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Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **DOCUMENT HAVING A SECURITY FEATURE**

(57) A method for providing a physical document (1) with a security feature comprises the steps of providing the document (1) with two images (10, 20) depicting a same subject. The two images (10, 20) are produced with respectively two different techniques. The two images (10, 20) are arranged to cover the same image area on

the document (1) and to be in matching superposition with each other. This matching superposition is difficult to realize and yet very easy to verify with naked eyes, thereby improving the security of the document (1) and the verification of its authenticity.

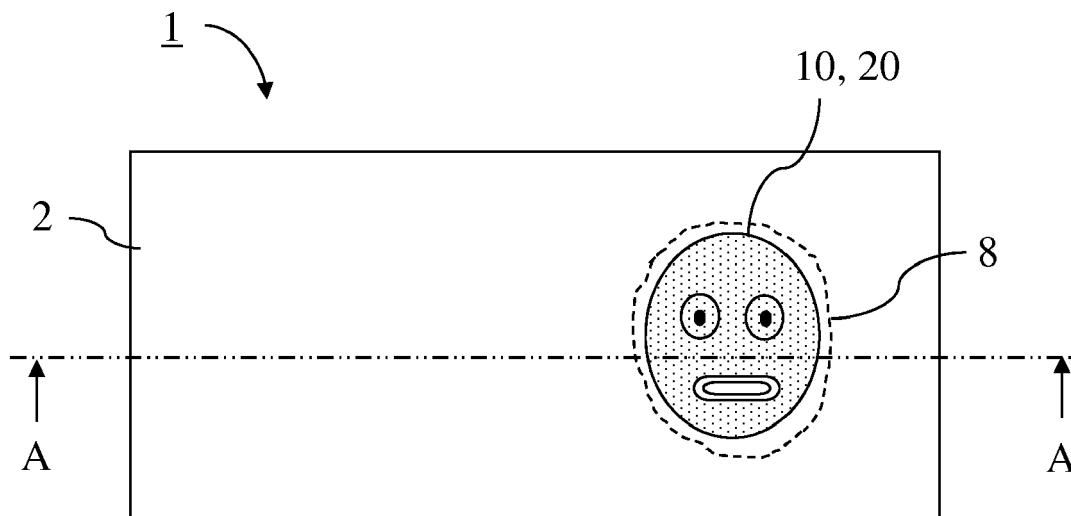


Fig. 1

Description

Field of the invention

[0001] The invention relates to a method of providing a physical document with a security feature. The invention also relates to a physical document comprising a security feature. By physical document, one shall understand a document which exists in the real world, by opposition to a virtual document for instance.

Description of prior art

[0002] Documents having such security features are known for example from WO2015/030575. According to this disclosure, an identity document includes three images of the face of the legitimate owner of the identity document. A first and a second image of the face of the legitimate owner are arranged on two different image areas on a planar substrate and a third image of the face of the legitimate owner is arranged on an adjacent surface which is hingedly attached to the substrate. Authenticity of the identity document is verified by visually checking the correspondence between the three images. Although such security features work well, the skills of counterfeiters continue to improve, so that there is a need to further improve these security features.

Summary of the invention

[0003] It is an object of the invention to furnish a method of providing a physical document with an improved security feature. It is also an object of the invention to furnish a physical document comprising an improved security feature.

By an improved security feature, one understands a security feature which renders the forging of the said document more difficult and/or which renders the visual verification of the authenticity of said document easier, and/or a security feature which can be applied to a wider variety of physical documents.

[0004] The invention is defined by the independent claims. The dependent claims define advantageous embodiments.

[0005] According to the invention, there is provided a method for providing a physical document with a security feature in the form of images, said document comprising a planar and monolithic substrate presenting a front face and a back face separated by a thickness t , said method comprising the steps of:

- producing a first image depicting a first subject on said substrate, said first image being visible when looking at the front face and said first image extending over a first image area,
- producing a second image depicting the first subject on said substrate, said second image being visible when looking at the front face and said second image

being in the form of a perforation pattern which displays grey tones when viewed against a bright background, ,

characterized in that the second image extends over the first image area, in matching superposition with the first image.

[0006] By a monolithic substrate presenting a front face and a back face separated by a thickness t , one shall understand a substrate forming a single piece having a total thickness t such as for example a single sheet of paper of thickness t or a multilayer laminate of total thickness t or more generally a substrate made by bonding together two or more sheets by their surfaces and having a total thickness t .

