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(54) SELF-ADHESIVE SAFETY FILM FOR INDICATION OF TAMPERING, AND RELATIVE PROCESS FOR THE PRODUCTION THEREOF

SELBSTKLEBENDE SICHERHEITSFILM ZUM ANGEBEN VON VERFÄLSCHUNG UND VERFAHREN ZU DESSEN HERSTELLUNG

FEUILLE DE SECURITE AUTO-ADHESIVE METTANT EN EVIDENCE TOUTE TENTATIVE D'EFFRACTION, ET SON PROCEDE DE PRODUCTION

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(56) References cited:
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Description

The present invention relates to a self-adhesive safety film capable of indicating any attempt to tamper with documents, using holograms, and a process for the production thereof.

The main object of the present invention is to provide a film that, when cut and reduced to a suitable shape and size, is destined to be applied to an object, for example a document, to indicate and in this way also prevent any attempt to tamper with that document. In the case of documents the film, arranged in a suitable manner, will prevent the alteration of data, replacement of photographs or other paper object attached to the document and forming an integral or complementary part thereof, and likewise the replacement of any part of the document itself.

State of the art

It is well known that, while there are objective difficulties in falsifying objects and documents because of the methods perfected for this purpose by manufacturers, it is generally speaking not equally difficult to make alterations of falsifications, in particular on documents, to the material that is necessarily used and to the operating methods used to draw them up. To prevent alterations, self-adhesive films are already in use, and these are applied to the area to be protected against alteration and/or replacement, but the effectiveness is greatly conditioned by the characteristics of the material to which said film is applied - type of paper, state of the surface also as a result of the printing on it, etc. - and by the type of self-adhesive glue spread on the film, so much so that in some cases it is possible, using suitable means, to detach the protective film applied to the object or document.

A further improvement, aimed at obtaining safety labels (Italian patent No 1214024 to Autoadesivi S.r.l. of Soliera - MO) has been obtained by causing a thin layer to be embossed, that is to say to undergo mechanically obtained plastic deformation, with matrix engraved using the holographic technique, providing for vacuum plating of said thin layer, subsequently spread with a suitable lake and finally adhesived; the method is proposed to obtain labels for which the removal and transfer to other objects of lower commercial value is to be avoided, and it is effective, but, given the characteristics of the vacuum plating, which is of necessity total, it is inapplicable in those cases where it is necessary to leave the underlying surface visible, for example in case of the page of a written document or a photograph, or in any case the surface of an object carrying elements to be protected, a non limiting example of which may be a trade mark or signature.

Two different types of film using full coverage holographic techniques, with different levels of adhesion denominated "Frangible" or "Tamper Evident", make use of drawn microfractures in the lake plus metal or adhesive layer complex, distributed coherently over small surface areas (around $1 \div 3$ mm^2). The metal layer reacts at any attempt to detach, fracturing and adhering in part to the film and in part to the object to be protected; in both these examples the film, which is already plated and treated with suitable lakes, is made to undergo embossing to receive the holographic imprint with the desired design or picture, but in any case the film is fully plated and prevents vision of the elements (whether written or other) written or printed or shown in the area to be protected from tampering, and onto which the film has been applied.

Detailed description of the invention

According to the present invention, the holographic technique is again used to obtain (as far as possible) a safety film incapable of being forged, in order to prevent any form of reconstruction on the part of forgers. However, unlike the films indicated above - for non-transferrable labels or labels that are destroyed on removal, both with total coverage because of the metal layer - it has the holograms, perfectly visible with images of the limited size desired, that leave ample free space for the transparent film, allowing what is on the surface over which the safety film is applied to be seen.

The specific characteristics of the safety film and the process according to the present invention, respectively, are indicated in the following claims.

The safety film according to the present invention is formed, in this order, of:

- transparent film in polyester, PVC or other equally transparent material and of suitable mechanical strength, capable of undergoing a holographic embossing operation;
- a hologram is embossed on the back of said film, said hologram optionally containing information invisible to the naked eye, but visible using laser reading instruments and capable of being displayed on viewers, displays or, if the reading device is connected to a personal computer, on the monitor, of the OSC HOLOSCOPE or HOLOCODE type. The area occupied by the hologram is limited and of the geometrical shape desired. The hologram, in turn, is made up of the following layers:

  a) release layer, that is to say a layer of a product with a synthetic and/or natural wax base, silicon substances, in either simple or complex mixtures, with a thickness of a few micrometers,

  b) layer of paint or lake for registration of the holographic information, that is to say of thermoformable lake that acquires the holographic imprint at a moderately high temperature and maintains it at ordinary temperatures and at

higher temperatures of up to 150° and above, with a thickness of a few micrometers,

c) layer of reflecting metal, for example aluminium, but also of another equally reflecting metal element, with a thickness of a few hundredths of a micrometer.

