

(19)



(11)

EP 4 159 466 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
04.09.2024 Bulletin 2024/36

(51) International Patent Classification (IPC):
B42D 25/41 ^(2014.01) **B42D 25/435** ^(2014.01)
B42D 25/455 ^(2014.01) **B42D 25/46** ^(2014.01)
B42D 25/23 ^(2014.01) **B42D 25/305** ^(2014.01)
B42D 13/00 ^(2006.01) **B41M 3/14** ^(2006.01)

(21) Application number: **22199304.1**

(22) Date of filing: **30.09.2022**

(52) Cooperative Patent Classification (CPC):
B42D 25/23; B41M 3/14; B42D 13/00;
B42D 25/305; B42D 25/41; B42D 25/435;
B42D 25/455; B42D 25/46; B41M 5/24

(54) **SECURITY ELEMENT, SECURITY DOCUMENT WITH SECURITY ELEMENT, AND METHOD FOR MANUFACTURING SAME**

SICHERHEITSELEMENT, SICHERHEITSDOKUMENT MIT SICHERHEITSELEMENT UND VERFAHREN ZU DESSEN HERSTELLUNG

ÉLÉMENT DE SÉCURITÉ, DOCUMENT DE SÉCURITÉ AVEC ÉLÉMENT DE SÉCURITÉ ET PROCÉDÉ DE FABRICATION ASSOCIÉ

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR

(72) Inventor: **GAWEL , Kamil**
05-807 Podkowa Lesna (PL)

(30) Priority: **30.09.2021 PL 43910821**

(74) Representative: **Marcinska-Porzuc, Aleksandra**
Kancelaria Patentowa
Ul. J. Słowackiego 5/149
01-592 Warszawa (PL)

(43) Date of publication of application:
05.04.2023 Bulletin 2023/14

(56) References cited:
EP-A1- 2 641 746 DE-A1- 10 006 377
DE-A1- 102019 004 518 US-A1- 2005 095 408

(73) Proprietor: **Polska Wytwarznia Papierow**
Wartosciowych S.A.
00-222 Warszawa (PL)

EP 4 159 466 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

DescriptionField

[0001] This invention relates to a securing element in the form of personalization data placeable on and/or within a security document, which data contains an extra, separate identification entry. Also, this invention relates to a security document comprising a securing element of the invention and a method for manufacturing the security document.

State of the art

[0002] In the field of valuable documents, identifying and/or secured, particularly identity cards, passports, driving licenses, and bank cards, it is known to place, in or on them, one or more securing elements of different types to protect these documents against counterfeiting, replicating or falsifying.

[0003] Valuable documents, identifying documents, and/or security documents, referred to as security documents, comprise personalizing data such as the document owner's name and last name, document number, his/her nationality, place, and date of birth, the document owner's identification number, document date of issue, document validity date, and many other data related to the document type, or distinctive marks. Lasers have been used for many years to personalize documents. Thanks to that, it is possible to make long-lasting and irreversible markings of the document in the form of photolithography or text data, alphanumerical characters, and/or distinctive marks.

[0004] For example, from DE2907004B1, it is known that when personalizing documents, a plastic substrate is blackened using a suitably guided laser beam.

[0005] The document DE 100 06 377 A1 describes a label which can be inscribed with a laser beam, comprises macroscopic and microscopic inscription.

[0006] The document US 2005/095408A1 describes laser engraving methods and compositions, and articles having laser engraving thereon wherein a composition has laser engraving properties and comprise a host material and an effective amount of a laser enhancing additive. The composition can be used during the manufacture of many articles of manufacture, including identification documents.

[0007] From DE102019004518A1, it is known that an identification, security or value document comprises a substantially flat data carrier extending in two main dimensions and one secondary dimension.

[0008] From EP2641746, it is known that a method involves printing a part (IMG1) of pattern i.e. guilloche pattern, on a layer by offset printing process. Another part (IMG2) of pattern is printed on another layer by using a laser printing process, where the latter part of the pattern does not completely cover the former part of the pattern.

[0009] However, documents and methods as in the in-

vention now to be described are neither disclosed nor suggested in these documents.

Summary

[0010] The problem addressed by the present invention is to make the personalizing data extra protection of a security document, being simultaneously recognizable, both visually and tactilely, but simultaneously being difficult to produce and falsify.

[0011] The purpose of the present invention is to make that personalizing data located on and/or within a security document is extra protection of the security document, preferably of the first and second order, thus making it difficult both to remake the original documents as well as to produce a totally false one.

[0012] Thus, the aim of the invention is to place a separate identifying entry into the trace of at least one mark of personalizing data to increase the safety of these documents against scanning, replicating by xerography, and falsifying.

[0013] This aim has been achieved by a securing element, a security document, and a method for manufacturing the security document of the invention.

[0014] This invention relates to a securing element as defined in claim 1.

[0015] The mark of the second personalized marking is one of the following: a letter, a numeral, a geometrical shape, a distinctive mark, or a mark of any shape.

[0016] Preferably, the mark of the second personalized marking may be placed in any arbitrary location on the surface of the mark of the first personalized marking.

[0017] If there is more than one mark, then marks of the second personalized marking may constitute, into the trace of the mark of the first personalized marking, an arrangement and/or a vertical and/or horizontal entry and/or an entry of such a shape that is consistent with the shape of the mark of the first personalized marking in which it is placed.

[0018] The same single mark of the second personalized marking may reoccur into the trace of at least two marks of the first personalized marking, or a single different mark of the second personalized marking is placed into the trace of each of the at least two marks of the first personalized marking.

[0019] Optionally, the same marks of the second personalized marking reoccur into the trace of at least two marks of the first personalized marking in the same or different order and/or in the same or different arrangement and/or entry. Also, different marks of the second personalized marking may be placed into the trace of at least two marks of the first personalized marking in the same or different arrangement and/or entry.

[0020] Preferably, a single arbitrary mark of the second personalized marking is placed in the mark of the first personalized marking, which, together with the remaining single arbitrary marks of the second personalized marking placed in other selected marks of the first personal-

ized marking, creates the first identification entry. However, it is also possible that the marks of the second personalized marking, which are collectively constituting the first identification entry, are placed in arbitrarily selected marks amongst all the marks of the first personalized marking. Alternatively, it also is possible to place the marks of the second personalized marking that collectively make the first identification entry within all the marks of the first personalized marking. Preferably, the first identification entry is created by all marks of the second personalized marking, which are arranged in arbitrarily selected marks amongst all the marks of the first personalized marking. Optionally, the marks of the second personalized marking, which are collectively constituting the first identification entry, are placed in a single arbitrarily selected mark amongst all the marks of the first personalized marking. The marks of the second personalized marking are the same, different marks, or any arbitrary combination thereof.

[0021] Preferably, the first identification entry is created by at least one mark of the second personalized marking placed in one and/or many marks of the first personalized marking being a repetition of the first personalized marking entirely or partially. Also, the first identification entry is created by marks of the second personalized marking, which are personalized for the owner of the given security document.

[0022] Preferably, a mark of the second personalized marking is a micro mark.

[0023] Preferably at least one mark of the first personalized marking is placed into the surface of at least one engrave-able layer of the security document by means of a laser beam, which is visible as irreversible changes in the optical properties of the security document caused by the laser beam.

[0024] Preferably, the convexity of a mark and/or a series of marks of the second personalized marking is from 0.02 mm to 0.3 mm, and the sides of the mark and/or marks of the second personalized marking have a semicircular or polygonal cross-section shape.

[0025] Also, this invention relates to a security document comprising a securing element as described above, comprising a substrate and of any number of additional layers making a consistent inseparable unity, the securing element constituting a built-in fragment of the layer in the structure of the security document. The substrate may be at least one layer that can be laser-engraved, or more preferably, at least one white polycarbonate foil that can be laser-engraved. Also, the substrate may have any laser-engraved layers and/or additional layers.

[0026] Preferably, the substrate may have regions of different colors beneath the first personalized marking. Also, an ink layer may be placed between the substrate and the transparent layer.

[0027] Also, this invention relates to a method for manufacturing a security document as defined in claim 12.