[0007] Producing two images of the same subject in matching superposition on a substrate is indeed harder to realize than producing these two images at different locations. A document comprising a security feature obtained with a method according to the invention is therefore harder to forge. The authenticity of such a document is also easier to verify because the person making the visual verification only needs to look at one single place on the document, namely at the first image area. Furthermore, a method according to the invention is as well suitable for documents made of one single substrate (whether single layer or multilayer), such as current Belgian ID cards for example, as for documents made of several sheets of paper and/or other planar substrates, such as for current Belgian passports for example. Indeed, a single substrate is sufficient to produce the security feature.

[0008] Preferably, the first image depicts a real subject. By a real subject, one shall understand a subject which physically exists in the real world. A flower which can be found in the nature is an example of a real subject. An imaginary flower, namely a flower which doesn't exist in nature but only in one's imagination, is not a real subject. Indeed, this renders the verification of the authenticity of the document by a human person more reliable.

More preferably the first image depicts a human face.

[0009] Preferably, the physical document is a personal identity document and the first image comprises an image of the face of the legitimate owner of the personal identity document. More preferably, the physical document is an identity card or a passport or a driving licence and the first image comprises or is an image of the face of the legitimate owner of the identity card, passport or driving licence. A method according to the invention is indeed particularly suited to produce a security feature on such documents.

[0010] Preferably the perforation pattern consists of a plurality of holes, each hole having an average diameter comprised between 50 microns and 200 microns. Such holes are so small that they interfere little with the visual appearance of the first image. In one example, the perforation pattern comprises a plurality of blind holes. In another example, the perforation pattern comprises a plurality of through holes. In yet another example, the

perforation pattern comprises a mix of blind holes and through holes.

Each hole is preferably produced by perforating the substrate with the use of a laser beam.

[0011] Preferably, the method according to the invention further comprises the step of producing a third image on said substrate, said third image being visible when looking at the back face, said third image extending over a projection of the first image area on the back face, in matching superposition with the first image, and said third image being a mirror image of the first image.

With this additional step, one obtains indeed a document which is even more difficult to forge.

[0012] Preferably, the step of producing the first image on the substrate is a step of printing the first image on said substrate. More preferably, the step of producing the first image on the substrate is a step of laser engraving the first image on said substrate.

[0013] Preferably, the step of producing the first image on said substrate precedes the step of producing the second image on said substrate. The inventors have indeed found that such order of preference results in a better final visual result than with the opposite order.

[0014] Preferably, the physical document is a personal identity document and the first image comprises an image of the face of the legitimate owner of the personal identity document. More preferably, the physical document is an identity card or a passport or a driving licence or the like.

[0015] The invention also relates to a physical document comprising a planar and monolithic substrate presenting an front face (4) and a back face (5) separated by a thickness t , said planar substrate comprising :

- a first image depicting a first subject, said first image being visible when looking at the front face (4) and extending over a first image area,
- a second image depicting the first subject, said second image being in the form of a perforation pattern which displays grey tones when viewed against a bright background,

characterized in that the second image extends over the first image area and is arranged in matching superposition with the first image.

Short description of the drawings

[0016] These and further aspects of the invention will be explained in greater detail by way of examples and with reference to the accompanying drawings in which:

- Fig.1 schematically shows a general example of a document according to the invention;
 Fig.2 shows a cross-section along the line A-A of a first exemplary embodiment of the document of Fig.1 ;
 Fig.3 shows a cross-section along the line A-A of a

second exemplary embodiment of the document of Fig.1 ;

Fig.4 shows a cross-section along the line A-A of a third exemplary embodiment of the document of Fig.1 ;

Fig.5 shows a cross-section along the line A-A of a fourth exemplary embodiment of the document of Fig.1 ;

Fig.6 schematically shows another example of a document according to the invention, in perspective view;

Fig.7 schematically shows the document of Fig.6, in front view;

Fig.8 schematically shows another example of a document according to the invention, in perspective view;

Fig.9 schematically shows the document of Fig.8, in front view.

[0017] The drawings of the figures are neither drawn to scale nor proportioned. Generally, similar or identical components are denoted by the same reference numerals in the figures.

Detailed description of embodiments of the invention

[0018] The invention firstly concerns a method for providing a physical document (1) with a security feature in the form of images, wherein said document (1) comprises a planar and monolithic substrate (2) presenting a front face (4) and a back face (5) separated by a thickness t . By a monolithic substrate presenting a front face and a back face separated by a thickness t , one shall understand a substrate forming a single piece having a total thickness t such as for example a single sheet of paper of thickness t or a multilayer laminate of total thickness t or more generally a substrate made by bonding together two or more sheets or layers by their surfaces and having a total thickness t .