- The transparent film and the three embossable layers a), b), c) are normally commercially available under various names under the trade name of "films for holographic embossing";
- a layer of glue for hot-application, of the type that tempers under the action of pressure and high temperature (up to 120 ÷ 140°C), based on a mixture of silicon substances in a water solution
- a layer of cold adhesive glue, with an acrylic resin base, water soluble, such as NACOR 9863 manufactured by the National Starch Chemical Company, or the like, modified with additives, spread in solution with a percentage of solids of 50 ÷ 60% and in such a way as to obtain a dry thickness of approximately 10 micrometers
- a layer of removable, non-adhesive, silicon coated paper, to preserve the film described above and to facilitate its application.

The safety function of the film described is seen when, having removed the layer of silicon paper protecting the self-adhesive glue, the film is applied to the document or object to be protected.

The self-adhesive glue sticks the film to the surface of the document, and, as it is distributed over the whole surface, comprising the metal coated and embossed, that is to say holographed, areas, it also sticks the hologram to the document or object to be protected. In applying the film to the document or object to be protected from alteration or falsification the hologram must naturally be positioned in a suitable way, for example covering in part any photograph of the owner of the document and in part the surface of the sheet of paper on which it is positioned, or else the hologram must be positioned close to the information to be protected without covering it, or it must be repeated at the edges of the film, corresponding to the edges of the sheet of paper on which the film is to be applied.

The above examples are non limiting, and serve merely to illustrate the function of the hologram.

Should any attempt be made to detach the film as described and used after application, which is always possible when cold adhesives are used and if methods employing heat and the humidity of water vapour are used, the surface of the hologram will lose its flatness, and this alteration will be highlighted by the metal layer forming the reflecting element of the hologram and diffracting incident light.

The alteration to the flatness of the hologram and the resulting decay of the holographic image are irreversible and even if an attempt is made to make the film stick to the surface of the document in object once more, spreading it to avoid folds, waves and bubbles, the flatness is not regained; in this way it is obvious that an attempt has been made to detach the film from the surface of the protected object, and care must be taken to check the veracity of the information shown on the document under the transparent film, the authenticity of the photograph and the enclosures partially covered by the film, or in general the integrity of the object that, by means of the film in question comprising the holograms, is desired to be protected from tampering.

The present invention will be described with reference to the figures of the enclosed drawings, in which figures 1 to 5 show the successive operations for production of the composite safety film, with holograms, and figure 6 shows, as an example, a facsimile of a document to which the safety film according to the present invention is applied.

- Given the above, and with reference to the figures of the enclosed drawings, a polyester, polyvinylchloride or other film (layer 1 of figure 1) is spread with a suitable release lake (layer 2), then with lake suitable to record the holographic information (layer 3) and finally the whole is covered with a reflecting metal layer deposited with vacuum plating or another process capable of depositing an extremely thin layer of metal (a few hundredths of a micrometer) (layer 4);
- the composite material obtained in this way is made to undergo an embossing process with a holographic matrix to obtain images, which are confined to small areas of suitable size and shape, spaced and positioned according to the needs dictated, for example, by the size of the sections of film to be made, and/or the position of the information, photograph, and elements to be protected (figure 2) on a document;
- after further working the structure of figure 3 is created, in which on the composite film made up of the film (layer 1), with the release lake (layer 2), the holographic recording layer (layer 3) and the metal layer (layer 4), already embossed in the small areas in which the holograms are situated, is uniformly spread with a layer of hot-application adhesive (layer 5 in figure 3);
- finally the structure of figure 4 is created by removing layer 2 (release lake), layer 3 (holographic recording lake), layer 4 (reflecting metal layer) and layer 5 (hot-application adhesive) in the areas not of interest to the hologram;
- to obtain the self-adhesive structure of figure 5, operations are completed by spreading a uniform layer of high adhesion self-adhesive glue with a long life span (at least 10 minutes) on the rear surface of the structure (layer 6 of figure 5) and coupling it with a removable silicon paper layer or non-adhesive silicon layer, suitably pre-cut if required to

facilitate application (layer 7 of figure 5) and finally by reducing the film product, if necessary, into portions of the required size, shape, or with the required distribution of holograms.

