

SECURE IDENTIFICATION DOCUMENT AND METHOD FOR PRODUCING IT

BACKGROUND

5 **[0001]** This invention relates generally to secure identification documents and method for making such identification documents. More particularly, this invention relates to an identification document comprising an anti-counterfeiting element that allows detecting a fraudulent modification of an existing official personalization or a completely falsified document.

10 **[0002]** Identification documents are associated with secure applications, such as for example driving licenses, identity cards, membership cards, badges or passes, passports, discount cards, banking cards, money cards, multi-application cards, and other papers of value; and security documents such as bank notes. Such documents are widely used, they may comprise an
15 electronic module or not. If they comprise an electronic module, they can function either with contact and/or without contacts depending on the application to which they are intended. They may take the shape of card or a booklet or something else. Such identification documents are graphically personalized. Personalized information is personal data of the card's owner,
20 i.e for example his photo, his name, his birth date, his social security number, his biometric information such as his fingerprint for example, a validity date, an identification number allocated to him etc... This personalized information is printed onto the surface of the document, or into one or more constitution layers of the document. Because of the value and importance associated with
25 each of these data carriers, they are often the subject of unauthorized copying and alterations, and forgeries.

[0003] To prevent such activities from being carried out on these documents, different types of visual and touchable security features have been added to them. One of these security features consists in providing a
30 see-through portion into the structure of the document, said see-through portion comprising security markings and/or personal data of the legitimate holder, that are for example laser-engraved into the material constituting the

see-through portion. Generally, such see-through portion is made in polycarbonate comprising carbon particles that are sensitive to laser beam, so that they burn and blacken under the laser beam. Such see-through portion are difficult to scan and therefore to copy. Moreover, due to the fact that the security markings are laser engraved into the material constituting the see-through portion, they are impossible to remove by scratching or by attacking with chemical solvents or the like. However, a drawback of such security feature relates to the fact that an infringer can still modify the markings inside the see-through portion, by laser engraving, even if it is difficult, it is not impossible.

[0004] Another existing security feature consists in providing on at least one of the main surfaces of the identification document, an optically variable security element, which comprises at least two security markings and/or images. Such security feature is also called "CLI/MLI image" (acronym for "Change Laser Image/ Multiple Laser Image). Said markings are decomposed and interleaved, to create a complex image that is printed into the document. Then, a filter is placed over this complex image, said filter being arranged so that it enables to visualize each marking at a respective particular angle by tilting the document. Such filter can be made either with micro-lens or with printed pattern, which in the simplest case can comprise just parallel lines.

[0005] Figure 1 shows an example of such existing printed filter over a complex image in a cross-sectional view. The filter 4 comprises parallel lines 6 that are printed onto an upper layer 2 at least translucent. In fact, the filter comprises a set of substantially opaque lines 6 that are parallel and clear gaps 5 between opaque lines 6. The period P of the filter is defined by the sum of the line width L and the gap width G . The gap width G essentially defines the resolution requirements for the markings to be revealed. A complex image 3 is printed onto a layer underneath, for example a core layer 1. The complex image, or security pattern, comprises in this example two markings A and B decomposed into bands that are interleaved. The printing of the complex image and the filter can be made either by laser engraving or by conventional printing process such as inkjet or offset or silkscreen etc... Each

security markings A and B is decomposed into bands that are spaced from a distance P from each other, and each band A of one security marking is interleaved with two bands of the other security marking B, and reciprocally. The distance P between each band of each security marking must be substantially the same as the period P of the filter layer 4. Then, when tilting the document, such that only one marking A or B is seen through the clear gaps 5 of the filter layer 4, this marking is seen clearly. In the figure 1, one can see that marking A can be viewed when tilting the document at viewing angle VA, while marking B can be viewed when tilting the document at viewing angle VB.