[0028] Preferably, the marking process is executed using a marking laser in which the pulse spot is of small

dimensions. Preferably, the mark of the second personalized marking is produced by means of a laser beam by suitably concentrating points marked with the laser. The better the quality of the laser beam and the smaller the pulse spot, and the more precise the scanning head, the smaller and clearer the mark of the second personalized marking is.

[0029] The securing element of the invention is a first personalized marking and a second personalized marking. The second personalized marking is entirely contained within the surface of the first personalized marking. According to the invention, the first personalized marking is any personalizing data produced by laser engraving onto/within the security document during the personalization process of the given document. For example, this data may identify the document owner, like the document owner's identification number, country of origin, city, and date of birth. The personalizing data includes all text data and/or alphanumerical and/or distinctive marks placed onto or within the document and required for the security document of the given type. According to the invention, a mark of the first personalized marking is at least one letter "A" and/or numeral and/or distinctive marking. Marks of the first personalized marking may be a series of arbitrarily connected marks in the form of text or alphanumerical characters and/or distinctive marks. Preferably, marks of the first personalized marking are produced by blackening the substrate and/or at least one additional layer during the process of laser engraving (marking). The second personalized marking may be at least one mark, for example, in the form of a letter, a numeral, a geometrical shape, a distinctive marking, or a mark of any shape. For example, it may be an asterisk, a line, a zigzag, a butterfly, a building, or a plant. Also, the second personalized marking may be constituted by marks creating a series of arbitrary marks and/or a series of personalized marks created by numbers, numerals, distinctive marks, marks of any shape, and/or a combination thereof.

[0030] In the sense of the present invention, the term "slightly convex" or "convex" second personalized marking means that mark (marks) of the second personalized marking is (are) convex, slightly palpable tactilely, or barely palpable tactilely.

[0031] Preferably, the height of the first personalized marking is from 1 mm to several dozen mm, for example, 10 mm, preferably from 1.5 mm to 2.5 mm. The height of the second personalized marking is from 0.1 mm to 0.5 mm, preferably from 0.2 mm to 0.3 mm. The heights of the marks of the second personalized marking depend on the amount of the markings or the lengths thereof.

[0032] So, one mark and/or series of marks of the second personalized marking may be written into one mark of the first personalized marking. The mark, marks, or series of marks of the second personalized marking may be placed in any arbitrary location within the surface of at least one mark of the first personalized marking. The terms "within the surface" and "into/on the trace" of the

mark are used interchangeably. The second personalized marking is placed in a trace of a mark of the first personalized marking on its outer surface. Optionally, a mark, marks, or a series of marks of the second personalized marking creates, into the trace of a mark of the first personalized marking, a vertical and/or horizontal entry, and/or it has a shape that is consistent with the mark it is placed in. Also, the mark and/or marks of the second personalized marking may be arranged arbitrarily. They may be arranged in rows and/or columns vertically, horizontally, or obliquely.

[0033] According to the invention, at least one mark, or marks or a series of marks of the second personalized marking placed on at least one mark of the first personalized marking creates a first separate identification entry - also referred to as a first identification entry or identification entry. For example, the first identification entry may be any vector graphic, any distinctive marking, a mark of any shape, or any letter or numeral. Also, the first identification entry may be personalized data that is not placed on/within the security document. The personalized data in the sense of the present invention is data related to the owner of the security document, and it may be, for example, the first letter of the name or the last name of the security document owner, the owner's initials, his/her identification number, the day, month, and year of birth, the document owner's full name and/or last name, etc., or a part of this data. Also, the first identification entry may be a reoccurred piece of personalized data or several arbitrarily selected pieces of data that are placed on/within the security document, such as passport number, number of the given document, the document owner's identification number, his/her date of birth, the document owner's name or last name, etc., or a part of this data. Also, the identification entry may be created by a single mark of personalizing data or several selected marks of the personalizing data placed in/on the security document. For example, it may be data selected according to adopted rules - every second mark, every third mark out of the name and last name of the document owner, and/or out of the document number. Also, it may be randomly selected marks of the personalizing data. According to an embodiment of this invention, the first identification entry may be arbitrarily selected marks personalized for the given document owner, including a password he/she selected, a pin number, an individual code, and/or any data or name. According to an embodiment of this invention, the first identification entry may be constituted by arbitrarily selected alphanumerical and/or text marks and/or distinctive marks, including marks selected randomly. Also, it is possible that the first identification entry is at least one identical mark and/or identical marks and/or a series of identical marks of the second personalized marking placed in every mark, in selected marks, or only in selected at least one mark of the first personalized marking. All the marks that make the first identification entry may be placed in a single one arbitrarily selected mark of the first personalized marking.

Optionally, the first identification entry is created by marks of the second personalized marking spanning all the marks or only across a part of the marks of the first personalized marking. So, any part of the marks of the second personalized marking constituting the first identification entry may be written into the first mark of the first personalized marking, whereas a subsequent part of the marks of the second personalized marking constituting the first identification entry is written into the trace of subsequent following each other marks of the first personalized marking. Thus, marks of the second personalized marking may be placed on at least two marks of the first personalized marking and all the marks of the first personalized marking. Also, they may be placed only on arbitrarily selected marks of the first personalized marking, for example, on marks of the first personalized marking selected in any arbitrary order or on marks selected in an even or uneven order, or in every second, every third mark of the first personalized marking, etc. Also, the number of marks of the first personalized marking, into which the marks of the second personalized marking are written, is arbitrary. However, irrespective of the number of marks of the first personalized marking, into which the marks of the second personalized marking are written and/or registered, they create together the first identification entry. The marks constituting the first identification entry may constitute logical entry and/or abstractional entry. The term logical entry is to be understood as a commonly known word, document number, ID number, reoccurred personalized data or a part thereof, a code known to the owner, a pin number, a password, distinctive marks, a number, or another data, etc. The term abstractional entry is to be understood as a group of arbitrarily randomly selected text and/or alphanumerical marks and/or distinctive marks.

[0034] The ratio of the dimension of the mark of the first personalized marking to the dimension of the mark of the second personalized marking may be, for example, at least 25:1, preferably 7.5:1, and most preferably 5:1. However, it is obvious that the ratio of the dimensions may vary widely. It depends, for example, on the font type and boldening (maximum micro text size relative to the whole mark of the first personalized marking). Every case of personalized markings placed on/within the security document may have different individual dimensions.

[0035] The elements that constitute the first and second personalized marking are interchangeably referred to as a mark, marks, or a series of marks, where a series of marks is created by at least two marks. A mark, marks, or a series of any arbitrary and/or personalized marks of the second and personalized markings, are, preferably, micro marks. Marks or a series of marks may be placed in a mark of the first personalized marking in any arbitrary location, arbitrary order, and an arbitrary arrangement.

[0036] The personalizing data is placed on the substrate of the security document. The substrate, in the sense of the present invention, is a layer of the security

document onto which the first personalized marking is placed. According to the invention, the substrate may be both the upper layer of the document, which can be laser-engraved, or any inner layer of the document. Also, the substrate may be created by any number of layers that can be laser-engraved. Preferably, at least one upper layer is laid onto the substrate.

[0037] The proposed solution may be employed on various substrates that are in use in documents. The substrate may be a material free of outer protective layers, i.e., for example, it may be a paper substrate, a paper-like and/or made from paper-like materials like Teslin, as well as any polymer substrate such as polycarbonate (PC) and/or PVC (poly(vinyl chloride)) and/or polyester (e.g., poly(ethylene terephthalate) (PET)), and/or polyolefins, e.g., polyethylene (PE), polypropylene (PP) and/or acrylonitrile/butadiene/styrene copolymer, (copolymer) ABS and/or polyurethane (PU) and/or polyether ether ketone (PEEK), and combinations thereof. These materials may be used to produce additional layers, such as transparent layers and a white layer that can be laser-engraved.

[0038] The security document may have any structure, i.e., any thickness, any number of layers making the document, and any arrangement of the layers. However, at least one of the document layers is a layer that can be laser-engraved. According to the invention, the document structure preferably has at least two layers that can be laser-engraved, yet more preferably, all the layers can be laser-engraved.

