

Description

Identification document having two superimposed images

5 The invention relates to an identification document provided with two superimposed images, and to a method for producing such an identification document. Furthermore, the invention relates to a method for checking the authenticity of such an identification
10 document.

Identification documents such as, for example, identity cards or passports, or else other record carriers such as, for example, bank cards or credit cards, etc., are
15 more and more often being provided with a color image, for example with a color photograph of the owner. The printing methods often employed in practice for printing color images, e.g. dye sublimation printing, are deemed to be insecure, since the dyes can be
20 removed relatively easily on account of their small penetration depth. In order to increase the security of the color image, a transparent laminate or a lacquer has been applied to the color image in the past.

25 Another possibility for increasing the security of such documents is to use, in addition to the printing method, a further method for applying image information with a higher security. In this case inscription by means of an inscription laser is deemed to be a secure
30 inscription method on account of the possible high penetration depth and the irreversible material change, such that in practice color printing is combined with laser inscription.

Such a combination is known from the document EP 0 537 484 A1, for example. In the method described therein, a color image is split into two portions, namely a light/dark portion and a colored portion, wherein the light/dark portion is introduced into an image carrier with the aid of an inscription laser in a counterfeit-proof manner. The partial image thus generated is then superimposed congruently with the color portion, which is printed onto the image carrier for this purpose. In other words, the printed colored partial image exclusively contains color information, while the associated light/dark information is contained in the underlying partial image. The two partial images thus complement each other to form the total information stored. The light/dark partial image introduced in the image carrier in a counterfeit-proof manner remains even if the printed color image is removed from the image carrier. Identification is then intended to be possible solely on the basis of the remaining light/dark partial image.

What is disadvantageous about the method outlined is, however, that the two partial images always have to be arranged exactly one above another, in order that the desired overall impression with complete image information arises. For this purpose, either a complex coordination of the data sets for printer and laser arrangement or a no less complex assignment of the two partial images to one another is necessary, by virtue of markings provided on the image carrier being detected with the aid of optical sensors. The method described is therefore comparatively complex, particularly if different printing systems have to be used and coordinated with one another.

Moreover, the increase in security is also limited. Since the colored partial image superimposes the light/dark partial image congruently, the light/dark partial image cannot be completely recognized with the naked eye, and so the image information of the light/dark portion can be verified only poorly. A manipulation of the image data could exploit the fact that only a portion of the image information has been stored in the light/dark partial image in a counterfeit-proof manner. This is because it is thus possible to remove the color image and, using a conventional color printing system, to print a new color image having other image information, which image then superimposes the light/dark portion, which has remained unchanged. Such a manipulation is facilitated in the case of identification documents having photographs owing to the fact that a uniform orientation of the head, the size of the image excerpt, etc. is required in the case of photographs. By virtue of the high similarity of the different photographs among one another, the newly applied color image can thus be oriented to the more clearly visible parts of the light/dark partial image (e.g. eyes, nose, mouth, etc.), such that a very precise superimposition of the manipulated colored partial image with the existing light/dark partial image is possible.

It is an object of the present invention to better secure identification documents provided with a color image against counterfeiting or manipulation.

This object is achieved by means of an identification document according to claim 1 and a method for producing such an identification document according to claim 8.

The identification document according to the invention is distinguished by the fact that it is provided with two superimposed images, that the images are applied in separate work steps, that at least one of the images is present in a form that is not accessible externally, that one of the images is a gray-scale image, and that one of the images is a color image comprising both color information and light/dark information.

10 The method according to the invention for producing an identification document which is provided with two superimposed images is distinguished by the fact that one of the images is a gray-scale image, that one of the images is a color image comprising both color
15 information and light/dark information, and that the color image is printed onto an image carrier and the gray-scale image is introduced into an image carrier by means of a controlled laser beam.

20 Furthermore, the abovementioned object is achieved by means of a method for checking such an identification document or the like according to claim 11.

The method according to the invention for checking the authenticity of an identification document is distinguished by the following steps: irradiating the
25 identification document or the like with a first checking radiation for the purpose of reading the image information of the color image, irradiating the
30 identification document or the like with a second checking radiation for the purpose of reading the image information of the gray-scale image, reading the image information of the color image and of the gray-scale image, and evaluating, in particular comparing, the
35 image information obtained.