[0019] The method comprises the step of producing a first image (10) depicting a first subject on said substrate (2), said first image (10) being visible when looking at the front face (4) and said first image (10) extending over a first image area (8). The first image (10) may be produced by various known processes, such as by printing or by laser engraving for example. The process used for producing the first image (10) shall however be different from the process used for producing the second image (20) and which will be described herein below.

The first subject may be any subject, concrete or abstract. Preferably, the first subject is a real subject and more preferably a human face.

The method further comprises the step of producing a second image (20) depicting the said first subject on the said substrate (2), said second image (20) being visible when looking at the front face (4) of the substrate (2) and said second image (20) being in the form of a perforation

pattern which displays grey tones when viewed against a bright background.

Specific to the invention is that the second image (20) is produced to extend over the first image area (8), in matching superposition with the first image (10). The visual appearance of a document (1) produced with a method according to the invention will therefore be as shown for example in Fig.1 (when the subject is a human face) or in Fig.7 (when the subject is a line segment) or in Fig. 9 (when the subject is a capital letter "A").

[0020] Techniques for producing the second image (20) by perforating a substrate (2) are well known in the art and are for example described in patent application publication numbers PCT/NL95/00119 and US 2002/0027359.

[0021] The perforation pattern preferably consists of a plurality of holes, each hole having an average diameter comprised between 50 microns and 200 microns.

[0022] Preferably, the perforation pattern comprises a plurality of blind holes.

[0023] Alternatively or additionally, the perforation pattern comprises a plurality of through holes.

Preferably, each hole is produced by perforating the substrate (2) with the use of a laser beam. For producing through holes, the laser beam may be directed towards the front face (4) or towards the back face (5) of the substrate (2). Preferably the said laser beam is directed towards the back face (5) of the substrate (2). Since holes obtained with this method are generally conical in shape, this preferred position and orientation of the laser beam with respect to the substrate (2) results in smaller openings at the level of the front face (4) than at the level of the back face (5), thereby interfering less with the appearance of the first image (10) than if the laser was directed towards the front face (4).

[0024] Preferably, the method further comprises the step of producing a third image (30) on said substrate (2), said third image (30) being visible when looking at the back face (5), said third image (30) extending over a projection of the first image area (8) on the back face (5), in matching superposition with the first image (10), and said third image (30) being a mirror image of the first image (10).

The third image (30) may be produced by various processes, such as by printing or by laser engraving for example. The process used for producing the third image (30) shall however be different from the process used for producing the second image (20) as described herein above. Preferably, the process used for producing the third image (30) is the same as the process used for producing the first image (10).

[0025] Preferably, the step of producing the first image (10) on said substrate (2) precedes the step of producing the second image (20) on said substrate (2). The inventors have indeed found that such order of preference results in a better visual result than with the opposite order. In case the method comprises the step of producing the third image (30) on the substrate (2), this step as well as

the step of producing the first image (10) on the substrate (2) both preferably precede the step of producing the second image (20) on said substrate (2).

[0026] Preferably, the physical document (1) is a personal identity document (1) and the first image (10) comprises an image of the face of the legitimate owner of the personal identity document (1). Preferred examples of such identity document (1) are for example an identity card, a passport, or a driving licence.

[0027] According to the invention, there is also provided a physical document (1) having a security feature in the form of images.

Fig.1 schematically shows a general example of a physical document (1) according to the invention. Such document (1) comprises a planar and monolithic substrate (2) presenting a front face (4) and a back face (5) separated by a thickness t .

The substrate (2) comprises:

- a first image (10) depicting a first subject, said first image (10) being visible when looking at the front face (4) and extending over a first image area (8), and
- a second image (20) depicting the first subject, said second image (20) being in the form of a perforation pattern which displays grey tones when viewed against a bright background.

Specific to a document (1) according to the invention is that the second image (20) extends over the first image area (8) and is arranged in matching superposition with the first image (10).

Preferably, the first image (10) depicts a real subject, more preferably a human face as is shown in the example of Fig.1.

The perforation pattern preferably consists of a plurality of holes, each hole having an average diameter comprised between 50 microns and 200 microns.

[0028] Fig.2 shows a cross-section along the line A-A of a first exemplary embodiment of the document (1) of Fig.1. This figure gives a better view of features of the invention. One can for example see:

- the front face (4) and the back face (5) of the substrate (2),
- the thickness t of the substrate (2)
- the width of the first image area (8),
- a cutaway of the first image (10), and
- a cutaway of the holes of the perforation pattern forming the second image (20).

In this example, all holes perforated in the substrate (2) to form the second image (20) are through holes.

