creating a partial image on different sheets, such as the sheet 312 and the sheet 304A, and/or by providing the insert 320 in the form of two or more different sheets having formed therein respective partial images. Furthermore, in some illustrative embodiments, the insert 320 may be processed with invisible ink printing prior to performing the perspective assembling process.

[0054] Again, it is to be noted that one or more respective inserts may be provided in the sheet 312, in the sheet 311 or in both or none of them.

[0055] Figure 4 illustrates the insert 321 of the pre-form 300 in differently processed versions. That is, on the right-

hand side of Figure 4 the insert 321 provided in the form of any appropriate material has formed therein text and/or an image, for instance obtained by laser engraving process techniques, while in other cases, an effect based on a red fluorescent pigment may be implemented. In a further variant photo-chromic dye may be used. Also in this case, the insert 321 may be provided in the sheet 311, the sheet 312 or both or none of these sheets. Furthermore, MLI/CLI (multiple laser image/changeable laser image) techniques may be applied to create multiple effects within the same area.

[0056] Figure 5 schematically illustrates the datapage 350, wherein for convenience only the sheet 312 and the additional sheet 304A are illustrated. As shown, the foil/ink component 330 may be formed or patterned such that in combination with an image formed in the sheet 304A a respective superior final optical appearance may be obtained. For example, the right-hand side of Figure 5 illustrates respective results upon combining the component 330 with the image of the sheet 304A. For example, respective effects may be obtained on the basis of a metallic green foil/ink, a metallic gold foil/ink, and the like. It should be appreciated that, as is also discussed above, these effects may be accomplished also at various locations of the datapage 350 in the two-dimensional plane and may also be achieved on the basis of the sheet 312 (see Figure 4), if required. Hence, in combination, superior sophisticated images, artwork, and the like may be accomplished by providing at least a part of the respective pattern within the pre-form 300.

[0057] It should also be appreciated that a respective effect may also be accomplished by applying respective offset printing techniques, for instance as discussed in the context of the pre-form 200 Figure 2, when referring to the print pattern 240.

[0058] Furthermore, it is to be noted that any one of the structures or any of the processes formed or pre-formed in combination with the sheets 312 and 304A may also be formed/performed in combination with sheets 311 and 304B.

[0059] Figure 6 illustrates a further example of achieving superior external appearance by using a print pattern or a foil component in order to obtain more sophisticated decorative features and/or security features. Also, optically variable ink may be used in a respective print pattern so as to obtain a superior effect. The right-hand side of Figure 6 illustrates a respective example when using a metallic gold foil in combination with an image formed in an additional material sheet, such as the sheet 304A or 304B of Figure 5.

[0060] Figure 7 illustrates a further example of applying UV ink printing techniques so as to obtain a combined image in order to further enhance overall external appearance of the resulting combined image. For example, a respective image is formed in and on the sheet 304A, which, as discussed above, may be provided by the datapage manufacturer, while on the other hand, a respective print pattern 340 may be formed in the pre-form 300

on the basis of application-specific information obtained from the datapage manufacturer in order to form a combined image. As shown on the right-hand side of Figure 7 the ink may disappear under UV light in a selected area, thereby temporarily "deleting" the respective print pattern 304A. In a further example, the print pattern 340 formed on the sheet 312 may be revealed under UV light and may thus be visible through sheet 304A.

[0061] As a result, the present invention provides structures and techniques, in which a polycarbonate core or pre-form or inlay with embedded security features and/or decorative features may be provided as an enhanced inlay that acts as a core material for completing a datapage of a security document. The security features and/or decorative features and the polycarbonate pre-form or inlay may be associated with security features provided on customer print sheets on the front side, on the backside or on both, thereby creating an enhanced level of complexity, which in turn translates into superior tamper resistance of the respective security document. At the same time, the datapage manufacturer's workload is reduced, since less material sheets, features and techniques have to be used for handling extra sheets compared to conventional manufacturing techniques for traditional datapages or electronic datapages. That is, the manufacturer has less material to handle, thereby resulting in reduced process time. Furthermore, scrap costs on the manufacturer's side are reduced. Additionally, the product is superior with respect to avoiding forgery/alteration of the datapage. Additionally, for a given two-dimensional size of the datapage more security features can be implemented into the final product. Additionally, superior product design flexibility is obtained, while also a wider variety of techniques for integration of features and elements are available and can, thus, be applied. Consequently, investment efforts for developing products of higher complexity are reduced.