[0006] However, even if these optically variable security elements are difficult to copy because impossible to scan, they may still be falsified. Indeed, an infringer can arrive to change the variable data viewed through the filter, or to remove the part of the document comprising the optically variable security feature and to replace it by another part comprising another falsified optically variable element. Moreover such security feature necessitates complex software for computing the complex image, and it necessitates also the use of a filter material that has to be well registered with the computed complex image, in order to achieve the required effect. Consequently, such a security feature is relatively complex and expensive to implement.

[0007] Considering the above, a problem intended to be solved by the invention, is to propose an identification document comprising an anti-counterfeiting element able to display different data and/or images when tilting the document, so that it protects the personalization against counterfeiting, said anti-counterfeiting element being very difficult to modify or to copy, and impossible to remove without destroying the material, while being easy to create.

SUMMARY

[0008] The solution of the invention to this problem relates to the fact that said anti-counterfeiting element is created in three-dimensions through the thickness and depth of an at least translucent portion of the document.

[0009] Thus, the fact to create different data and/or images to be revealed depending on the tilt angle of the document, in three dimensions, so that the data and/or image is not printed at only one depth of the at least translucent portion, but through the thickness at different depths, it becomes much more
5 difficult to reproduce it or to modify it, because it necessitates to accurately control the depth to which the modification is to be made.

[0010] In such case, each data and/or image to be revealed at a predetermined tilting angle is created into a predetermined plan, through the thickness and depth of the at least translucent portion, and comprises pixels,
10 each pixel being arranged at predetermined location into said plan.

[0011] In a further embodiment, all data and/or images to be revealed at different predetermined tilt angles are defined by only one common set of pixels that are arranged at predetermined locations, through the thickness and depth of said at least translucent portion, so that said common set of pixels
15 enables to display the different data and/or images depending on the tilt angle of the document.

[0012] Thus, with such an embodiment, it becomes impossible to change a first data and/or image to be displayed without changing a second one. Consequently, such embodiment complicates much more a fraudulent
20 modification.

[0013] In a preferred embodiment, the pixels are formed by bubbles that are created into the material of said at least translucent portion.

[0014] Such bubbles are very advantageous because it becomes impossible to remove them without destroying the material. Moreover, they
25 enable to prevent the fraudulent creation of additional bubbles under existing bubbles, because the existing bubbles interfere on the laser beam used to create such bubbles.

[0015] According to another aspect, the invention relates also to a method for manufacturing a secure identification document comprising an anti-
30 counterfeiting element able to display different data and/or images when tilting the document. The method is particularly remarkable in that it comprises following steps :

- for each data and/or image to be revealed, defining a plan through the thickness and depth of an at least translucent portion,
- in each plan, computing amongst several potential locations, the location of each pixel of the data and/or image to be revealed, each location inside said plan being more or less deep into the at least translucent portion,
- creating each pixel at each computed location, starting from bottom to the top of the at least translucent portion.

[0016] According to a further embodiment, the method comprises following additional step: for each thickness of the at least translucent portion, moving each computed location of each pixel of each data and/or image to be revealed, along lines of potential locations into transversal plans that intersect defined plans, in order to create a common set of pixels able to display each data and/or image depending on the tilt angle of the document.

[0017] The pixels are advantageously formed by bubbles that are created by means of a laser beam with short focal distance.

BRIEF DESCRIPTION OF DRAWINGS

[0018] Other particularities and advantages of the invention will be better understood with the help of the description below, which has been provided as an illustrative and non limitative example by reference to the enclosed figures that represent:

Figure 1, already described, is a cross-sectional view of an existing printed filter over a complex image able to reveal different sets of data or images when tilting the document and viewed through the printed filter,

Figure 2, a schematic perspective view of an identification document comprising an anti-counterfeiting element according to a first embodiment of the invention,

Figure 3, schemas illustrating the steps of construction of an anti-counterfeiting element according to the embodiment of figure 2,

Figure 4A to 4C, schemas illustrating the steps of construction of an anti-counterfeiting element according to a second embodiment of the invention,

5 Figure 5, a schematic perspective view of an identification document comprising the anti-counterfeiting element according to the second embodiment and made according to the manufacturing steps illustrated in figures 4A to 4C.