Advantageous embodiments of the invention are specified in the dependent claims.

5 The advantages and configurations explained below in connection with the method analogously also apply to the devices according to the invention, and vice versa.

10 An identification document within the meaning of the invention is understood to be not only identity cards or passports, but also other record or data carriers, such as, for example, bank or credit cards or the like, which are not or not primarily used for identification purposes. Generally, it is understood to be a document or record carrier which is provided with images that
15 are intended to be secured against manipulation or counterfeiting.

In this case, an image is understood to be an optically readable representation of information, wherein this
20 can be, in particular, photographs of persons, national emblems, graphical security elements, text information or other representations.

It is a basic concept of the invention to take up the
25 technology described in the prior art and to modify it in such a way that the color image comprises complete image information, that is to say both color and contrast information. It is therefore a central point of the invention precisely not to use any partial
30 images. Since two images each having complete image information are always present, the latter can be verified more simply, such that manipulations can be identified more easily and counterfeiting is made significantly more difficult.

In this case, the image information from one image can be completely or partly contained in the other image. In one advantageous embodiment of the invention, the
5 gray-scale image comprises all the image information of the color image with the exception of the color information.

If the two images are identical or if the images differ
10 merely with regard to the color information, then they are advantageously arranged with respect to one another in such a way that they are superimposed congruently. For this purpose, the two images have identical dimensions and are arranged positionally accurately
15 with respect to one another. In this case, two images having maximum image information can be arranged in a particularly space-saving manner on a carrier. The color image is preferably embodied in such a way that in daylight it is dominantly visible to an observer
20 relative to the underlying gray-scale image. Therefore, exact alignment of the two images with respect to one another is not necessary. Furthermore, congruent superimposition is also not absolutely necessary, since the images do not have to complement one another to
25 form total information.

In an alternative embodiment of the invention, none of the images contains image information of the respective other image. In other words, it is likewise possible to
30 provide the identification document with two different images. This possibility is not possible in the case of the solution which is known from the prior art in which the image information of the two partial images first has to complement one another in order to generate the
35 total image.

An embodiment of the invention has proved to be especially advantageous in which the color image is transmissive to a checking radiation that irradiates the gray-scale image for checking purposes. What is thus achieved is that reading of the complete image information of the gray-scale image is not impeded by the color image. Particularly simple checking of the authenticity of the identification document is thereby made possible.

If the color image is printed onto an image carrier by a printer and the gray-scale image is introduced into an image carrier by means of a controlled laser beam, that is to say if, in other words, the images are applied in separate work steps, then it is possible to use such printing and inscription methods which have already been tried and tested in practice. Consequently, the present invention can be realized substantially using already existing machines, without relatively high conversion costs arising.

Preferably, it is the gray-scale image which is generated in a form that is not accessible externally. For this purpose, the use of a controlled laser beam that writes the gray-scale image into the image carrier is particularly suitable. In this case, a gray-scale image is understood to be an image that comprises light/dark information. In this case, the number of gray shades is only of secondary importance for the invention; in principle, therefore, the gray-scale image can also be a black/white image.

By way of example, a transparent film such as is used as one of the outer layers of a plastic identification document is suitable as the image carrier. If the transparent film is used as a common carrier element

for the color image and the gray-scale image, then the color image is printed onto the transparent film. The gray-scale image is burned into the film with the aid of the laser beam. Preferably, a further protective layer, for example a laminate or lacquer layer, is fitted over the transparent film in order to protect the color image.

If the printing ink used for the color image is transmissive to the checking radiation used for irradiating the gray-scale image and if an inscription laser which emits in the same wavelength range is used, the order of the "printing processes" is arbitrary. In other words, either the color image can be produced first or alternatively the gray-scale image can be produced first. The optical impression of the visible color image is identical in both methods.

In a further embodiment of the invention, different image carriers are used for color image and the gray-scale image. If the identification document is constructed in layered fashion, for example, as is often the case with laminated cards, then different layers of the cards serve as image carriers for the color and gray-scale image, respectively.

The image carrier for the color and gray-scale image can be an intermediate product in the process for producing the security document. Thus, by way of example, the film image carrier can be arranged on a carrier substrate that serves as part of a layer construction of an identity card. However, the image carrier can also already be a finished end product.