Claims

1. A datapage pre-form for a datapage of a security document, comprising
a central plastic sheet having a bottom surface and a top surface;
a top plastic sheet attached to said top surface; and
a bottom plastic sheet attached to said bottom surface,
said central plastic sheet, said top plastic sheet and said bottom plastic sheet forming a stacked structure, wherein at least one of said top plastic sheet and said bottom plastic sheet comprises at least one of
a first insert that differs in at least one characteristic from a material laterally bordering said first insert,
a second insert having embedded therein at least one of a decorative feature and a security feature,
a foil/ink attached to a surface of said at least one of

- the top plastic sheet and the bottom plastic sheet,
and
a printed pattern.
2. The datapage pre-form of claim 1, wherein said first insert comprises a laser-able polycarbonate material. 5
 3. The datapage pre-form of claims 1 or 2, wherein said second insert is formed of one of thermoplastic urethane and polycarbonate material. 10
 4. The datapage pre-form of claim 3, wherein said at least one of a decorative feature and a security feature is formed by at least one of laser, super laser, ultraviolet printing, infrared printing, photochromic ink, thermo-chromic ink, metallic ink and metallic pigments. 15
 5. The datapage pre-form of any of claims 1 to 4, wherein foil is one of a metallic foil and a non-metallic foil and wherein said foil comprises at least one of a hologram, kinegram, an offset print pattern formed by at least one of infrared ink, ultraviolet ink, optically variable ink and metallic color. 20 25
 6. The datapage pre-form of any of claims 1 to 5, wherein said top plastic sheet comprises a one of a white polycarbonate and a transparent polycarbonate. 30
 7. The datapage pre-form of any of claims 1 to 6, wherein said bottom plastic sheet comprises one of a one of a white polycarbonate and a transparent polycarbonate. 35
 8. The datapage pre-form of any of claims 1 to 7, wherein said stacked structure including said central plastic sheet, said top plastic sheet and said bottom plastic sheet has a thickness in the range of 200 μ m to 600 μ m. 40
 9. The datapage pre-form of any of claims 1 to 8, wherein said stacked structure are heat-treated so as to form a mono-block of material. 45
 10. A datapage pre-form for a datapage of a security document, comprising
a stacked structure including at least one of an insert,
a foil attached to an internal surface, and a printed pattern formed on said internal surface. 50
 11. The datapage pre-form of claim 10, wherein a thickness of said stacked structure is in the range of 200 μ m to 600 μ m. 55
 12. The datapage pre-form of claim 15, wherein said insert comprises at least one of a laser-able polycarbonate material, a thermoplastic urethane and a polycarbonate..
 13. A method of forming a pre-form of a datapage for a security document, the method comprising
performing at least one of a process for forming an insert in a cut-out portion of a plastic sheet and a process for forming at least one of a decorative feature and a security feature on a surface of said plastic sheet;
attaching said plastic sheet to a surface of a central plastic sheet;
and
heat-treating said plastic sheet and said central sheet so as to form a mono-block of material.
 14. The method of claim 13, wherein said at least one of a decorative feature and said security feature are formed by at least one of the following processes:

attaching a foil/ink to said plastic sheet, and
performing offset printing on the basis of at least one of UV ink, IR ink, optically variable ink, metallic color, photochromic ink and thermal-chromic ink.
 15. The method of anyone of claims 13 and 14, further comprising receiving application specific information on a post-processing of said pre-form and adjusting at least one of a size, a shape, a color, an external appearance, a process technique and a position of at least one of said insert, said decorative feature and said security feature on the basis of said application specific information.