DETAILED DESCRIPTION

10 **[0019]** Hereafter, an embodiment of the present invention will be described in the context of identity (ID) card and a method for producing it. However, it is to be understood that the invention is usable with any data carrier that includes, but is not limited to, a driving license, a badge or pass, a passport, a discount card, a membership card, a banking card, a credit card, a money
15 card, a multi-application card, and other security documents and papers of value that are to be provided with information or data in such a way that they cannot be easily imitated by common means. Such identification documents may take indifferently the shape of card, or booklet, or something else.

[0020] Figure 2 shows a schematic perspective view of an identification
20 card 10. The card comprises for example a body 20 made either of only one layer, by molding for example, or of several layers attached together by means of lamination or glue or other conventional process. The card body 20 is preferably protected from external stresses by two overlay layers 21, 22 that cover each main surface of the body. These overlays are preferably
25 transparent, or at least translucent, in order to let visible some information 26 printed onto at least one main surface of the body. Such information 26 can be linked to the personal information of the legitimate holder of the identity card, such as his name and/or his birth date and/or his address and/or his photography and/or a biometric information such as his finger print etc...

30 **[0021]** The card body 20 can be either opaque, or at least translucent and at the most transparent. If the body is completely opaque, it is necessary to provide a portion 23, inside the card body 20, which is at least translucent and

at the most transparent. Such translucent portion 23 enables to create a security marking inside, which acts as an anti-counterfeiting element, i.e. that allows detecting a fraudulent modification of an existing document or a completely falsified document.

5 **[0022]** In order to increase the security of such document, the anti-counterfeiting element, which is provided inside the at least translucent portion 23, is created in three dimensions through the thickness and depth of the portion 23. In fact, the different data and/or images that are intended to be viewed through the at least translucent portion 23 are created in
10 predetermined locations that are arranged in different plans through the thickness and depth of the portion.

[0023] In the example of figure 2, two different information are able to be viewed through the portion 23 depending on the tilting angle of the card around the tilting axis A-A, which is for example perpendicular to front
15 longitudinal edge E of the document. At a first angle α_1 , information "02" is viewed, while at a second angle α_2 information "13" is viewed. For that, each character that composes the information to be revealed at a particular angle, is created into a particular plan 24, 25 through the thickness T and depth D of the at least translucent portion 23. In the example of figure 2, each character
20 "0" and "2" of the first information "02" to be displayed is created in each parallel plan 24a and 24b, while each character "1" and "3" of the second information "13" to be revealed is created in each other parallel plan 25a, 25b. In the example of figure 2, only two different data are to be revealed when tilting the document, but it is only for simplification and of course it is possible
25 to display more than two different data when tilting the document. In this case, each different data to be displayed is created into one different plan 24, 25 through the thickness T and depth D of the portion 23. The data to be revealed can be indifferently text and/or number and/or logo and/or image and/ or photography, or the like... Moreover, such data can be linked to the
30 personal information of the legitimate holder of the ID card. In this later case,

each data and/or image to be displayed, when tilting the identification document, is variable from one document to another.

[0024] Each plan 24, 25 contains several potential locations 27 (shown in figure 3) for creating each point or pixel that will compose one character.

5 Amongst these potential locations 27, some of them are transformed in order to change the appearance of the material of the at least translucent portion 23, so that each point or pixel that composes each character of the information to be revealed becomes visible. For that, the material can be changed at predetermined locations into each plan 24, 25, by using a laser
10 beam for example. Such laser beam can either burn the material constituting the portion 23, so that black points can be obtained for each pixel of each character to display, or it can create bubbles inside the material by material ablation or sublimation. In order to change the material with great precision, a laser beam with short focal distance is preferred, such as a picosecond YAG
15 laser for example, with a short focal distance of typically few centimeters. For example, focale distance can be reduced to 5 cm. YAG laser used can have a short pulse duration, typically 10 ps, pulse energy can vary from 0 up to 200μJ at a repetition rate of 50KHz for standard YAG laser functioning at 1064nm with maximum power of 10W, while the pulse energy can be around 100μJ at
20 a repetition rate of 50KHz for YAG laser functioning at 532 nm wavelength with a maximum power of 5W. But such example is not limitative and it is also possible to use for example nanosecond laser, which is less expensive than picosencond laser.