[0039] Preferably, the document structure has at least one white layer that can be laser-engraved, for example, made from polycarbonate foil. Preferably, there are two white layers. The first personalized marking is placed on the white foil layer and on transparent foils that are located above it. Also, the first personalized marking may be placed only on the substrate or on the substrate and foils located below the substrate and on foils located above the substrate. Optionally, it is possible that the document structure only consists of transparent layers, including at least one laser-engraved layer. The term substrate in the sense of the present invention is understood widely. It can be a single layer that can be laser-engraved or a stack of many such layers, also layers that can be or not laser engraved. The layers may be transparent or white.

[0040] The substrate may be printed with ink for offset printing, relief printing, flexographic printing, or ink printing. Also, the ink may have optically changing properties, as well as fluorescent properties.

[0041] Preferably, the whole surface of the substrate may be printed with ink of the same color. Optionally, the fragment of the substrate on which the first personalized marking is located has a different color than the remaining part of the substrate of the document. According to yet another embodiment, the substrate below every mark of the first personalized marking may have another color. The term another color of the substrate is understood as

a single uniform color of imprinting or a multi-color combination- colored lines, zigzags, asterisks, etc.

[0042] The marking process is carried out by scanning with a laser beam according to a prepared layout in which marks of the second personalized marking are placed within basic marks, i.e., marks of the first personalized marking. A classical marking, blackening, or tactile marking tactilely palpable may be achieved when using a combination of process parameters with a similar power applied throughout the process. Optimally, these are the maximum speed and frequency of the laser and spacing of individual lines of the object filling combined with the appropriate laser power output. In the case of marking with the marks of the second personalized marking within the given mark of the first personalized marking, the optimization (depending on the system's precision) is shifted. With the same frequencies of the laser, it is preferable to perform the marking process with a lower speed and smaller spacings between the lines of the object filling, such as to obtain a higher density of points. Even if neighboring points overlap significantly, an appropriate blackening effect and convexity of the second personalized marking are obtained by adapting the laser power suitably.

[0043] The first personalized marking may be at least one mark of the personalizing data placed on or into the given document by laser engraving, which identifies the document owner or the given document.

[0044] A securing element is located on and/or in the security document. The securing element is constituted by the first personalized marking and the second personalized marking.

[0045] The second personalized marking written into the trace of the first personalized marking constitutes the first identification entry. According to the invention, a second personalized marking is placed on the first personalized marking in the form of at least one darkened mark. At least one mark of the second personalized marking is located on the trace of at least one mark of the first personalized marking. The second personalized marking may also be convex; preferably, it may give an effect of a slight convexity such that the second personalized marking may be palpable tactilely. Also, it is possible that this effect is weak or barely palpable due to the size of the second personalized marking. The second personalized marking is weakly visible when looking directly and more visible at an angle. According to the present invention, both the first and second personalized markings have the same color. It results from blackening the substrate and/or additional layers. Optionally, the first personalized marking has a brighter color than the second personalized marking or not differing much; for example, the first marking is gray, and the second marking is black. Optionally, the second personalized marking has another brighter color than the first personalized marking.

[0046] The process of marking a mark of the first personalized marking is performed in a way known in the art. Then, using appropriately selected parameters of

power speed and density of pulses, the second personalized marking is marked on the trace of the first marking, wherein the substrate on the trace of the second marking may be additionally blackened and made slightly convex. This embodiment may be obtained in such a manner that when performing the marking process with appropriately selected laser parameters, the substrate and/or at least one upper layer (outer) is subjected to a slight foaming - a convexity is obtained in this spot.

[0047] The convexity of at least one mark and/or a series of marks of the second personalized marking may be from 0.02 mm to 0.3 mm, preferably from 0.1 mm to 0.3 mm. The sides of the mark and/or marks of the second personalized marking may have a semicircular or polygonal cross-section shape.

[0048] The marking process, or a process of personalizing a security document with personalization data in the form of text and/or alphanumeric and/or distinctive marks, i.e., producing a first personalized marking, is carried out on the white foil layer and on transparent foils placed above it. Preferably, the marking process is carried out on a ready document that consists of many foil layers after laminating and constitutes a uniform inseparable whole. The present solution may also be applied with engrave-able paper or paper laminated with a plastic foil that creates a uniform inseparable whole. Also, the marking process may be performed on a printed substrate.

[0049] The solution of the invention may be realized with infrared, RGB, or UV pulse lasers. The better the quality of the laser beam and the smaller the spot, and the more precise the scanning head, the smaller and clearer the proposed second personalized marking may be. Depending on the size of the mark or the whole text of the second personalized marking, the second personalized marking may be observed with the naked eye or under magnification. The second personalized marking may be placed in a document personalization text of a typical size, i.e., 2.5 mm or smaller, for example, in a text of a height of 1.25 mm. As mentioned above, it depends on the laser design and on a proposed embodiment. The ratio of the dimension of a mark of the first personalized marking to the dimension of a mark of the second personalized marking is at least 25: 1, preferably 7.5:1, and most preferably 5:1. The ratio results from the ratio of the trace part of a letter to the whole letter. Depending on the selected fonts, the solution may have another ratio.

Definitions

[0050] According to the invention, the term security document is understood as any document, such as personal documents, driving licenses, passports, and also other valuable and security documents, and data media being media for safe data registration and storage.

[0051] For a better understanding, the embodiments described in the following examples are reduced to significant basic information, and the illustrations shown in

the figures are very schematical and do not reflect real conditions. First, the proportions shown in the figures do not correspond to real conditions and only serve for illustrating purposes. It should be emphasized that the drawings neither reflect the actual colors of the personalized markings placed on the security document. The colors in the drawings only serve to distinguish individual elements shown in these drawings. In practical realization, one may use much more complex patterns and pictures made in a single color or multi-colored. The same relates to engravable structures. The examples of information presented in the following examples may be replaced with complex and combined graphical/text information.

[0052] The terms "first" and "second," as used in the specification and the patent claims, are only intended to distinguish similar elements and not to dictate any sequential or chronological order. One should understand that terms used in this way are interchangeable in particular circumstances and that the embodiments of the present invention described in this document may function in other sequences than described or illustrated in the present document.

[0053] Also, the references to colors - first/second color - aim to distinguish coloristic elements. Simultaneously, all the described embodiments related to a single coloristic sequence are suitable for every coloristic sequence. If a solution for a single coloristic sequence has been indicated in the specification, it also means that it is appropriate for any other coloristic sequence. If no colors are referred to in the specification, it means that the given solution is valid for any other coloristic sequence. It relates to coloristic variants of the substrate and the first and second personalized marking.

[0054] The same single mark of the second personalized marking denotes the same identical letter, numeral, geometrical shape, distinctive marking, or mark of any shape.

[0055] A single different mark of the second personalized marking denotes another, different, not the same, nonidentical letter, numeral, geometrical shape, distinctive marking, or mark of any shape.

[0056] A single arbitrary mark of the second personalized marking either denotes the same single mark or a single different mark of the second and/or third personalized marking.

[0057] Marks or a series of marks of the second personalized marking denotes any number of single arbitrary marks, i.e., any number of the same and/or different single marks of the second personalized marking. The number of marks of the second personalized marking is selected according to the planned personalization of the security document.

[0058] The same marks of the second personalized marking denote at least two of the same single marks of the second personalized marking, and a multiplicity of the marks is possible, for example, PP, XXXX, >>>, ?????.

[0059] Different marks of the second personalized

marking denote at least two single different marks of the second and/or third personalized marking, for example, POL, 567, POL%*&, PP678, "KAMIL," POL567&*>><<. It means that in every selected arbitrary mark of the first and/or second personalized marking, another mark or a series of marks is written.

[0060] Marks of both the first and second personalized marking are selected according to the planned personalization of the security document.

[0061] Examples show preferred embodiments that in no way are intended to limit the scope of the invention. In particular, different embodiments are not limited to the described forms, and their combinations may be employed to obtain still better results.