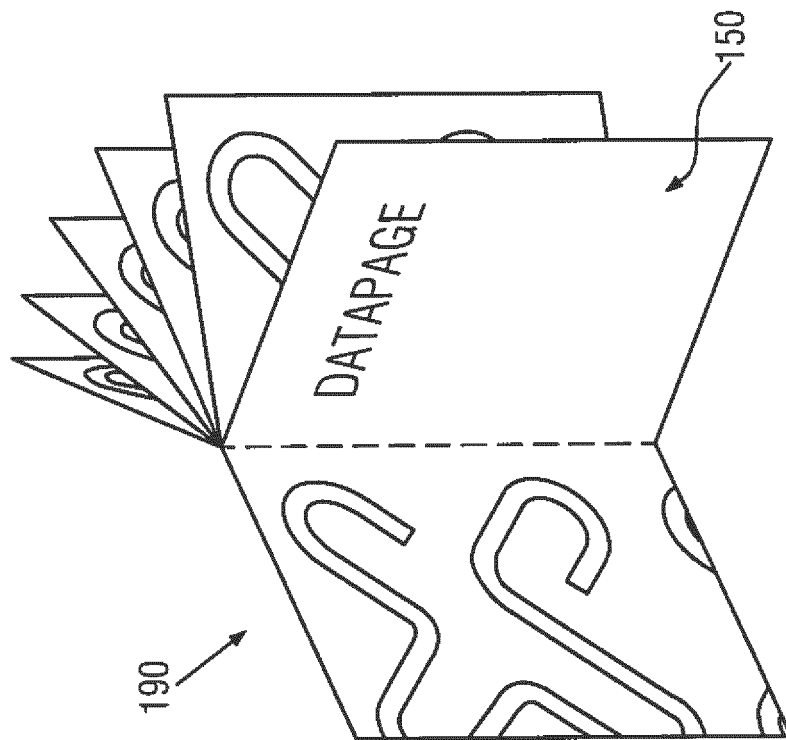


FIG. 1A

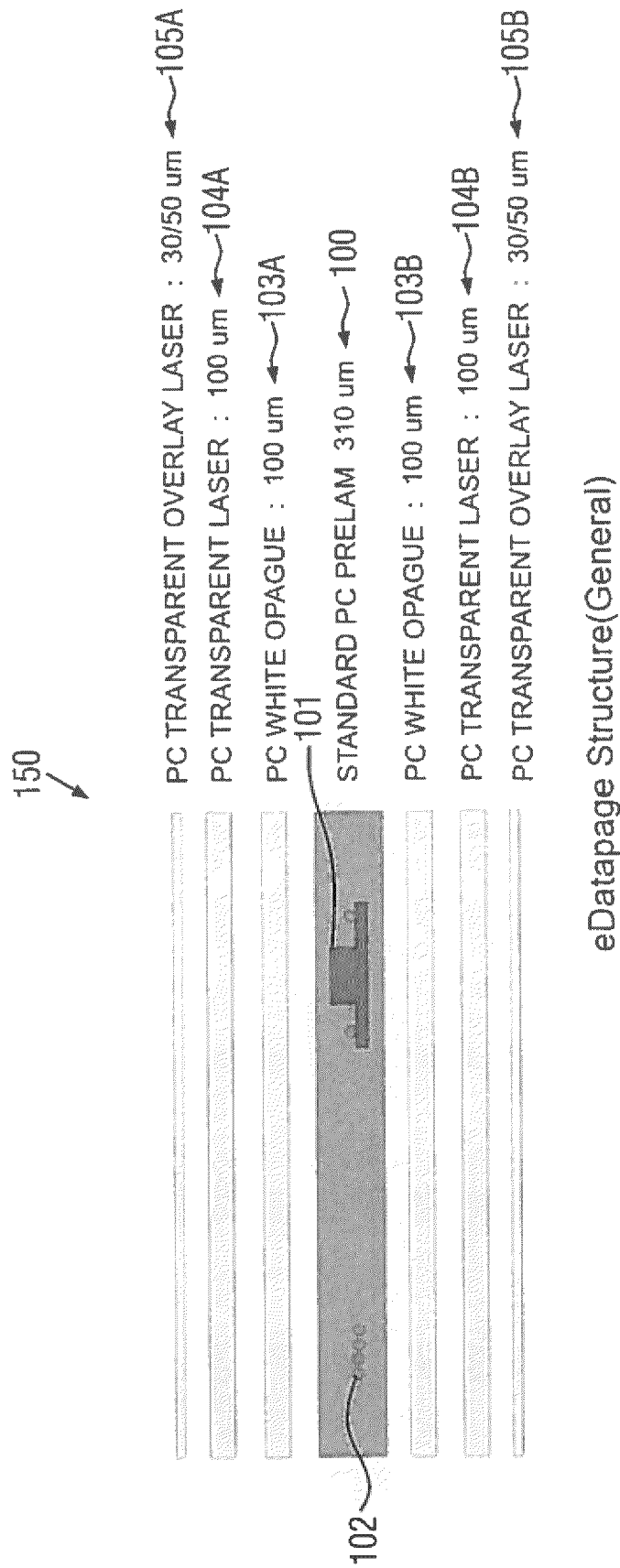


FIG. 1B

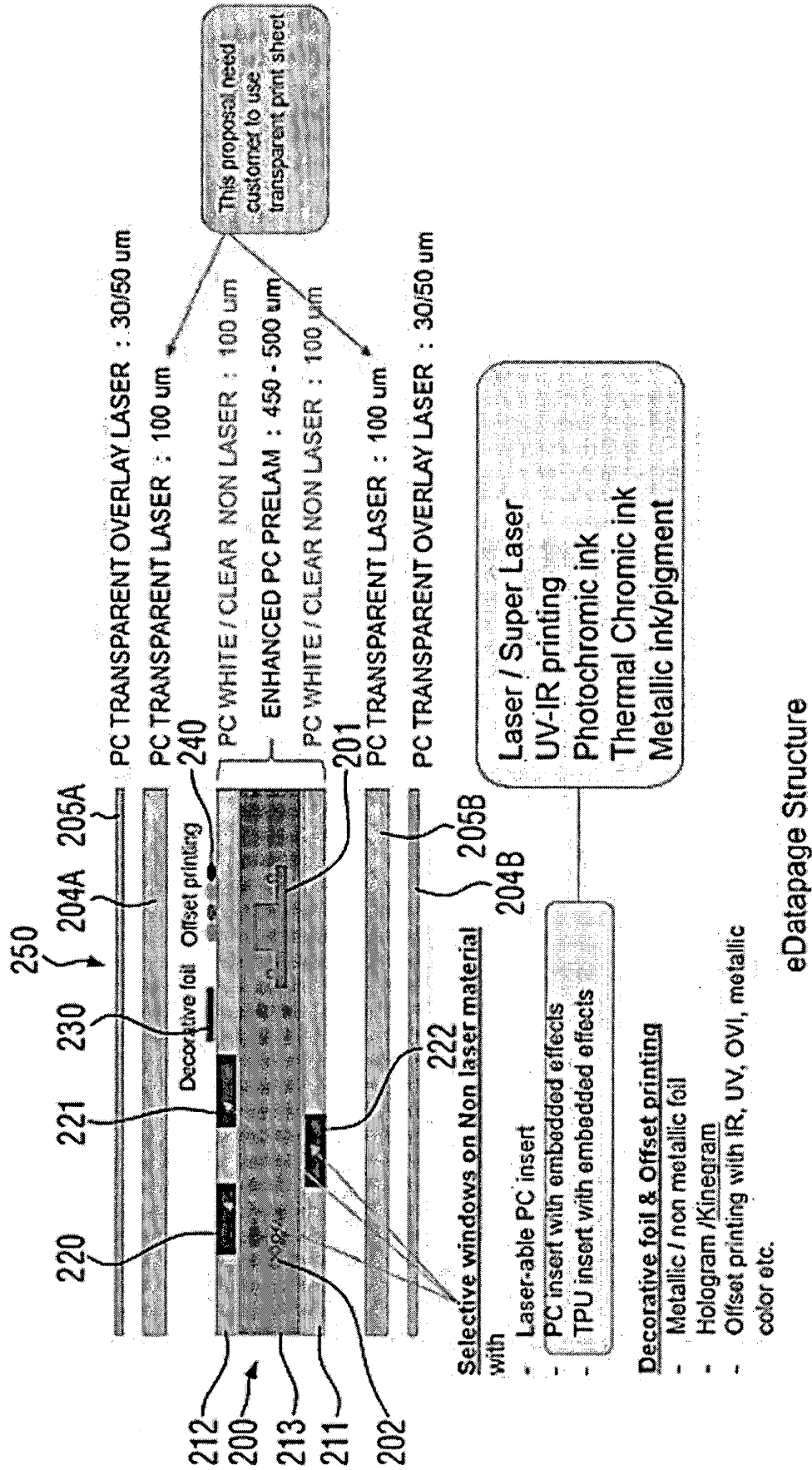