[0025] For creating the bubbles or black points in a predetermined depth
25 inside the portion 23, or inside the at least translucent card body if such card body is used, the card is tilted or moved in order to change its position compare to the focal distance of the laser beam.

[0026] The thus created bubbles that are trapped inside the thickness of the document may be of different nature. They can be for example filled with a
30 gas resulting from the combustion of the constitution material. Thus, they can be filed for example by a carbonic gas, which forms due to the presence of carbon particles in the constituting material 23, or by a chlorine gas for

example, due to the combustion of PVC when this material is used in the constitution of the at least translucent portion 23, or the at least translucent body 20, in case no see-through portion 23 is used but only an at least translucent card body. Moreover, such bubbles are not limited to spherical shape, but can be of any three-dimensional shape, which is representative of a change of the visual appearance of the constitution material. In a further example, such three-dimensional shape can be not filled by a gas but can offer an optical distortion, such that it appears with a different coloration into the at least translucent material.

[0027] Such bubbles present some advantages. Namely, if an attempt is made by an infringer to modify the information to be revealed when tilting the document, by means of a laser beam through the thickness of the at least translucent portion 23, then the existing bubbles will interfere onto the laser beam which will be diffracted, so that fraudulent modification will appear to be different than the original anti-counterfeiting element and fraud will appear immediately to naked eyes.

[0028] In the schema of figure 2, one can define a plan P1(YOY') perpendicular to the two plans 24,(XOY) and 25 (XOY') Such transversal plan P1, which is parallel to front edge E surface, can be with other relative angles, which must be around the 90° compare to plans 24 (XOY) and 25 (XOY'). This plan P1 provides the alignment of the bubbles of one of the lines, of a logo or text or other items to be revealed by tilting the card. By duplicating the plan P1 using other plans parallel to P1, across the plans 24 and 25, through the thickness T of the portion 23, and at separated distance of pixels size, the different lines of the different items to be created are defined.

[0029] In order to explain how the different locations of the pixels constituting each character to be displayed are predetermined, i.e. the locations of each bubble to create, figure 3 shows an example where the thickness T of the at least translucent portion 23 has been theoretically divided into 7 parts numbered A to G, corresponding respectively to the relative plans P1/A to P1/G . All these parts are intended to be piled together,

and when piled they reveal the information to be displayed at a particular tilt angle of the document.

[0030] As it has already been explained, each part A to G corresponds to the plans P1/A to P1/G, which corresponds respectively to each line of pixels, of data and/or image to be revealed, that have to be created in plans 24 (XOY) and 25 (XOY'). The intersection of the plan P1/A to P1/G with the plans 24 (XOY) and 25 (XOY') provides respectively the line OY and OY', on which the pixels of the Line A to Line G, of the data and/or images to be revealed, that have to be created.

[0031] Thus, on part A, one can see, on the left part of the drawing, that at first intersection of the transversal plan P1/A and the surface 24a corresponding to first top line OY of plan XOY 24a, there are three locations for bubbles to create (in dark) amongst potential locations 27 (schematized by all the circles). This corresponds to the creation of the dark pixels of character "0" on Line A. In a same manner, the intersection of the transversal plan P1/A and the surface 25a corresponding to first top line OY' of plan XO'Y' 25a, reveals only one location for bubbles to create (in dark) amongst potential locations 27 (schematized by all the circles). This corresponds to the creation of the only dark pixel of character "1" on Line A. In a similar way, on the right part of the drawing, first intersection of the transversal plan P1/A and surface 24b corresponding to first top line OY of plan XOY 24b, there are three locations for bubbles to create (in dark), corresponding to the three dark pixels of the character "2" on Line A, while first intersection of the transversal plan P1/A and surface 25b corresponding to first top line OY' of plan XOY' 25b, there are three locations for bubbles to create (in dark), corresponding to the three dark pixels of the character "3" on Line A. These steps of computing are repeated for each thickness T of portion 23, using plan P1/A to P1/G in correspondence to the characters line A to Line G, i.e. for each line OY and OY' of each plan XOY and XOY', until bottom lines OY, OY' (Line G, part G). Then, all the computed bubbles are created inside the at least translucent material, by using a laser beam with short focal distance. For that, for each thickness of the at least translucent portion, bubbles are created in such a

manner that the deepest are first created, until the surface of the at least translucent portion.