[0062] The present invention will be better understood and appreciated when after reading the following detailed description with reference to the drawing in which:

Fig. 1 shows a simplified plan view of a security document comprising a securing element;

Fig. 2 shows a mark of a first personalized marking with a series of marks of a second personalized marking placed on the first marking in the form of the word "KAMIL";

Fig. 3 shows a cross-section along the line F-F of Fig. 2, showing the word "KAMIL" constituting the second personalized marking placed on a mark of the first personalized marking;

Fig. 4 shows a cross-section of a mark of the second personalized marking in the form of the letter "L" of the word "KAMIL" of Fig. 2 in a first variant of realization;

Fig. 5 shows a cross-section of a/the mark of a/the second personalized marking in the form of the letter "L" of the word "KAMIL" of Fig. 2 in the second variant of realization;

Fig. 6 shows a section of a cross-section of a security document with a securing element contained therein in the form of a single mark of the first personalized marking with a series of marks of the second personalized marking in the form of the word "KAMIL" placed therein, that constitutes the first separate identification entry.

[0063] The following description presents examples of the realization of a securing element of a security document and a method for manufacturing the securing element composed of personalized markings written into personalizing data located on and/or in the document, thanks to which various effects securing the documents are obtained. However, it must be emphasized that the examples described below are not intended to limit the scope of protection and only illustrate one of many pos-

sible uses of the present invention. The present invention may be employed in any application in which a personalized laser marking is needed that gives additional protection for the document.

Detailed description

[0064] In one embodiment, a security document has the form and format of a card, such as an identity card. In alternative embodiments, another data medium may function as the security document, e.g., inserts for passports, chip cards, smart cards, personal documents, driving licenses, other valuable and security documents, and data media being media for safe data registration and storage.

[0065] Fig. 1 shows a security document 100 according to the invention with various securing means. The securing means are elements that increase the safety against counterfeiting the security document. For example, personalization may be applied on/within the security document 100, having the form of the document owner's photograph (not shown in the drawing) and/or in the form of personalization data that, preferably, is produced by means of printing or laser engraving in a layer of the security document 100 that is laser active or sensitive. This data identifies the document owner's, for example, name and last name, the document owner's identification number, document number, country of origin, place/date of birth, etc. So, this is data that is placed onto or within the document and is required for the security document of the given type. The security document 100 may also contain electronic components such as an RFID transponder, chip modules, antennas for dual-interface modules, or a hologram. These securing means are not shown in the drawing since it is not a matter of the present invention. The security document 100 comprises a securing element 301 composed of a first personalized marking 302, into which, on its surface, a second personalized marking 304 is entirely placed, constituting the first identification entry.

[0066] The first personalized marking 302 is composed of at least one mark 303 or a series of marks 303 that is/are placed on the substrate 110 of the security document 100. According to the invention, the first personalized marking 303 is constituted by at least one letter, numeral, distinctive marking, or a series of arbitrarily connected marks in the form of text or alphanumerical characters and/or distinctive marks. The second personalized marking 304 may be constituted by at least one mark 308, for example, in the form of a letter, a numeral, a geometrical shape, a distinctive marking, or a mark of any shape, for example, it may be an asterisk, a line, a zigzag, a butterfly, a building, a plant, or any combination thereof. The first personalized marking 302, along with the second personalized marking 304, produces an optical and/or tactile effect and also constitutes the first identification entry, making the securing element 301. The first identification entry is an additional separate identifi-

cation entry in the securing element 301. The first laser personalized marking 302 and the second laser personalized marking 304 can be assessed both visually and automatically. The visual assessment is done using the human eye.

[0067] The substrate 110, 110a may be made from plastic material, for example, polycarbonate (PC) or polyester. The substrate may be composed of transparent or white foil or a combination of transparent and white foils, but also only from transparent foils. The substrate in the meaning of this invention also may be paper laminated with PC or PCV foils. The foils may have different thicknesses ranging from 30 to 300 μm . Optionally, at least one printing ink layer may be applied onto the substrate. Then, according to the invention, the substrate 110, 110a takes the color of the printing ink layer. It may be printed with currently available printing techniques, for example, offset printing, relief printing, ink printing, screen printing, spraying, or pad printing. The thickness of the printing ink layer is, for example, from 5 to 20 μm , preferably from 5 to 10 μm . Any number of additional layers may be placed onto the substrate 110, 110a on both sides thereof.

[0068] Fig. 2 shows the securing element 301 placed in the security document 100. The securing element 301 is constituted by the first personalized marking 302 and at least the second personalized marking 304 entirely written within the surface of the first personalized marking 302, constituting together a first identification entry. On the surface of the first personalized marking 302, the second personalized marking 304 is placed in the form of at least one mark 308. The second personalized marking 304 may be convex, and also it may, preferably, give an effect of a slight convexity such that the second personalized marking 304 may be palpable tactilely. Also, it is possible that due to the size of the second personalized marking 304, this effect is weak or barely palpable. According to the invention, the second personalized marking 304 is weakly visible when looking directly and more visible at an angle.

[0069] Fig. 2 shows a schematical view of the mark 303 of the first personalized marking 302 in the form of the letter "P" of Fig. 1, along with the second personalized marking 304 in the form of the word "KAMIL" which is entirely located on the first personalized marking. Every letter of the word "KAMIL" corresponds to a single mark 308, 308a-308d of the second personalized marking 304. The marks 308-308d of the second personalized marking 304, for example, in the form of the word "KAMIL," may be placed in each or only in selected marks 303 of the first personalized marking 302 shown in Fig. 1: "KAMIL" XXX POL >>>KI597568. Also, the same word "KAMIL" or only its single letter, or a part of it may be located in every mark 303 of the first personalized marking 302 of Fig. 1. Optionally, any arbitrary marks 308, 308a-308d of the second personalized marking 304 may be placed in selected marks 303 of the first personalized marking 302.

[0070] Fig. 3 shows a cross-section of the word "KAMIL," of Fig. 2 taken at the mark's base. In this case, the projecting regions, referred to as "posts," are the convex marks 308 of the second personalized marking 304.

5 Thus, the first mark 308 of the second personalized marking 304 corresponds to the letter "K," the second mark 308a corresponds to the letter "A," the third mark 308b corresponds to the letter "M," the fourth mark 308c corresponds to the letter "I," and the fifth mark 308d corresponds to the letter "L."

10 **[0071]** The marks 308, 308a-308d of the second personalized marking, written entirely into the trace of marks 303 of the first personalized marking 302, constitute the first identification entry. In the present embodiment, the first identification entry has the form of the word "KAMIL" located in the letter "P" of Fig. 1 - a mark 303 of the first personalized marking 302.

15 **[0072]** Preferably, marks 308, 308a, 308b, 308c, 308d of the second personalized marking 304 are micro marks.

20 **[0073]** Both the first personalized marking 302 and the second personalized marking 304 have the same color - for example, blackened. However, it is possible that the first personalized marking has a first color - for example, a brighter color than that of the second personalized marking 304, or not differing much. Optionally second personalized marking has a brighter color than the first personalized marking.

25 **[0074]** Preferably, the first personalized marking 302 is blackened due to laser engraving, and the second personalized marking 304 is additionally engraved, so it is convex.

30 **[0075]** The convexity of at least one mark 308 and/or marks 308, 308a, 308b, 308c, 308d of the second personalized marking 304 may be several hundred micrometers high, preferably from 0.05 mm to 0.5 mm. The sides of a mark 308 and/or a series of marks 308, 308a, 308b, 308c, 308d of the second personalized marking 304 may have polygonal cross-sections of slightly semicircular sides (Fig. 4) or may have semicircular cross-sections (Fig. 5).