When checking authenticity of the identification document, the latter is irradiated with a first and a second checking radiation, wherein the first checking radiation serves for reading the image information of the color image and the second checking radiation serves for reading the image information of the gray-scale image. Afterward, the image information obtained is compared, wherein all of the abovementioned method steps, but in particular the comparison step, can proceed in an automated manner in the corresponding checking device.

Since the color image is transmissive to the checking radiation that irradiates the gray-scale image for checking purposes, it cannot be detected when such a checking radiation is used. In other words, it is not possible to read the image information of the color image when this checking radiation is used. The gray-scale image, by contrast, is fully readable in this case. Consequently, it is possible to check whether the color image has actually been applied using such printing inks which are transmissive to the checking radiation. If incorrect printing inks were used, the color image covers the underlying gray-scale image and reading of the complete image information of the gray-scale image is precluded. In other words, it is possible for the gray-scale image covered by the color image to be made completely visible with the aid of the checking radiation, without the color image covering image information of the gray-scale image.

The checking radiation that irradiates the gray-scale image for checking purposes is preferably infrared radiation detected by means of an infrared illumination system and an infrared-sensitive detector, e.g. a CCD

sensor, which can be used in image or video cameras. As an alternative thereto, checking radiations having other wavelengths or wavelength ranges can also be used. A prerequisite for this is that the working
5 environment is correspondingly adapted. In particular, it is necessary to use materials suitable for the checking radiation, in particular for the printing inks of the color image and the image carriers, and suitable sensors for checking the image information have to be
10 available.

The checking radiation that irradiates the color image for checking purposes is preferably light visible to the human eye, e.g. daylight. When the identification
15 document is irradiated with daylight, substantially only the color image is visible to an observer.

Preferably, a detector that is sensitive to both visible and infrared light is used in conjunction with
20 a light source that emits visible light together with infrared light. This can involve both artificial light and sunlight. In this case, the color image and - provided that it is not covered by the color image - at the same time the gray-scale image as well can be
25 detected.

If a filter that only transmits infrared light is fitted in front of said detector, then the gray-scale image can be detected since the color image is
30 transparent to the infrared light.

As an alternative thereto, the image carrier can optionally be illuminated with visible light and with infrared light.

The image information of the two images thus detected can be compared with one another after the illumination and detection of the image information.

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Manipulation or counterfeiting can be identified when either the color image is visible under the infrared light or the gray-scale image is not visible under the infrared light and/or under visible light or else the
10 gray-scale image and the color image do not contain the expected information.

Exemplary embodiments of the invention are explained in greater detail below with reference to the drawings, in
15 which:

Fig. 1 shows a schematic illustration of an identification document comprising a transparent film as image carrier (sectional
20 view),

Fig. 2 shows a schematic illustration of an identification document comprising two different image carriers (sectional view),
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Fig. 3 shows a schematic illustration of a first exemplary identification document in daylight (fig. 3a) and IR light (fig. 3b),

30 Fig. 4 shows a schematic illustration of a second exemplary identification document in daylight (fig. 4a) and IR light (fig. 4b),

Fig. 5 shows a schematic illustration of a third exemplary identification document in daylight (fig. 5a) and IR light (fig. 5b), and

5 Fig. 6 shows a schematic illustration of a fourth exemplary identification document in daylight (fig. 6a) and IR light (fig. 6b).

All of the figures show the invention merely
10 schematically and with the essential constituent parts thereof. In this case, identical reference symbols correspond to elements having an identical or comparable function.

15 The schematic illustration of the printer or of the printing method for printing the color image and the schematic illustration of the laser arrangement or of the method for driving the laser beam, and also the
20 schematic illustration of the checking method or of the checking device are dispensed with since this information is either familiar to the person skilled in the art or will become apparent with sufficient clarity from the following description.

25 A schematic illustration of an identification document embodied as an identity card 1 is represented in fig. 1. The identity card 1 comprises a polymer carrier 2 and a transparent plastic film 3, serving as cover layer and arranged on the carrier 2, as image carrier
30 for two superimposed images.