[0032] Then, when all the plans P1/A to P1/G are piled together, all the created bubbles on surface 24a, by means of transversal plans P1
5 corresponding to all the lines OY of plan XOY, are intended to reveal "0", while all the created bubbles on first surface 24b are intended to reveal "2". In the same manner, all the created bubbles on surface 25a, by means of transversal plans P1,, corresponding to all the lines OY' of plan XOY', are intended to reveal "1", while surface 25b is intended to reveal "3".

10 **[0033]** In the illustrated example, when all the parts are piled together, the markings that are created in each parallel plan 24 reveal first information "02" when tilting the document at a first angle, "0" being located in first plan 24a, while "2" is located in second parallel plan 24b; and second information "13" appears when tilting the document at a second angle, "1" being created in
15 first plan 25a, while "3" being created in second parallel plan 25b. Planes 24 and 25 are in fact inclined compare to the main surfaces of the document and extend through the thickness T and depth D of the at least translucent portion 23.

[0034] Creation of data and/or images, comprising bubble for each pixel of
20 a character to display is preferred compare to a black burned point. Indeed, in such case, the bubbles are created inside the thickness of the at least translucent portion 23 from the bottom to the top of the portion, in order to render impossible the counterfeiting possibilities by modification. Namely, it is impossible to create an additional bubble deeper than an existing bubble, the
25 existing bubble making interference for the laser beam, and causing particularly a diffraction phenomenon.

[0035] A second and more complex embodiment, also called "encrypted embodiment" in the following description, compare to the first simple embodiment, is illustrated in figures 4A to 4C and 5. Instead of creating
30 several sets of bubbles, each set being intended to reveal each information to be displayed as in the first embodiment, this encrypted embodiment consists in finding a common location for only one common set of bubbles, which is

intended to reveal at least two different data and/or images depending on the tilt angle of the document. For implementing such encrypted embodiment, the first simplest embodiment defines the starting point for computing the locations of the common set of bubbles.

5 **[0036]** Figure 4A shows two different plans 24 and 25, into which are theoretically created the bubbles, according to the simplest first embodiment, for displaying respectively the figure "0" and the figure "1" depending on the tilt angle of the document around a tilting axis A-A. In figure 4A, plans 24 (XOY) and 25 (XOY') are a little bit shifted from theoretical axis OX, in order to show
10 the two figures "0" and "1" to be revealed. Moreover, the figures are shown such that first front lines OY and OY' on the drawing are the bottom lines (i.e. the characters line G in the portion 23, compare to explanations given with figure 3).

15 **[0037]** First plan 24 is called plan XOY. The schema illustrates a number of bubbles. Amongst these schematic bubbles, the clear circles 27 schematize potential locations of bubbles into the plan XOY, while the dark bubbles schematize the theoretical locations of the bubbles created in the plan XOY according to the first simplest embodiment, according to which each information to be revealed is created into one plan. In this first plan 24 XOY,
20 one can see that the dark bubbles are located, so that they draw the figure "0". In the same manner, the second plan 25, also called plan XOY', comprises dark bubbles that are located in locations, so that they draw the figure "1".

25 **[0038]** Figure 4B schematizes the view on the bottom edge, opposite to front longitudinal edge E of the document (front edge E is shown in figure 5). This surface of bottom edge comprises a transversal plan P1 having a triangle shape, whose sides corresponds respectively to lines OY and OY' of the two plans XOY and XOY' . In fact, at each thickness T into the translucent portion 23, there is a surface, parallel to the surface of front longitudinal edge E, that
30 comprises a transversal plan P1 having a triangle shape, whose sides corresponds to each line OY and OY' of the plans XOY and XOY'. This transversal plan P1 is the same as the first embodiment and figure 3.