35 **[0076]** Fig. 6 schematically shows a cross-section of a security document 100 composed of a stack of foil layers of various dimensions and colors. Preferably, the substrate 110, 110a is a layer made from polycarbonate, poly(vinyl chloride), polyester, or derivatives thereof in various combinations. The remaining layers of the security document 100 are nontransparent or transparent foils 111, 112, 114 from polycarbonate, poly(vinyl chloride), polyester, or derivatives thereof, and their number depends on the safety means and graphics to be used. According to the invention, depending on the version and size of the solution, one may also use engravable paper or paper laminated with plastic foil or similar materials, e.g., Teslin. The securing element 301 is applied onto the substrate, preferably the substrate 110, 110a, in the form of at least one engravable foil, preferably white, and yet more preferably at least two white engravable foils. Also, it is possible to use transparent foils as the substrate

110, 110a. Also, an ink layer may be applied onto the foils, for example, an offset or inkjet ink, preferably of a thickness from 10 to 20 μm , preferably from 5 to 10 μm .

[0077] According to the invention, the security document 100 may, for example, be composed of a stack of layers, starting from above: a transparent layer 111, two layers of white polycarbonate foil that constitute the substrate 110, 110a, and subsequent two transparent layers 112, 114 applied one on the top of the other. This structure of the document 100 is subjected to a merging process, for example, lamination.

[0078] After applying additional securing elements, which are not the subject matter of the present invention, the structure of the document 100, created in any arbitrary manner, is subjected to a merging process in a temperature from 130 to 210°C, preferably from 140 to 200°C. Also, the layers may be merged with the substrate 110, 110a by lamination, welding, gluing, fusing, etc. The engraving/markings process is carried out after the merging process on the laminate produced by merging the foil layers, having the form of the security document 100. This process is carried out on a ready-to-use security document 100 that, after being laminated, is a uniform inseparable whole.

[0079] According to the invention, the marking process is performed using a pulse marking laser, in which the spot is of small dimensions, and the beam is guided by means of a precise scanning head. The laser beam is guided according to predefined graphics with personalization data. Additionally, it is necessary to concentrate individually laser-marked points, such as to obtain an appropriate resolution and, in consequence, the quality of the picture. In the sense of the present invention, the picture may be any graphics, in particular alphanumerical or text marks defining the first personalized marking, and text or any other marks, or vector graphics defining the second personalized marking.

[0080] Embodiments of the invention may be produced with infrared, RGB, or UV pulse lasers. The better the quality of the laser beam and the smaller the spot and more precise the scanning head, the smaller and clearer the proposed mark 308 of the second personalized marking 304 may be. Depending on the size of the first personalized marking 302, the mark 308 of the second personalized marking 304 may be observed with the naked eye or under magnification. At least one mark 308 of the second personalized marking 304 may be placed in typically sized marks of personalization data of security documents 100, which correspond to the first personalized marking 302, or in smaller marks of the first personalized marking 302, for example, of a height of 1.25 mm. As mentioned above, it depends on the laser design and a proposed embodiment.

[0081] After the merging and marking process, the securing element 301 is a built-in and infringement-resistant fragment of a layer within the structure of the security document 100.

[0082] Fig. 6 schematically shows a section of a cross-

section of the security document 100 with the securing element 301 with the above-described structure of the security document 100, according to the embodiment of the invention of Fig 2. The securing element 301 is placed on the substrate 110, 110a, which is composed of two layers of laser-engravable white polycarbonate foils. The marking is produced within an upper layer, for example, in the transparent layer 111 placed on the substrate 110. The mark/marks 303 of the first personalized marking are also produced by blackening the substrate 110 and/or the second substrate layer 110a and/or the upper transparent layer 111, 114, wherein the upper layer may be constituted by many layers. Fig. 6 shows, for example, in black, one mark 303 corresponding to the letter "P" of the first personalized marking 302 of Fig. 1 or Fig. 2. The mark 303 of the first personalized marking 302 is produced by blackening. In its trace, i.e., on the outer surface of this mark 303, the second personalized marking 304 is entirely located in the form of marks: 308, 308a, 308b, 308c, 308d of the second personalized marking 304, which also have been shown in the drawing in black. The series of marks 308, 308a, 308b, 308c, 308d of the second personalized marking 304 of Fig. 6 corresponds to the name "KAMIL." According to Fig. 6, the mark 308 of the second personalized marking 304 corresponds to the letter "K," the mark 308a corresponds to the letter "A," the mark 308b corresponds to the letter "M," the mark 308c corresponds to the letter "I," and the mark 308d corresponds to the letter "L." When observing the security document 100 under magnification, the human eye receives the color of the first personalized marking 302 and the word "KAMIL," written into at least one mark 303 of the first personalized marking 302, constituting the second personalized marking 304, is barely visible. The first personalized marking 302 and the word "KAMIL" are written into at least one mark 303, here, the letter "P" is the first separate identification entry according to the invention. The securing element 301, in the form of a series of marks 308, 308a, 308b, 308c, 308d corresponding to the name "KAMIL" of the second personalized marking 304 written into the mark 303 of the first personalized marking 302, constitutes a built-in fragment of a layer in the structure of the security document.

[0083] During the marking process of the first personalized marking, the substrate and/or at least one upper layer is subjected to blackening. In the process of marking the second personalized marking, the substrate in the trace of the second personalized marking becomes additionally blackened and becomes slightly convex, causing a convexity of the mark 308, 308a, 308b, 308c, 308d of the second personalized marking 304. Hence, the mark/marks 308-308d of the second personalized marking 304 has/have the same color as the mark/marks of the first personalized marking 302. Therefore, the mark/marks 308-308d of the second personalized marking 304 is/are weakly/barely visible on the mark 303 of the first personalized marking 302. Optionally, it is possible to slightly differentiate the color scheme between

the marks 303 of the first personalized marking 302 and the marks 308-308d of the second personalized marking 304. For example, one may choose the color scheme black-gray. The location of the mark/ marks 308-308d of the second personalized marking 304 on the mark 303 of the first personalized marking 302 is palpable tactilely. Therefore, also the securing element 301 is palpable tactilely.

[0084] According to the method of the invention, firstly, the relevant graphics is prepared in the form of personalization data. Then, the first personalized marking 302 is prepared, using the appropriate parameters of UV lasers in a wavelength range from 150 nm to 380 nm, visible light lasers in a wavelength range from 400 nm to 720 nm, or infrared lasers of wavelengths from 0.8 to 3.3 μm . Then, the second personalized marking 304 is produced due to the laser irradiation in the following laser pass using appropriate laser parameters. Thereby, one may obtain such a change of the material - of at least one upper layer 111, 114 or the substrate 110, 1 10a, depending on the structure of the security document 100 - that raises the region directly affected by the laser, making a palpable tactile convex second personalized marking 304. Depending on the side of the security document 100 that is processed, the upper layer may be any outer layer 111, 114 of the structure of the document 100. Also, the selected laser power is important and depends on the intended shades of the first personalized marking 302 and the second personalized marking 304, the power being higher or smaller than that used when producing the first personalized marking 302.

[0085] According to the invention, marks 108, 208 of the second personalized marking 104, 204 are marked with a slower laser speed, increasing the resolution and concentrating pixels and having a smaller spacing of lines between subsequent rows of the marking laser passes.