FIG. 2

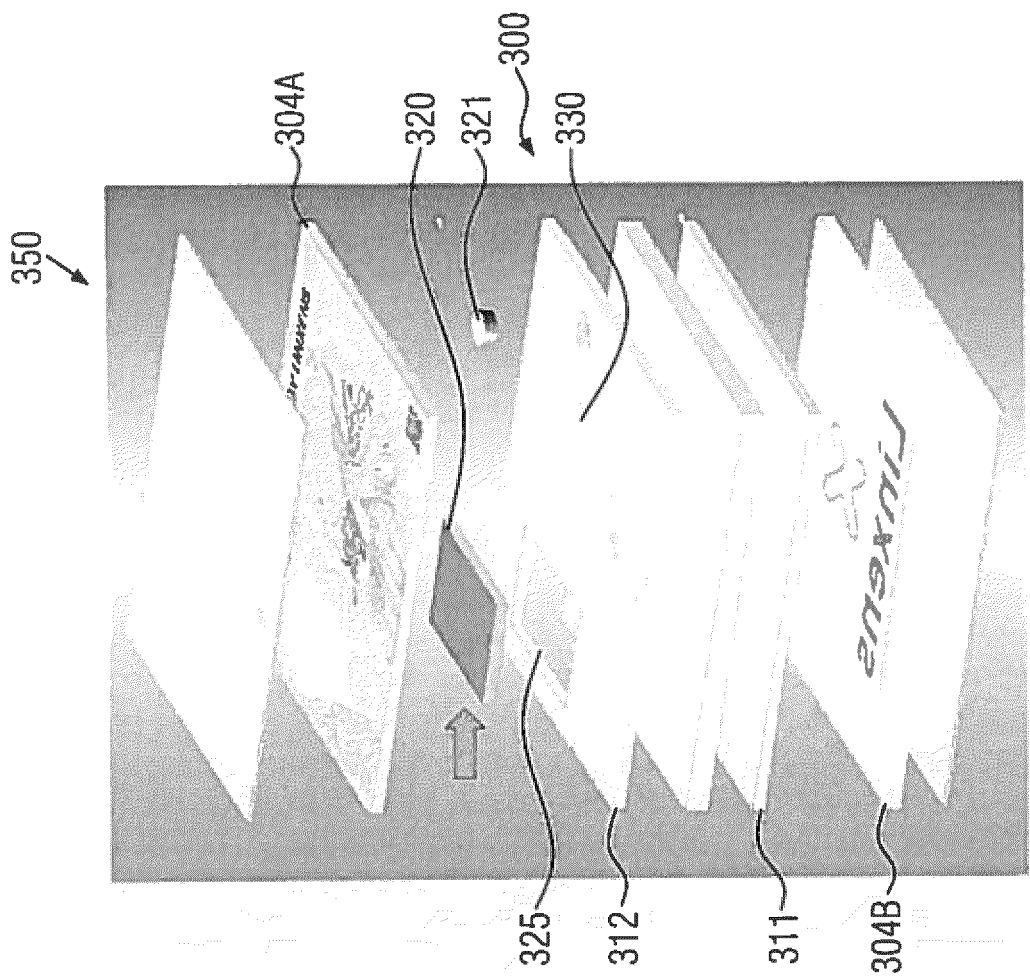


FIG. 3

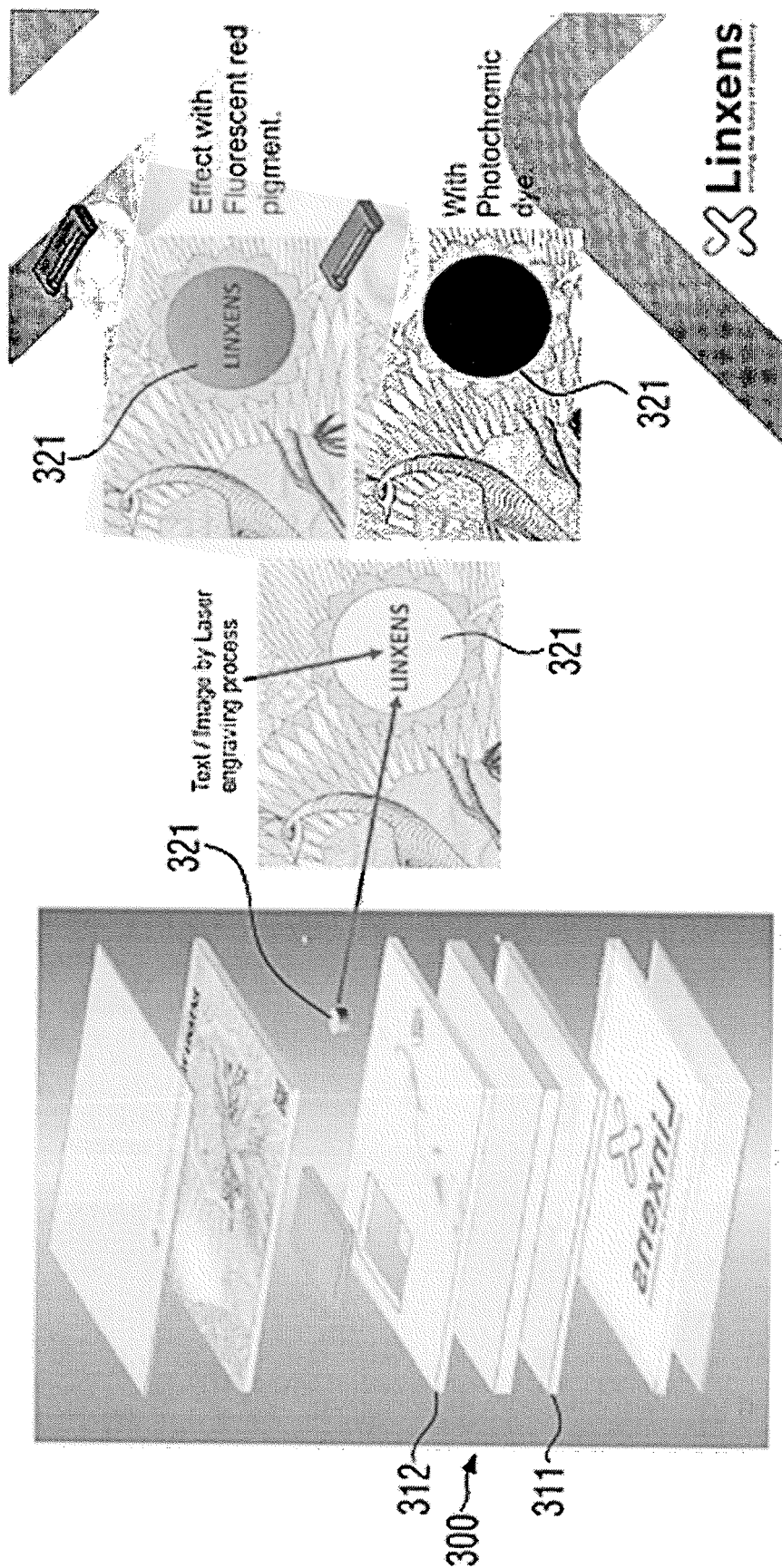


FIG. 4