The two images are applied to the film 3 and introduced into the film 3 in separate work steps. This involves firstly a color image 5 printed onto the surface 4 of
35 the film 3, and secondly a gray-scale image 6 burned

into the film 3, said gray-scale image therefore being present in a form that is not accessible externally. In this case, the color image 5 and the gray-scale image 6 are superimposed.

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In this case, the color image 5 is applied with the aid of a dye sublimation printer. The gray-scale image 6 is introduced with the aid of a (near) infrared laser beam which operates with a wavelength of 1064 nm and which
10 discolours the processed material proceeding from the surface internally by local burning or sooting irreversibly and thus in a counterfeit-proof manner.

The color image 5 is distinguished by the fact that it
15 comprises both color information and light/dark information. The underlying gray-scale image 6 comprises all the image information of the color image 5 with the exception of the color information. In order to generate the gray-scale image 6, the color image 5
20 is preferably converted into a gray-scale image 6, such that all the image information with the exception of the color information is maintained.

Fig. 2 illustrates a further identification document,
25 likewise embodied as an identity card 1. In this case, different layers of the identity card 1, constructed in a layered design, serve as image carriers. The color image 5 is printed on an upper layer 7, while the gray-scale image 6 is introduced, by means of a controlled
30 laser beam, into an underlying, lower layer 8 directly adjoining the upper layer 7. An exact assignment of the two layers 7, 8 to one another in such a way that the color image 5 and the gray-scale image 6 are arranged congruently with respect to one another is not
35 absolutely necessary, since each image already contains

complete image information and an exact joint view of the two images is not necessary.

5 In order to protect the color image 5, in both cases a protective layer 17 in the form of a transparent laminate is provided above the image carrier of the color image.

10 In both cases, the color image 5 is transmissive to infrared radiation serving as checking radiation for irradiating the gray-scale image 6.

15 Checking the authenticity of the identity card 1 involves irradiating the identity card 1 with daylight for the purpose of reading the image information of the color image 5, and irradiating with infrared light for the purpose of reading the image information of the gray-scale image 6. In this case, the image information of the color image 5 and that of the gray-scale image 6
20 are read with the aid of suitable sensors and fed to an evaluation unit for evaluation, in particular for comparison of the image information obtained.

The first exemplary identification document 9
25 illustrated in fig. 3 is provided with a color image 10, namely the photograph of a woman. This image information is visible in daylight, as illustrated in fig. 3a. If this document 9 is irradiated with infrared light, the gray-scale image 11 illustrated in fig. 3b
30 is obtained, which, with the exception of the color information, contains the same image information as the color image 10. Upon an evaluation of the image information read, which is effected here in particular in the form of a comparison of the image information of
35 the color image 10 with the image information of the gray-scale image 11, this correspondence is

ascertained. No counterfeiting or manipulation of the color image 10 is present.

5 The second exemplary identification document 12 illustrated in fig. 4 is again provided with the color photograph of a woman. This image information is visible in daylight, as illustrated in fig. 4a. If this document is irradiated with infrared light, the gray-scale image 13 illustrated in fig. 4b is obtained, 10 which represents a photograph of a man. An evaluation of the image information read reveals that the image information does not correspond. The document 12 belongs to a male person. The color image 10 was counterfeited.

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The third exemplary identification document 14 illustrated in fig. 5, as in the cases described previously, is likewise provided with the photograph of a woman. This image information is once again visible 20 in daylight, as illustrated in fig. 5a. If this document 14 is irradiated with infrared light, no gray-scale image is found, as illustrated in fig. 5b. Therefore, this is a counterfeited document 14 in which only a color image 10 was printed. The counterfeit- 25 proof gray-scale image, by contrast, is absent. This is ascertained during an evaluation of the image information.

The fourth exemplary identification document 15 30 illustrated in fig. 6, as in the cases described previously, is likewise provided with the photograph of a woman. This image information is once again visible in daylight, as illustrated in fig. 6a. The document 15 differs from the documents represented above in that 35 color image formation and gray-scale image do not contain identical image information. Instead, it is

provided that a numerical code, in this case the date of birth of the document owner, is written below the color image. Therefore, a counterfeit would be identified directly upon the absence of the numerical code. If this document 15 is then irradiated with infrared light, a gray-scale image 16 showing the numerical code is found, as illustrated in fig. 6b. Despite the fact that, as in fig. 4, color image and gray-scale image differ from one another, it can be assumed from initial appearances that no counterfeit is present. Confirmation of this statement requires a subsequent evaluation of the image information, here in particular an evaluation of the numerical code and checking of the date of birth.