[0039] For the purpose of computation of the common locations of the common set of bubbles in this second embodiment, a second transversal plan P2, symmetrical to the first P1 compare to the base of triangle, is created. Then, for each thickness T of the at least translucent portion, i.e. for each line

5 OY, or OY' of each plan XOY, XOY', the location of bubbles to be created for each information to be revealed is moved into the lozenge formed by the two transversal plans P1, P2, in order to obtain common locations of bubbles, defining a common set of bubbles, for the 2 characters to be displayed "0" and "1". This is schematized in figure 4C for the first line OY of the plan XOY and

10 the first line OY' of the plan XOY', said first line being at the bottom of the portion 23. In figure 4C, potential locations into the lozenge are schematized by clear bubbles, while theoretical bubbles for creating different sets of bubbles for each information to be revealed "0" and "1" according to first embodiment are schematized by a bold circle, and the common new set of

15 bubbles, according to the encrypted embodiment, intended to display the two characters "0" and "1", depending on the tilt angle of the document is schematized by dark bubbles. The new locations of bubbles have to be into the viewing axes of the two transversal planes P1 and P2. Figure 4C illustrates that the bottom line OY for drawing the "0" comprises theoretically

20 three bubbles (bold encircled), while the bottom line OY' for drawing the "1" comprises theoretically five bubbles (bold encircled). In this case, the common set of bubbles comprises only five bubbles and not eight, i.e. the greatest number of bubbles between the two lines OY and OY' of the two plans at the same thickness T. These locations of bubbles are moved towards the arrows

25 along lines of potential locations 27 of bubbles into the lozenge of the transversal plans P1, P2 that intersect the two planes XOY and XOY' , so that there is more than one possibility to locate the common set of bubbles. Some of the possible possibilities are shown in figure 4C. Then, these steps are repeated for all the lines OY and OY' of the different plans XOY and XOY', at

30 different thicknesses T of the at least translucent portion 23, from the deepest pixels until the pixels near the surface of the at least translucent portion.

[0040] Figure 5 shows a schematic perspective view of an identification document according to this second encrypted embodiment. The at least translucent portion 23 comprises a common set 28 of bubbles that does not seem to draw anything particularly. However, when tilting the document around the axis A-A perpendicular to the front longitudinal edge E of the document (along plan XOZ), then some interesting information appear and disappear depending on the tilt angle. In the illustrated example, a first character "0" appears at a first angle α_1 , while a second character "5" appears at a second angle α_2 . Before the first angle, a deformed "0" still appears, while between the two angles one can see a deformed information between a "0" and a "5" and after the second angle α_2 a deformed "5" appears.

[0041] All plans used for the realization of the different detailed embodiments that have been described can be not necessary perpendicular between each other and can be placed at different angles of a traditional 3D system comprising axes X, Y, Z and constituted by the borders of the body of the document 10.

[0042] The detailed embodiments that have been described are not limited to those and other embodiments apply without departing the scope of the invention. Particularly, the embodiments have been described for only two different information, but the invention applies also for such embodiments intended to reveal more than two different information depending on the tilt angle. Moreover, the described embodiments comprise an at least translucent portion 23, but the invention applies also for document whose the whole core is at least translucent and at the most transparent.

[0043] Bubbles that are created through the thickness of the translucent portion are easy to produce with an appropriate laser beam and appropriate computing software.

[0044] Moreover, it is possible to create information to be displayed that can be variable from one document to another, depending on personalization data. Indeed, it is possible to create two or more different data and/or images, through the thickness and depth of the translucent portion, said data and/or

images being linked to the personalization information of the legitimate holder of the document.