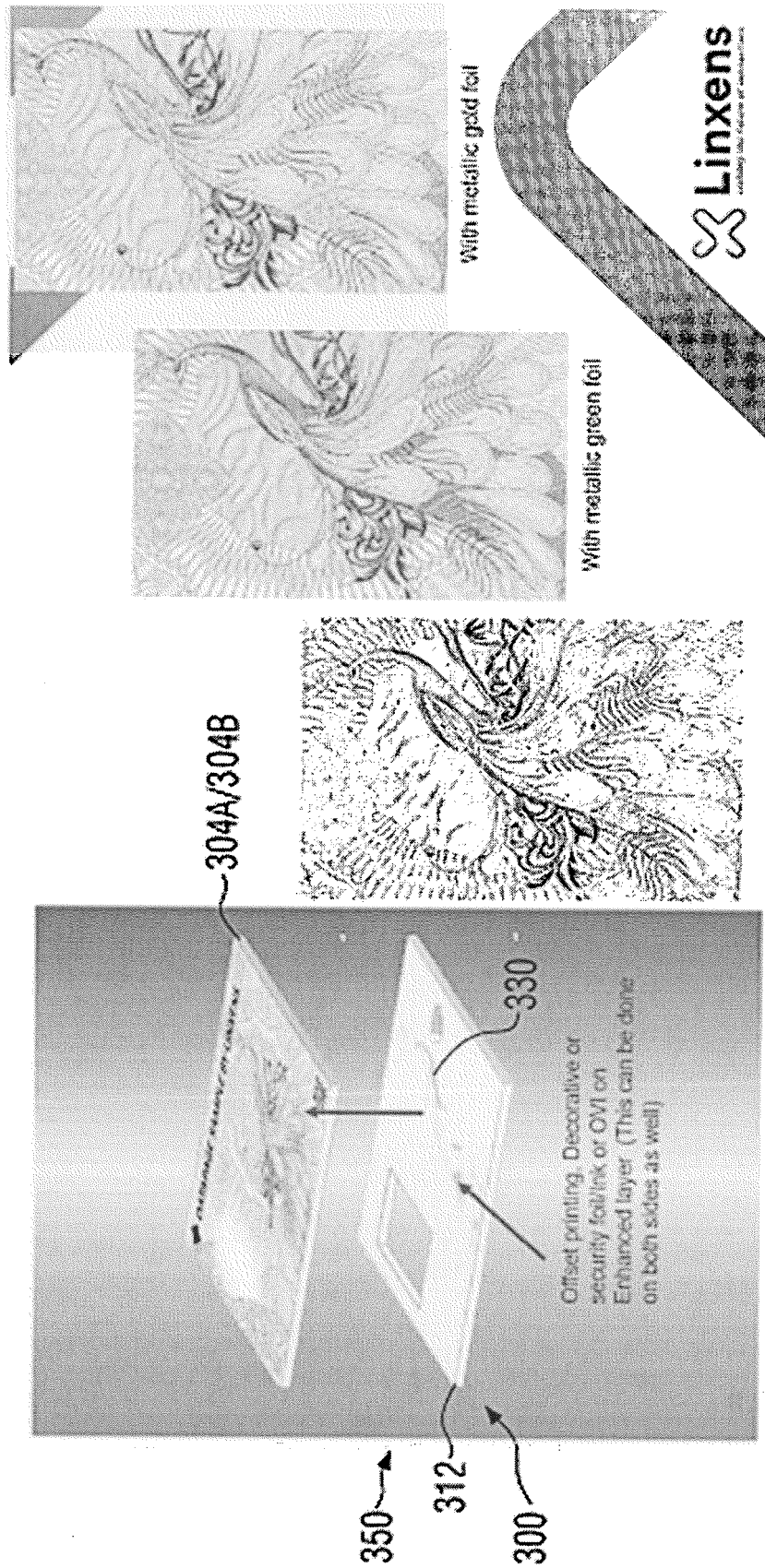


FIG. 5

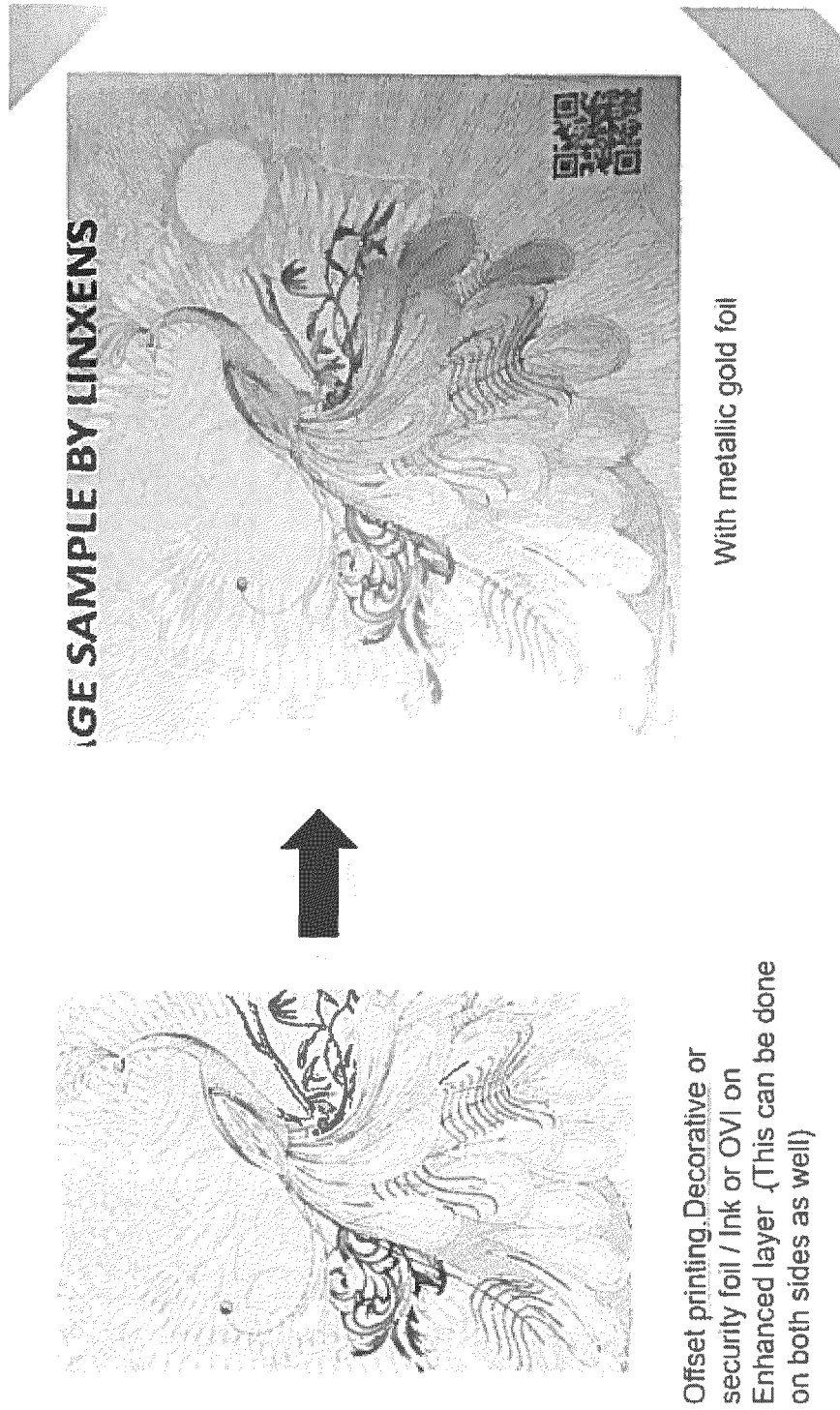


FIG. 6

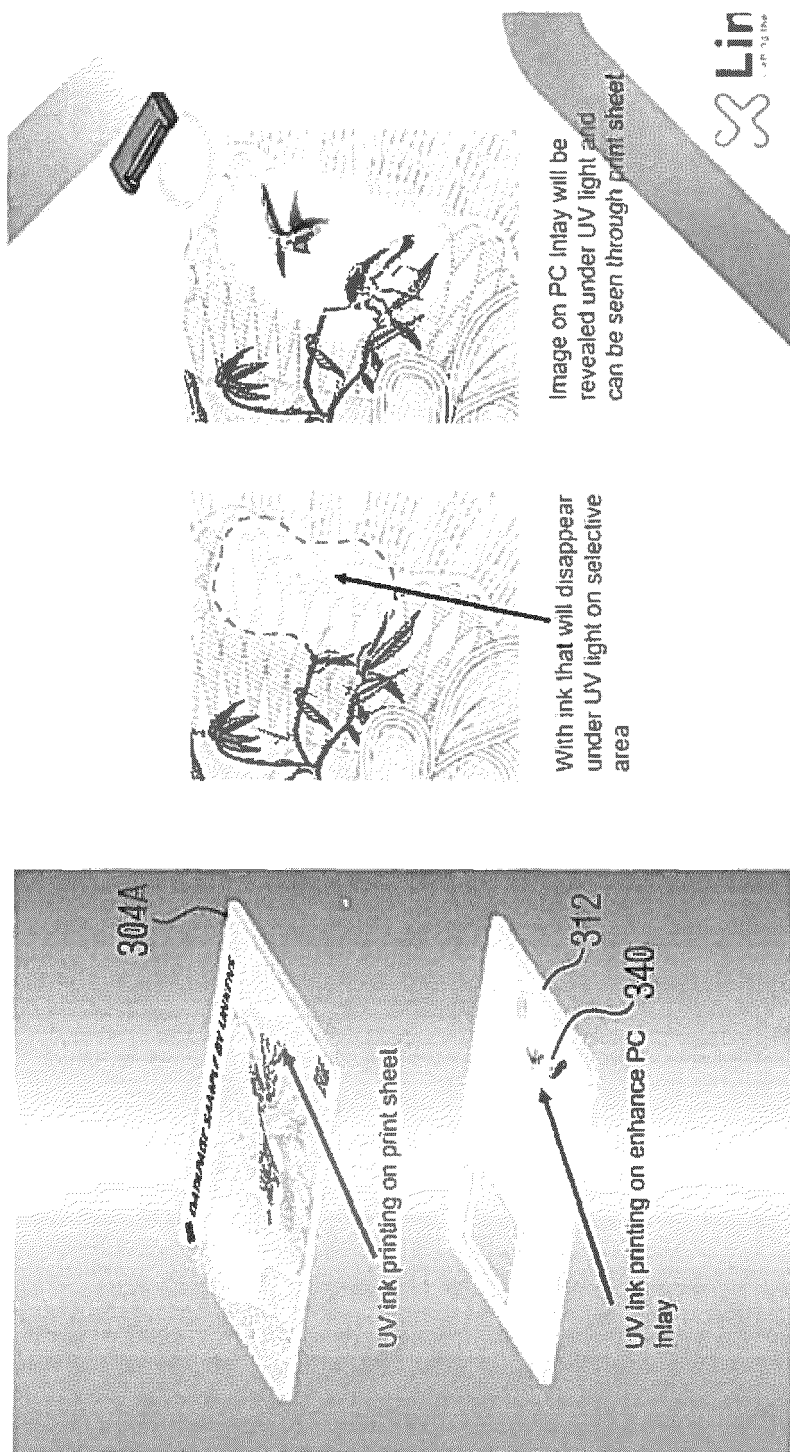


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 19 30 5737

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			B42D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 November 2019	Examiner Langbroek, Arjen
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 19 30 5737

5 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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