[0029] Fig.3 shows a cross-section along the line A-A of a second exemplary embodiment of the document (1) of Fig.1. It is similar to the embodiment shown on Fig.2 except that the second image (20) is formed by a perforation pattern comprising a mix of through holes and blind holes. The blind holes may for example correspond to

parts of the first image (10) which are the darkest.

[0030] Fig.4 shows a cross-section along the line A-A of a third exemplary embodiment of the document (1) of Fig.1. It is similar to the embodiment shown on Fig.2 except that the substrate (2) is a multilayer substrate (2) comprising three layers (2a, 2b, 2c) which are bonded to each other. In this example all holes perforated in the substrate (2) to form the second image (20) are through holes. In other examples, some holes may alternatively be blind holes, as is the case with the example of Fig.3. The substrate (2) may also comprise more than three layers.

[0031] Fig.5 shows a cross-section along the line A-A of a fourth exemplary embodiment of the document (1) of Fig.1. It is similar to the embodiment shown on Fig.2 except that the substrate (2) comprises a third image (30) which is visible when looking at the back face (5), said third image (30) extending over a projection of the first image area (8) on the back face (5), in matching superposition with the first image (10), and said third image (30) being a mirror image of the first image (10).

[0032] Fig.6 schematically shows another example of a document (1) according to the invention, in perspective view. It is similar to the example of Fig.1 and Fig.2, except that the subject is a thick line segment in this case. In this example, a straight line extending in a first image area (8) is printed on the front face (4) of the substrate (2) and this straight line defines the first image (10). A plurality of through holes (21) is furthermore made in the substrate (2) to form the second image (20). As can be seen, these through holes (21) extend over the first image area (8) and are aligned with the straight line so that the second image (20) is in matching superposition with the first image (10). It is the purpose of Fig.6 to better illustrate the principle of the matching superposition.

Fig.7 schematically shows the document (1) of Fig.6, in front view. When looking at this front view, one will see a thick line segment and a corresponding image from the light passing through the pattern of through holes.

[0033] Fig.8 schematically shows another example of a document (1) according to the invention, in perspective view. In this example, the first image (10) depicts a capital letter "A" which is for example produced by printing said capital letter "A" on the front face (4) of the substrate (2). In such a case, the second image (20) will depict the same capital letter "A" and will be produced by perforating the substrate (2) there where the first image (10) was printed or will be printed and in such a way that both images are in matching superposition, as shown in Fig. 8. It is to be noted that on Fig.8 the capital letter "A" shown in light grey and bearing reference number 20 is a schematic representation of a sectional view of the perforations, somewhere through the core of the substrate (2). Fig.9 schematically shows the document (1) of Fig.8, in front view.

When inspecting a document (1) comprising such a substrate (2), one shall visually verify if both capital letters "A" match in shape, size and position when looking at

the front face (4) of the substrate (2). In case of a match, it would indicate that the document (1) is most probably authentic. If both capital letters "A" are not in superposition, such as when one capital letter "A" is decentred or rotated compared to the other capital letter "A" or when one capital letter "A" has a larger size compared to the other capital letter "A", then this would indicate that the document (1) is most probably not authentic and has been forged.

[0034] In case the first subject is a human face, the inventors have found that the following imaging features provide good results:

- Case 1:

Dimensions of the picture of the human face:
13,5 X 18mm
Number of perforations for the second image (20): 30 X 40 perforations
Distance between perforations: 0,45mm

- Case 2:

Dimensions of the picture of the human face:
16,2 X 21,8mm
Number of perforations for the second image (20): 36 X 48 perforations
Distance between perforations: 0,45mm

- Case 3:

Dimensions of the picture of the human face:
16,4X22mm
Number of perforations for the second image (20): 41X55 perforations
Distance between perforations: 0,40mm

[0035] Preferably, the document (1) according to the invention is a personal identity document (1), such as an identity card, or a passport, or a driving licence for example.

[0036] The present invention has been described in terms of specific embodiments, which are illustrative of the invention and not to be construed as limiting. More generally, it will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and/or described hereinabove. Reference numerals in the claims do not limit their protective scope.

Use of the verbs "to comprise", "to include", "to be composed of", or any other variant, as well as their respective conjugations, does not exclude the presence of elements other than those stated.

Use of the article "a", "an" or "the" preceding an element does not exclude the presence of a plurality of such elements.

[0037] The invention may also be described as follows: a method for providing a physical document (1) with a

security feature comprises the steps of providing the document (1) with two images (10, 20) depicting a same subject. The two images (10, 20) are produced with respectively two different techniques. The two images (10, 20) are arranged to cover the same image area on the document (1) and to be in matching superposition with each other. This matching superposition is difficult to realize and yet very easy to verify with naked eyes, thereby improving the security of the document (1) and the verification of its authenticity.