[0045] Such laser security feature has to be made from the deepest part to the surface of the transparent portion, in order to limit the counterfeiting possibilities. Indeed, it is impossible to create an additional bubble deeper
5 than an existing bubble, the existing bubble interfering on the laser beam and causing particularly a diffraction phenomenon.

[0046] Moreover, such security feature is difficult to copy or modify because placement possibilities are difficult to compute. Finally, concerning
10 the second encrypted embodiment, adding a bubble, in order to modify a first data and/or image, implies to modify the second data and/or image to be revealed. Consequently, the second encrypted embodiment is much more difficult to modify.

CLAIMS

1. Identification document comprising an anti-counterfeiting element able to display different data and/or images when tilting the document,
5 characterized in that said anti-counterfeiting element is created in three-dimensions through the thickness (T) and depth (D) of an at least translucent portion (23, 20) of the document.
2. Identification document according to claim 1, wherein the whole body (20) of the document defines said at least translucent portion.
- 10 3. Identification document according to claim 1 or 2, wherein each data and/or image to be revealed at a predetermined tilt angle is created into a predetermined plan (24 (XOY); 25(XOY')), through the thickness (T) and depth (D) of the at least translucent portion (23, 20), and comprises pixels, each pixel being arranged at predetermined location into said plan (24
15 (XOY); 25(XOY')).
4. Identification document according to claim 1 or 2, wherein all data and/or images to be revealed at different predetermined tilt angles are defined by only one common set (28) of pixels that are arranged at predetermined locations through the thickness (T) and depth (D) of said at least
20 translucent portion (23, 20), so that said common set (28) of pixels enables to display the different data and/or images depending on the tilt angle of the document.
5. Identification document according to anyone of preceding claims, wherein the pixels are formed by bubbles that are created into the material of said
25 at least translucent portion (23, 20).
6. Identification document according to anyone of preceding claims, wherein at least one data and/or image to be revealed at a predetermined tilting angle is linked to personalized information of the legitimate holder of the document.
- 30 7. Method for manufacturing a secure identification document comprising an anti-counterfeiting element able to display different data and/or images

when tilting the document, characterized in that said method comprises the following steps :

- for each data and/or image to be revealed, defining a plan (24 (XOY); 25(XOY')) through the thickness (T) and depth (D) of an at least translucent portion (23, 20),
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 - in each plan (24 (XOY); 25(XOY')), computing amongst several potential locations (27), the location of each pixel of each data and/or image to be revealed, each location inside said plan being more or less deep into the at least translucent portion (23, 20),
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 - creating each pixel at each computed location, starting from bottom to the top of the at least translucent portion (23, 20).
8. Method according to claim 7, wherein the computing step consists in building several transversal plans (P1/A to P1/G) that intersect each defined plan (24 (XOY); 25(XOY')), through the thickness (T) of the at least translucent portion (23, 20), and at separated distance of pixel size,
15
- each built plan (P1/A to P1/G) providing the lines of the pixels to be created at each thickness (T) for each line (OY, OY') of each defined plan (24 (XOY); 25(XOY')).
9. Method according to claim 8, wherein it comprises following additional step: for each thickness (T) of the at least translucent portion (23, 20),
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- moving each computed location of each pixel, of each data and/or image to be revealed, along lines of potential locations (27) into transversal plans (P1, P2) that intersect the defined plans (24 (XOY); 25(XOY')), in order to create a common set (28) of pixels able to display each data and/or image
25
- depending on the tilt angle of the document.
10. Method according to anyone of claims 7 to 9, wherein the step of creation of pixels consists in creating bubbles in place of pixels, by means of a laser beam with short focal distance.
11. Method according to anyone of claims 7 to 10, wherein the step of
30
- computing the locations of pixels of the data and/or images to display consists in computing, for each thickness (T) of the at least translucent

portion (23, 20), said locations, so that when all the computed locations are piled, they form the data and/or images to be displayed.

12. Use of a laser beam with short focal distance for creating bubbles through the thickness (T) and depth (D) of an at least translucent portion (23, 20) of an identification document, so that each bubble defines a pixel of data and/or image to be revealed when tilting said document.
- 5