15 Conventional devices for checking the authenticity of identification documents usually already comprise the assemblies necessary for carrying out the checking method according to the invention, in particular an illumination unit for irradiating the identification document 1 with a first checking radiation (e.g. daylight) for the purpose of reading the image information of the color image 5 and/or for irradiating the identification document 1 with a second checking radiation (e.g. infrared light) for the purpose of reading the image information of the gray-scale image 6, and an evaluation unit for evaluating, in particular for comparing, the image information obtained. Therefore, in general only an adaptation of the evaluation algorithms is necessary for carrying out the method according to the invention.

Deviations from the implementation outlined by way of example are possible. Thus, for example, the color image 5 can also be applied with the aid of a different printing method, provided that the latter permits the

use of infrared-transmissive printing ink. In another variant, the gray-scale image 6 can contain, instead of a date of birth, some other image information that is different from the color image 5, for example a serial
5 number, a coat of arms or some other national emblem or the like.

All of the features presented in the description, the following claims and the drawing may be essential to
10 the invention both individually and in any desired combination with one another.

List of reference symbols

15	1	Identity card
	2	Carrier
	3	Film
	4	Film surface
	5	Color image
20	6	Gray-scale image
	7	Upper layer
	8	Lower layer
	9	First document
	10	Color image
25	11	Gray-scale image
	12	Second document
	13	Gray-scale image
	14	Third document
	15	Fourth document
30	16	Gray-scale image
	17	Protective layer

Claims

1. An identification document (1) or the like, which is provided with two superimposed images (5, 6),
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- wherein the images (5, 6) are applied in separate work steps,

- wherein at least one of the images is present in a
10 form that is not accessible externally,

- wherein one of the images is a gray-scale image (6), and

15 - wherein one of the images is a color image (5) comprising both color information and light/dark information.
2. The identification document (1) or the like as
20 claimed in claim 1, wherein at least portions of the image information of one image are contained in the other image.
3. The identification document (1) or the like as
25 claimed in claim 1 or 2, wherein the gray-scale image (6) comprises all the image information of the color image (5) with the exception of the color information.
4. The identification document (1) or the like as
30 claimed in any of claims 1 to 3, wherein the images (5, 6) are superimposed congruently.

5. The identification document (1) or the like as claimed in claim 1, wherein none of the images (5, 6) contains image information of the respective other image.

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6. The identification document (1) or the like as claimed in any of claims 1 to 5, wherein the gray-scale image (6) is present in a form that is not accessible externally.

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7. The identification document (1) or the like as claimed in any of claims 1 to 6, wherein the color image (5) is transmissive to a checking radiation which irradiates the gray-scale image (6) for checking purposes, in such a way that the color image (5) does not obstruct reading of the image information of the gray-scale image (6).

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8. A method for producing an identification document (1) or the like, which is provided with two superimposed images (5, 6),

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- wherein one of the images is a gray-scale image (6),

- wherein one of the images is a color image (5) comprising both color information and light/dark information, and

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- wherein the color image (5) is printed onto an image carrier (3; 7) and the gray-scale image (6) is introduced into an image carrier (3; 8) by means of a controlled laser beam.

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9. The method as claimed in claim 8, wherein the image carrier (3) for the color image (5) is simultaneously the image carrier (3) for the gray-scale image (6).

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10. The method as claimed in claim 8, wherein the image carriers are different, preferably directly mutually adjoining layers (7, 8) in the layer construction of the identification document (1) or the like.

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11. A method for checking the authenticity of an identification document (1) or the like as claimed in any of claims 1 to 8, comprising the following steps:

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- irradiating the identification document (1) or the like with a first checking radiation for the purpose of reading the image information of the color image (5),

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- irradiating the identification document (1) or the like with a second checking radiation for the purpose of reading the image information of the gray-scale image (6),

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- reading the image information of the color image (5) and of the gray-scale image (6), and

- evaluating, in particular comparing, the image information obtained.