Claims

1. Method for providing a physical document (1) with a security feature in the form of images, said document (1) comprising a planar and monolithic substrate (2) presenting a front face (4) and a back face (5) separated by a thickness t, said method comprising the steps of:
 - producing a first image (10) depicting a first subject on said substrate (2), said first image (10) being visible when looking at the front face (4) and said first image (10) extending over a first image area (8),
 - producing a second image (20) depicting the first subject on said substrate (2), said second image (20) being visible when looking at the front face (4) and said second image (20) being in the form of a perforation pattern which displays grey tones when viewed against a bright background, **characterized in that** the second image (20) extends over the first image area (8), in matching superposition with the first image (10).
2. Method according to claim 1, **characterized in that** the first image (10) depicts a real subject, preferably a human face.
3. Method according to any of claims 1 or 2, **characterized in that** the perforation pattern consists of a plurality of holes, each hole having an average diameter comprised between 50 microns and 200 microns.
4. Method according to any of claims 1 to 3, **characterized in that** the perforation pattern comprises a plurality of blind holes.
5. Method according to any of claims 1 to 4, **characterized in that** the perforation pattern comprises a plurality of through holes.
6. Method according to any of claims 3 to 5, **characterized in that** each hole is produced by perforating the substrate (2) with the use of a laser beam.
7. Method according to any of claims 1 to 6, **characterized in that** it further comprises the step of producing a third image (30) on said substrate (2), said third image (30) being visible when looking at the back face (5), said third image (30) extending over a projection of the first image area (8) on the back face (5), in matching superposition with the first image (10), and said third image (30) being a mirror image of the first image (10).
8. Method according to any of preceding claims, **characterized in that** the step of producing the first image (10) on said substrate (2) is a step of printing the first image (10) on said substrate (2).
9. Method according to any of preceding claims, **characterized in that** the step of producing the first image (10) on said substrate (2) is a step of laser engraving the first image (10) on said substrate (2).
10. Method according to any of preceding claims, **characterized in that** the step of producing the first image (10) on said substrate (2) precedes the step of producing the second image (20) on said substrate (2).
11. Method according to any of preceding claims, **characterized in that** the physical document (1) is a personal identity document (1), preferably an identity card or a passport or a driving licence, and **in that** the first image (10) comprises an image of the face of the legitimate owner of the personal identity document (1).
12. Physical document (1) comprising a planar and monolithic substrate (2) presenting a front face (4) and a back face (5) separated by a thickness t, said planar substrate (2) comprising :
 - a first image (10) depicting a first subject, said first image (10) being visible when looking at the front face (4) and extending over a first image area (8),
 - a second image (20) depicting the first subject, said second image (20) being in the form of a perforation pattern which displays grey tones when viewed against a bright background,**characterized in that** the second image (20) extends over the first image area (8) and is arranged in matching superposition with the first image (10).
13. Physical document (1) according to claim 12, **characterized in that** the first image (10) depicts a real subject, preferably a human face.
14. Physical document (1) according to claim 12 or 13, **characterized in that** the perforation pattern consists of a plurality of holes, each hole having an av-

erage diameter comprised between 50 microns and 200 microns.

15. Physical document (1) according to any of claims 12 to 14, **characterized in that** it is a personal identity document (1), preferably an identity card or a passport or a driving licence.

Amended claims in accordance with Rule 137(2) EPC.

1. Method for providing a physical document (1) with a security feature in the form of images, said document (1) comprising a planar and monolithic substrate (2) presenting a front face (4) and a back face (5) separated by a thickness t, said method comprising the steps of:

- producing a first image (10) depicting a first subject on said substrate (2), said first image (10) being visible when looking at the front face (4) and said first image (10) extending over a first image area (8),
- producing a second image (20) depicting the first subject on said substrate (2), said second image (20) being visible when looking at the front face (4) and said second image (20) being in the form of a perforation pattern which displays grey tones when viewed against a bright background,

wherein the second image (20) extends over the first image area (8), in matching superposition with the first image (10).

characterized in that it further comprises the step of producing a third image (30) on said substrate (2), said third image (30) being visible when looking at the back face (5), said third image (30) extending over a projection of the first image area (8) on the back face (5), in matching superposition with the first image (10), and said third image (30) being a mirror image of the first image (10).