References in the figures:

[0086]

100	security document
110	substrate layer
110a	second substrate layer
111	foil / additional layer
112	foil / additional layer
114	foil / additional layer
116	mark in the third personalized marking in the first and second embodiments
301	securing element in a third embodiment
302	the first personalized marking in a third embodiment
303	mark in the first personalized marking in a third embodiment
304	second personalized marking
308	mark in the second personalized marking
308a	mark in the second personalized marking

308b	mark in the second personalized marking
308c	mark in the second personalized marking
308d	mark in the second personalized marking

5

Claims

1. A securing element (301) placeable on a substrate (110, 110a) of a security document (100) comprising at least one mark (303) of a first personalized marking (302) in the form of personalized alphanumeric data and/or text data and/or distinctive marking, and at least one mark (308-308d) of a second personalized marking (304), that is entirely contained within the trace of at least one mark (303) of the first personalized marking (302) constituting the first identification entry, wherein the at least one mark of the first personalized marking and the at least one mark of the second personalized marking have been produced by means of a laser beam, **characterized in that** the mark (308-308d) of the second personalized marking (304) is located on the surface of the mark (303) of the first personalized marking (302) and is slightly convex.
2. The securing element according to claim 1, wherein the mark (308-308d) of the second personalized marking (304) is one of the following: a letter, a numeral, a geometrical shape, a distinctive mark, or a mark of any shape.
3. The securing element according to claims 1 or 2, wherein the mark (308-308d) of the second personalized marking (304) is located in any arbitrary place on the surface of the mark (303) of the first personalized marking (302).
4. The securing element according to claims 1 or 2 or 3, wherein the marks of the second personalized marking (304) create, into the trace of the mark (303) of the first personalized marking (302), an arrangement and/or a vertical and/or horizontal entry and/or an entry of such a shape that is consistent with the shape of the mark (303) of the first personalized marking (302) in which it is placed.
5. The securing element according to claim 1, wherein the convexity of the mark and/or the series of marks (308-308d) of the second personalized marking (304) is from 0.02 mm to 0.3 mm, and the sides of the mark and/or marks (308-308d) of the second personalized marking (304) have semicircular and/or polygonal cross sections.
6. The securing element according to claim 1, wherein the same and/or different marks (308-308d) of the second personalized marking (304) reoccur in the trace of at least two marks (303) of the first person-

- alized marking (302) in the same or different order and/or in the same or different arrangement and/or entry.
7. The securing element according to claim 1, wherein a single arbitrary mark (308-308d) of the second personalized marking (304) is placed in the mark (303) of the first personalized marking (302), that, together with the remaining single arbitrary marks (308-308d) of the second personalized marking (304) placed in other selected marks (303) of the first personalized marking (302), constitutes the first identification entry. 5
 8. The securing element according to claim 1, wherein the first identification entry is created by all marks (308-308d) of the second personalized marking (304) that are arranged in arbitrarily selected marks (303) amongst all the marks (303) of the first personalized marking (302). 10
 9. The securing element according to claim 1, wherein marks (308-308d) of the second personalized marking (304) that are collectively constituting the first identification entry are placed in a single arbitrarily selected mark (303) amongst all the marks (303) of the first personalized marking (302). 15
 10. The securing element according to claim 1, wherein the first identification entry is constituted by at least one mark (308-308d) of the second personalized marking (304) located in a single one and/or many marks (303) of the first personalized marking (302) and being a reoccurrence of the first personalized marking (302) as a whole or its part. 20
 11. A security document (100) comprising the securing element (301) according to claims 1-10, comprising a substrate (110, 110a) and any number of additional layers (111, 112, 114), making a consistent inseparable unity, wherein the securing element (301) constitutes a built-in fragment of a layer in the structure of the security document (100), wherein the substrate (110, 110a) is constituted by at least one layer that can be laser-engraved. 25
 12. A method for manufacturing a security document (100) with a securing element (301) comprising the following steps: 30
 - a) merging at least one layer of a substrate (110, 110a) with any number of additional layers (111, 112, 114) into a consistent inseparable structure of the security document (100);
 - b) placing at least one mark (303) of the first personalized marking (302) in the form of personalized alphanumeric data and/or text data and/or distinctive marking into at least the sur- 35
- face of the substrate (110, 110a) by means of a laser beam,
- c) marking, by means of a laser beam, at least one mark (308-308d) of the second personalized marking (304) entirely within the surface of at least one mark (303) of the first personalized marking (302), the at least one mark (308-308d) of the second personalized marking (304) constituting the first identification entry, wherein the substrate (110, 110a) and/or at least one additional layer becomes additionally blackened during marking the mark (303) of the first personalized marking (302) and becomes slightly convex causing a convexity of the mark (308-308d) of the second personalized marking (304).
13. The method for manufacturing the security document (100) according to claim 12, wherein the marking operation is performed using a marking laser with a spot of small dimensions.
 14. The method for manufacturing the security document (100) according to claim 12 or 13, wherein the mark (308-308d) of the second personalized marking (304) is produced with a laser beam by appropriately concentrating the laser-marked pixels.
 15. The method for manufacturing the security document (100) according to any one of the preceding claims, wherein the better the laser beam quality and the smaller the pulse spot, and the more precise the scanning head is, the smaller and the clearer the mark (308-308d) of the second personalized marking (304) is.

Patentansprüche

1. Sicherheitselement (301), das auf einem Substrat (110, 110a) eines Sicherheitsdokuments (100) angeordnet ist, das mindestens ein Zeichen (303) der ersten personalisierten Kennzeichnung (302) in Form einer personalisierter alphanumerischer Daten und/oder Textdaten und/oder besondere Kennzeichen und mindestens ein Zeichen (308-308d) einer zweiten personalisierten Kennzeichnung (304), das komplett in der Spur mindestens eines Zeichens (303) der ersten personalisierten Kennzeichnung (302) enthalten ist, aufweist, was das erste Identifizierungsmerkmal darstellt, wobei das mindestens ein Zeichen der ersten personalisierten Kennzeichnung und das mindestens ein Zeichen der zweiten personalisierten Kennzeichnung mittels eines Laserstrahls erzeugt werden, **dadurch gekennzeichnet, dass** sich das Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) auf der Oberfläche des Zeichens (303) der ersten personalisierten Kennzeichnung (302) befindet und leicht konvex

- ist.
2. Sicherheitselement nach Anspruch 1, wobei das Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) eines der Folgenden ist: ein Buchstabe, eine Ziffer, eine geometrische Figur, ein Sonderzeichen oder ein Zeichen beliebiger Form. 5
 3. Sicherheitselement nach Anspruch 1 oder 2, wobei sich das Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) an einer beliebigen Stelle auf der Oberfläche des Zeichens (303) der ersten personalisierten Kennzeichnung (302) befindet. 10
 4. Sicherheitselement nach Anspruch 1, 2 oder 3, wobei die Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) in der Spur des Zeichens (303) der ersten personalisierten Kennzeichnung (302) eine Anordnung und/oder ein vertikales und/oder horizontales Merkmal und/oder ein Eintrag einer Form bilden, die der Form des Zeichens (303) der ersten personalisierten Kennzeichnung (302), auf der sie aufgebracht werden, entsprechen. 20
 5. Sicherheitselement nach Anspruch 1, wobei die Konvexität des Zeichens und/oder der Reihe an Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) zwischen 0,02 mm und 0,3 mm beträgt und die Form der Seiten des Zeichens und/oder der Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) halbkreisförmige und/oder polygonale Querschnitte aufweisen. 30
 6. Sicherheitselement nach Anspruch 1, wobei gleiche und/oder unterschiedliche Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) in der Spur mindestens zweier Zeichen (303) der ersten personalisierten Kennzeichnung (302) in der gleichen oder in einer unterschiedlichen Reihenfolge und/oder in der gleichen und/oder einer unterschiedlichen Anordnung und/oder in dem gleichen und/oder einem unterschiedlichen Merkmal/Form wiederholt sind. 35
 7. Sicherheitselement nach Anspruch 1, wobei ein einzelnes beliebiges Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) in dem Zeichen (303) der ersten personalisierten Kennzeichnung (302) aufgebracht wird, das gemeinsam mit den anderen einzelnen beliebigen Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304), die in anderen ausgewählten Zeichen (303) der ersten personalisierten Kennzeichnung (302) aufgebracht werden, das erste Identifizierungsmerkmal bildet. 40
 8. Sicherheitselement nach Anspruch 1, wobei das erste Identifizierungsmerkmal durch alle Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304), die in beliebigen anderen ausgewählten Zeichen (303) aller Zeichen (303) der ersten personalisierten Kennzeichnung (302) angeordnet sind, erzeugt wird. 45
 9. Sicherheitselement nach Anspruch 1, wobei die Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304), die gemeinsam das erste Identifizierungsmerkmal bilden, in einem einzelnen willkürlich ausgewählten Zeichen (303) aus allen Zeichen (303) der ersten personalisierten Kennzeichnung (302) aufgebracht sind. 50
 10. Sicherheitselement nach Anspruch 1, wobei das erste Identifizierungsmerkmal aus mindestens einem Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304), das sich in einer einzelnen und/oder in mehreren Zeichen (303) der ersten personalisierten Kennzeichnung (302) angeordnet ist, die eine vollständige oder teilweise Wiederholung der ersten personalisierten Kennzeichnung (302) ist. 55
 11. Sicherheitsdokument (100), das das Sicherheitselement (301) gemäß Ansprüche 1 bis 10 aufweist, und ein Substrat (110, 110a) und eine beliebige Anzahl an zusätzlichen Schichten (111, 112, 114), die eine einheitliche und untrennbare Einheit bilden, aufweist, wobei das Sicherheitselement (301) ein integriertes Fragment einer Schicht in der Struktur des Sicherheitsdokuments (100) bildet, wobei das Substrat (110, 110a) mindestens eine lasergravierbare Schicht enthält.
 12. Verfahren zum Herstellen eines Sicherheitsdokuments (100) mit einem Sicherheitselement (301), das folgende Schritte umfasst:
 - a) Zusammenfügen von mindestens einer Schicht eines Substrats (110, 110a) mit einer beliebigen Anzahl an zusätzlichen Schichten (111, 112, 114) in eine einheitliche, untrennbare Struktur des Sicherheitsdokuments (100);
 - b) Aufbringen mindestens eines Zeichens (303) der ersten personalisierten Kennzeichnung (302) in der Form von personalisierten alphanumerischen Daten und/oder Textdaten und/oder besondere Kennzeichen mindestens in der Oberfläche des Substrats (110, 110a) mittels eines Laserstrahls;
 - c) Laserstrahlmarkierung mindestens eines Zeichens (308-308d) der zweiten personalisierten Kennzeichnung (304) vollständig innerhalb der Oberfläche des mindestens einen Zeichens (303) der ersten personalisierten Kennzeichnung (302), wobei das mindestens ein Zeichen (308-308d) der zweiten personalisierten Kenn-

zeichnung (304) das erste Identifizierungsmerkmal darstellt, wobei das Substrat (110, 110a) und/oder mindestens eine zusätzliche Schicht beim Markieren des Zeichens (303) der ersten personalisierten Kennzeichnung (302) zusätzlich geschwärzt wird und leicht konvex wird, wodurch eine Konvexität in dem Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) erzeugt wird.

13. Verfahren zum Herstellen des Sicherheitsdokuments (100) nach Anspruch 12, wobei die Markierung mit einem Markierungslaser durchgeführt wird, bei dem der Impulsfleck klein ist.
14. Verfahren zum Herstellen des Sicherheitsdokuments (100) nach Anspruch 12 oder 13, wobei das Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) mit einem Laserstrahl durch entsprechende Konzentration der lasermarkierten Punkte durchgeführt wird.
15. Verfahren zum Herstellen des Sicherheitsdokuments (100) nach einem beliebigen der vorherstehenden Ansprüche, wobei je besser die Laserstrahlqualität und je kleiner der Impulsfleck ist und je präziser der Tastkopf ist, desto kleiner und deutlicher das Zeichen (308-308d) der zweiten personalisierten Kennzeichnung (304) ist.

Revendications

1. Élément de sécurité (301) apte à être placé sur un substrat (110, 110a) d'un document de sécurité (100) comprenant au moins une marque (303) d'un premier marquage personnalisé (302) sous la forme de données alphanumériques personnalisées et/ou de données de texte et/ou d'un marquage distinctif, et au moins une marque (308-308d) d'un deuxième marquage personnalisé (304), lequel est entièrement contenu dans la trace d'au moins une marque (303) du premier marquage personnalisé (302) constituant la première entrée d'identification, dans lequel l'au moins une marque du premier marquage personnalisé et l'au moins une marque du deuxième marquage personnalisé ont été réalisées au moyen d'un faisceau laser, **caractérisé en ce que** la marque (308-308d) du deuxième marquage personnalisé (304) se situe sur la surface de la marque (303) du premier marquage personnalisé (302) et est légèrement convexe.
2. Élément de sécurité selon la revendication 1, dans lequel la marque (308-308d) du deuxième marquage personnalisé (304) est l'une parmi les suivantes : une lettre, un chiffre, une forme géométrique, une marque distinctive, ou une marque de n'importe

quelle forme.

3. Élément de sécurité selon les revendications 1 ou 2, dans lequel la marque (308-308d) du deuxième marquage personnalisé (304) se situe à n'importe quel emplacement arbitraire sur la surface de la marque (303) du premier marquage personnalisé (302).
4. Élément de sécurité selon les revendications 1 ou 2 ou 3, dans lequel les marques du deuxième marquage personnalisé (304) créent, dans la trace de la marque (303) du premier marquage personnalisé (302), un agencement et/ou une entrée verticale et/ou horizontale et/ou une entrée d'une forme coïncidant avec la forme de la marque (303) du premier marquage personnalisé (302) dans lequel il est placé.
5. Élément de sécurité selon la revendication 1, dans lequel la convexité de la marque et/ou de la série de marques (308-308d) du deuxième marquage personnalisé (304) est comprise entre 0,02 mm et 0,3 mm, et les côtés de la marque et/ou des marques (308-308d) du deuxième marquage personnalisé (304) présentent des sections transversales semi-circulaires et/ou polygonales.
6. Élément de sécurité selon la revendication 1, dans lequel la même marque et/ou des marques (308-308d) différentes du deuxième marquage personnalisé (304) se reproduisent dans la trace d'au moins deux marques (303) du premier marquage personnalisé (302) dans le même ordre ou un ordre différent et/ou dans le même agencement et/ou la même entrée ou un agencement et/ou une entrée différent(es).
7. Élément de sécurité selon la revendication 1, dans lequel une marque arbitraire unique (308-308d) du deuxième marquage personnalisé (304) est placée dans la marque (303) du premier marquage personnalisé (302), laquelle, ensemble avec les marques arbitraires uniques (308-308d) restantes du deuxième marquage personnalisé (304) placées dans d'autres marques (303) sélectionnées du premier marquage personnalisé (302), constitue la première entrée d'identification.
8. Élément de sécurité selon la revendication 1, dans lequel la première entrée d'identification est créée par toutes les marques (308-308d) du deuxième marquage personnalisé (304) agencées dans des marques (303) sélectionnées de façon arbitraire parmi toutes les marques (303) du premier marquage personnalisé (302).
9. Élément de sécurité selon la revendication 1, dans lequel des marques (308-308d) du deuxième mar-

- quage personnalisé (304) constituant collectivement la première entrée d'identification sont placées dans une marque unique sélectionnée de façon arbitraire (303) parmi les marques (303) du premier marquage personnalisé (302).
10. Élément de sécurité selon la revendication 1, dans lequel la première entrée d'identification est constituée par au moins une marque (308-308d) du deuxième marquage personnalisé (304) située dans une seule et/ou dans plusieurs marques (303) du premier marquage personnalisé (302) et consistant en une répétition du premier marquage personnalisé (302) dans son ensemble ou en partie.
11. Document de sécurité (100) comprenant l'élément de sécurité (301) selon les revendications 1 à 10, comprenant un substrat (110, 110a) et n'importe quel nombre de couches supplémentaires (111, 112, 114), produisant une unité inséparable uniforme, dans lequel l'élément de sécurité (301) constitue un fragment intégré d'une couche dans la structure du document de sécurité (100), dans lequel le substrat (110, 110a) est constitué par au moins une couche apte à être gravée au laser.
12. Procédé de fabrication d'un document de sécurité (100) doté d'un élément de sécurité (301), comprenant les étapes suivantes :
- a) fusion d'au moins une couche d'un substrat (110, 110a) avec n'importe quel nombre de couches supplémentaires (111, 112, 114) dans une structure inséparable uniforme du document de sécurité (100) ;
 - b) disposition d'au moins une marque (303) du premier marquage personnalisé (302) sous la forme de données alphanumériques personnalisées et/ou de données de texte et/ou d'un marquage distinctif, au moins dans la surface du substrat (110, 110a) au moyen d'un faisceau laser,
 - c) marquage, au moyen d'un faisceau laser, d'au moins une marque (308-308d) du deuxième marquage personnalisé (304) entièrement dans la surface de l'au moins une marque (303) du premier marquage personnalisé (302), l'au moins une marque (308-308d) du deuxième marquage personnalisé (304) constituant la première entrée d'identification, dans lequel le substrat (110, 110a) et/ou au moins une couche supplémentaire est/sont en outre noirci(es) pendant le marquage de la marque (303) du premier marquage personnalisé (302) et devient/deviennent légèrement convexe(s), réalisant une convexité de la marque (308-308d) du deuxième marquage personnalisé (304).
13. Procédé de fabrication du document de sécurité (100) selon la revendication 12, dans lequel l'opération de marquage est effectuée à l'aide d'un laser de marquage avec un point de petites dimensions.
14. Procédé de fabrication du document de sécurité (100) selon la revendication 12 ou 13, dans lequel la marque (308-308d) du deuxième marquage personnalisé (304) est produite à l'aide d'un faisceau laser avec une concentration appropriée des pixels marqués au laser.
15. Procédé de fabrication du document de sécurité (100) selon l'une quelconque des revendications précédentes, dans lequel plus la qualité du faisceau laser est élevée et plus le point d'impulsion est petit, et plus la tête de balayage est précise, plus la marque (308-308d) du deuxième marquage personnalisé (304) sera petite et claire.