2. Method according to claim 1, **characterized in that** the first image (10) depicts a real subject, preferably a human face.
3. Method according to any of claims 1 or 2, **characterized in that** the perforation pattern consists of a plurality of holes, each hole having an average diameter comprised between 50 microns and 200 microns.
4. Method according to any of claims 1 to 3, **characterized in that** the perforation pattern comprises a plurality of blind holes.
5. Method according to any of claims 1 to 4, **charac-**

terized in that the perforation pattern comprises a plurality of through holes.

6. Method according to any of claims 3 to 5, **characterized in that** each hole is produced by perforating the substrate (2) with the use of a laser beam.
7. Method according to any of preceding claims, **characterized in that** the step of producing the first image (10) on said substrate (2) is a step of printing the first image (10) on said substrate (2).
8. Method according to any of preceding claims, **characterized in that** the step of producing the first image (10) on said substrate (2) is a step of laser engraving the first image (10) on said substrate (2).
9. Method according to any of preceding claims, **characterized in that** the step of producing the first image (10) on said substrate (2) precedes the step of producing the second image (20) on said substrate (2).
10. Method according to any of preceding claims, **characterized in that** the physical document (1) is a personal identity document (1), preferably an identity card or a passport or a driving licence, and **in that** the first image (10) comprises an image of the face of the legitimate owner of the personal identity document (1).
11. Physical document (1) comprising a planar and monolithic substrate (2) presenting a front face (4) and a back face (5) separated by a thickness t, said planar substrate (2) comprising :
- a first image (10) depicting a first subject, said first image (10) being visible when looking at the front face (4) and extending over a first image area (8),
 - a second image (20) depicting the first subject, said second image (20) being in the form of a perforation pattern which displays grey tones when viewed against a bright background,
- wherein the second image (20) extends over the first image area (8) and is arranged in matching superposition with the first image (10), **characterized in that** said substrate (2) further comprises a third image (30), said third image (30) being visible when looking at the back face (5), said third image (30) extending over a projection of the first image area (8) on the back face (5), in matching superposition with the first image (10), and said third image (30) being a mirror image of the first image (10).
12. Physical document (1) according to claim 12, **characterized in that** the first image (10) depicts a real subject, preferably a human face.

13. Physical document (1) according to claim 12 or 13, **characterized in that** the perforation pattern consists of a plurality of holes, each hole having an average diameter comprised between 50 microns and 200 microns.

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14. Physical document (1) according to any of claims 12 to 14, **characterized in that** it is a personal identity document (1), preferably an identity card or a passport or a driving licence.

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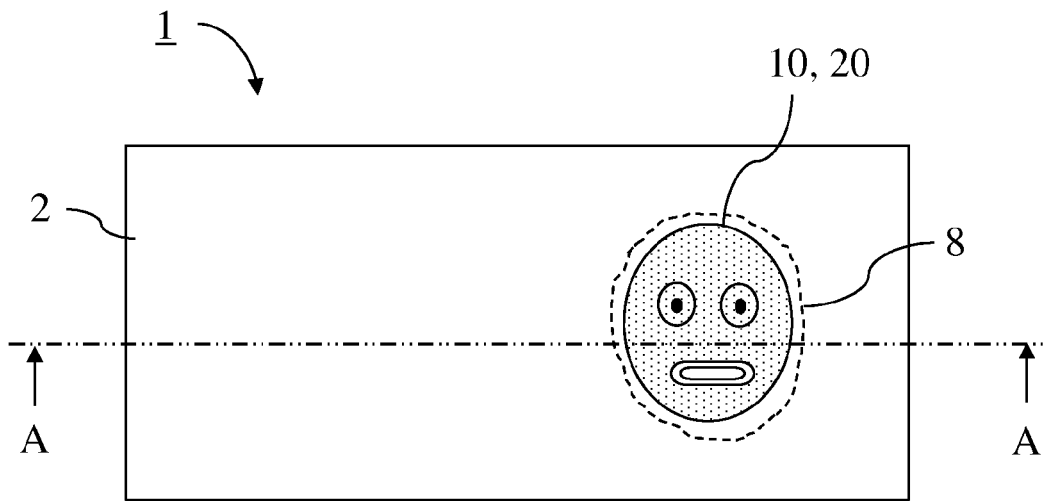


Fig. 1

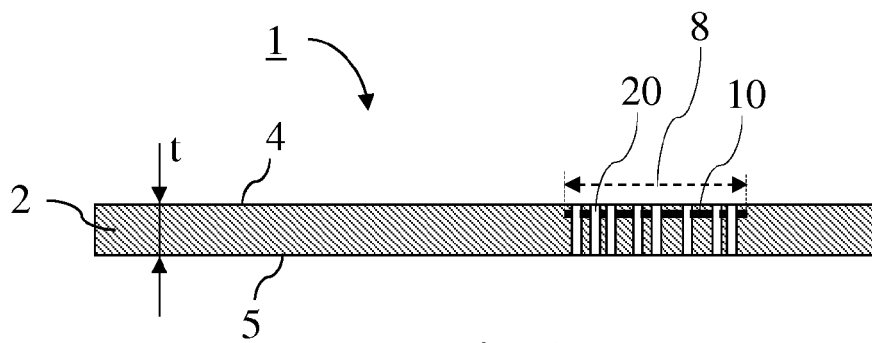


Fig. 2

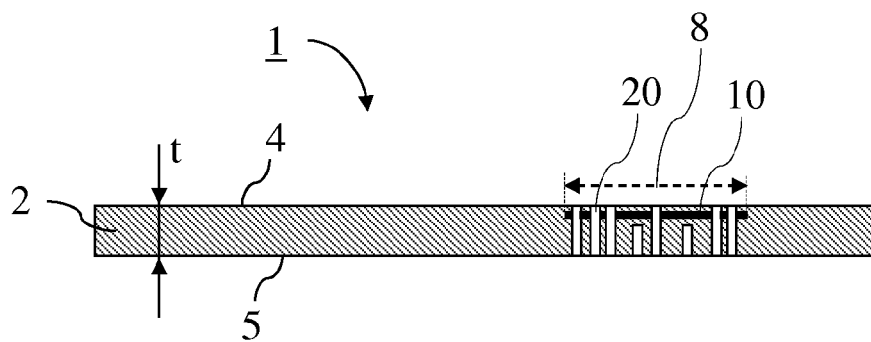


Fig. 3

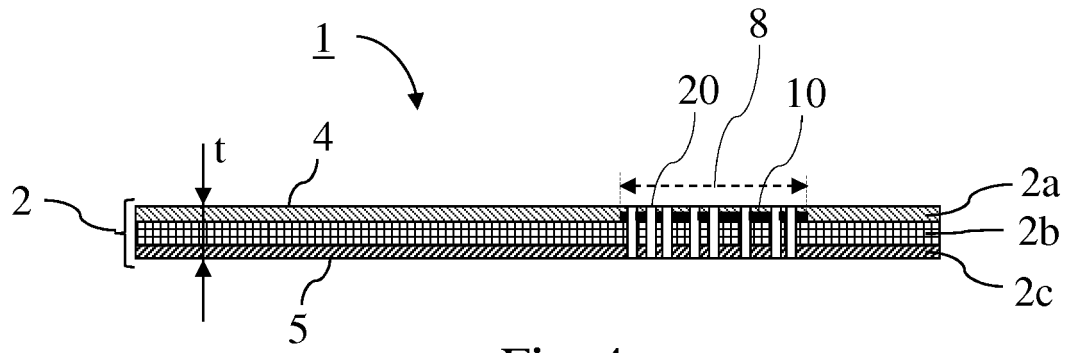


Fig. 4

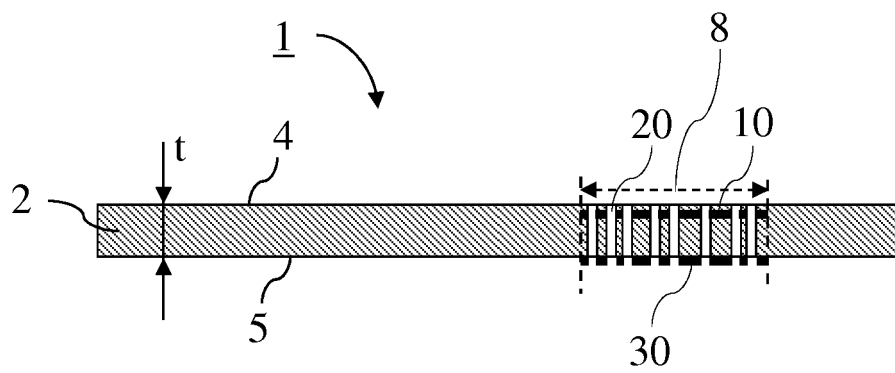
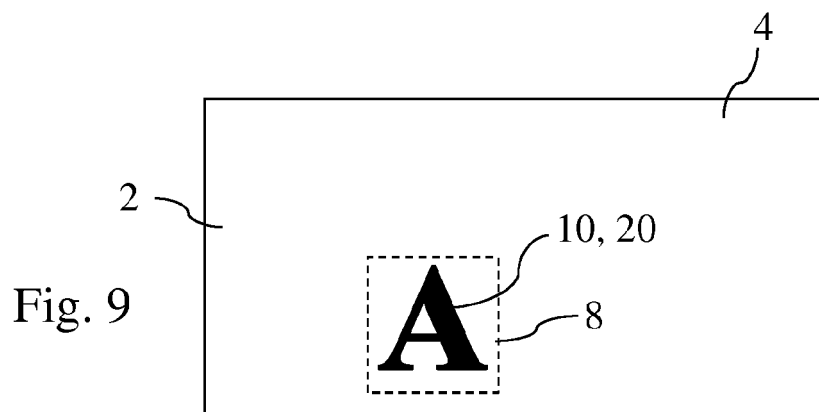
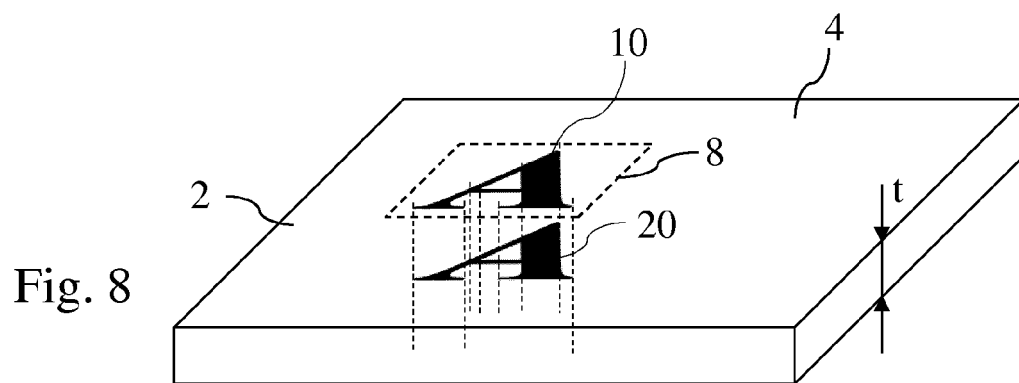
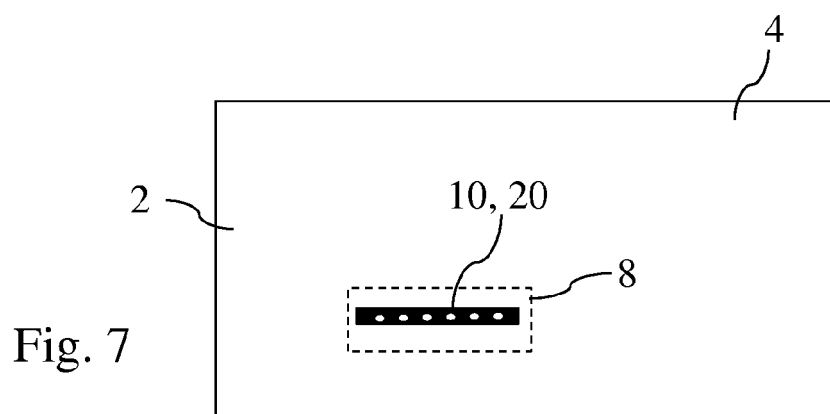