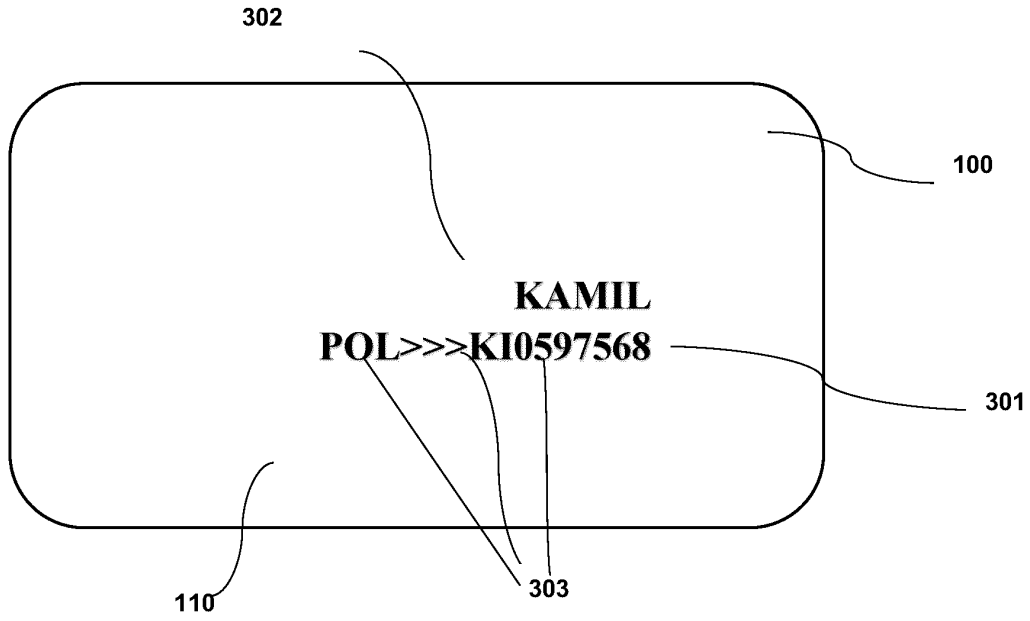


Fig. 1

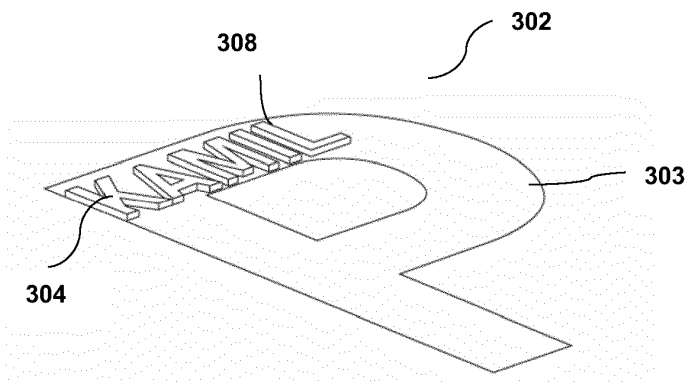


Fig. 2

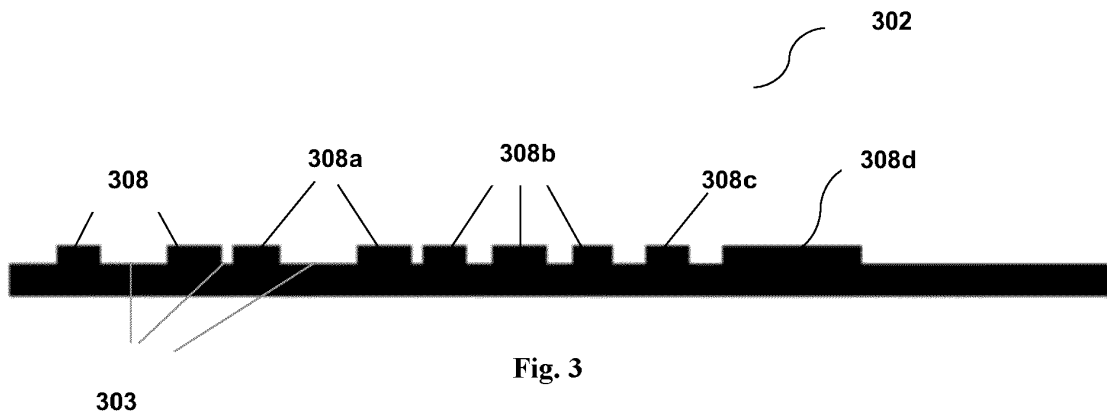


Fig. 3



Fig. 4

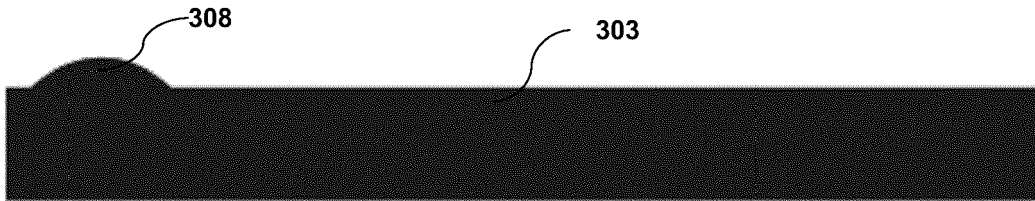


Fig. 5

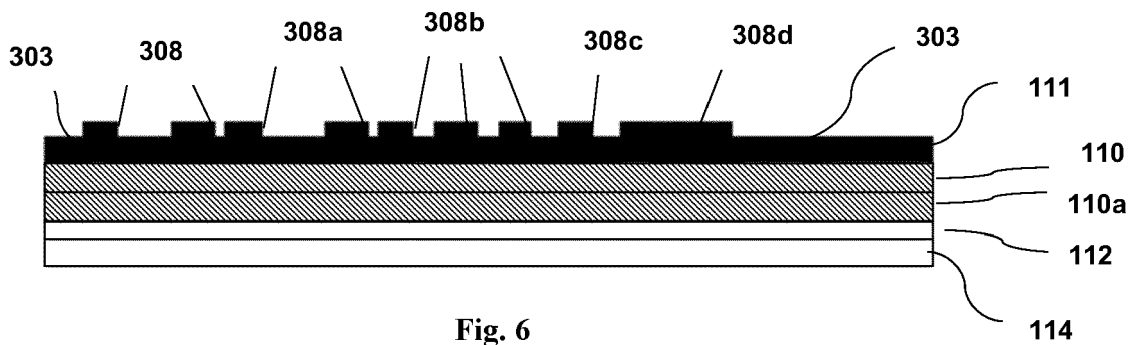


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 2907004 B1 [0004]
- DE 10006377 A1 [0005]
- US 2005095408 A1 [0006]
- DE 102019004518 A1 [0007]
- EP 2641746 A [0008]