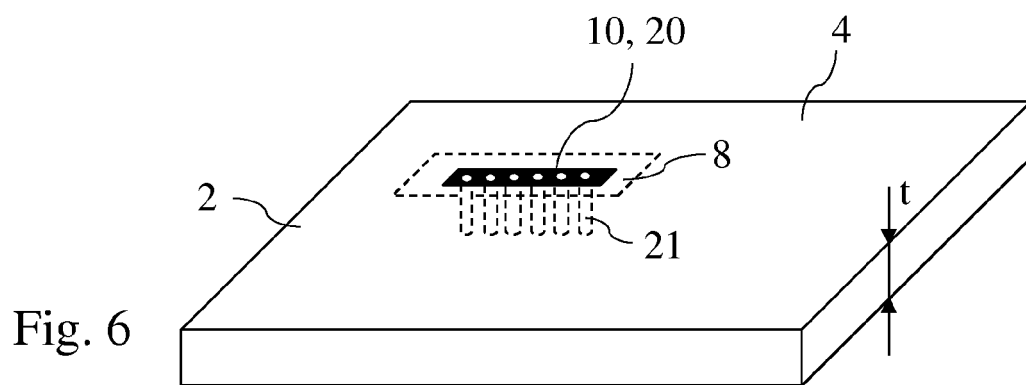


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 18 19 4637

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Place of search Munich		Date of completion of the search 28 February 2019	Examiner D'Incecco, Raimondo
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