Once reduced to portions of the required size, the film is applied to the document or object to be protected. For example, figure 6 illustrates the method of application of the film (detail a) to documents, with the possible position of the holograms (detail b) in order to protect the document from tampering.

Claims

1. A safety film to be applied on a document containing information to be protected against tampering or falsifications, comprising:

   - a transparent layer (1);
   - a layer (6) made of self-adhesive glue and disposed under said transparent layer (1);
   - a hologram layer made up of a release layer (2), a holographic recording layer (3) disposed under said release layer (2), a reflecting metal layer (4) disposed under said holographic recording layer (3), the hologram layer comprising perfectly visible holograms; and
   - a hot-application adhesive layer (5) disposed under said reflecting metal layer (4) and being of the same extension thereof,
     said hologram layer and said hot-application adhesive layer (5) being surrounded by said layer (6) made of self-adhesive glue and being disposed along predetermined areas, said areas being positioned close to the information to be protected without covering it and repeated at the edges of the film.

2. A safety film according to claim 1, wherein said visible holograms comprise information invisible to the naked eye detectable using laser reading instruments, whereby the alteration of the holograms due to attempts to detach said film from the document or object to be protected causes alteration of the light reflected by said reflecting metal layer (4) and thus changes of the information detected by said laser reading instruments.

3. A method for obtaining the safety film according to claim 1 or 2, comprising the steps of:

   - spreading the transparent layer (1) with the release layer (2);
   - spreading said release layer (2) with the holographic recording layer (3);
   - covering said holographic recording layer (3) with the reflecting metal layer (4);
   - effecting on the hologram layer an embossing process with a holographic matrix, to obtain the hologram;
   - spreading said reflecting metal layer (4) with the hot-application adhesive layer (5);
   - removing said release, holographic recording, reflecting metal and hot-application adhesive layers (2; 3; 4; 5) from the areas external to the hologram; and
   - spreading the layer (6) made of self-adhesive glue under said transparent layer (1), wherein said layer (6) of self-adhesive glue surrounds said release, holographic recording, reflective metal and hot-application adhesive layers (2; 3; 4; 5).

Patentansprüche

1. Sicherheitsfilm zum Aufbringen auf ein Dokument, welches gegen Fälschung oder vor unbefugten Gebrauch zu schützende Informationen enthält, umfassend:

   - eine transparente Schicht (1);
   - eine unter der transparenten Schicht (1) angeordnete Schicht (6) aus selbstklebendem Haftmittel;
   - eine Hologrammschicht, die aus einer Ablöseschicht (2), einer unter der Ablöseschicht (2) angeordneten holographischen Aufzeichnungsschicht (3) und einer unter der holographischen Aufzeichnungsschicht (3) angeordneten reflektierenden Metallschicht (4) besteht, wobei die Hologrammschicht perfekt sichtbare Hologramme umfaßt; und
   - eine unter der reflektierenden Metallschicht (4) mit gleicher Ausdehnung angeordnete Schicht aus heiß zu verwendendem Haftmittel (5);
     wobei die Hologrammschicht und die Schicht aus heiß zu verwendendem Haftmittel (5) von der Schicht (6) aus selbtklebendem Haftmittel umgeben und in vorgegebenen Bereichen, die sich in der Nähe der zu schützenden Informationen befinden, ohne diese zu bedecken, und an den Kanten des Films wiederholt werden, angeordnet sind.

2. Sicherheitsfilm nach Anspruch 1, wobei die sichtbaren Hologramme Informationen umfassen, die für das bloße Auge unsichtbar, aber unter Verwendung von Laserlesegeräten erfaßbar sind, wobei durch eine aufgrund von Versuchen, den Film von dem zu schützenden Dokument oder Gegenstand zu entfernen, hervorgerufene Veränderung der Hologramme eine Veränderung des von der reflektierenden Metallschicht (4) reflektierten Lichts verursacht wird und somit die von den Laserlesegeräten erfaßten Informationen verändert werden.

3. Verfahren zur Herstellung eines Sicherheitsfilms gemäß einem der Ansprüche 1 oder 2, umfassend die Schritte:

- Beschichtung der transparenten Schicht (1) mit der Ablöseschicht (2);
- Beschichtung der Ablöseschicht (2) mit der holographischen Aufzeichnungsschicht (3);
- Bedeckung der holographischen Aufzeichnungsschicht (3) mit der reflektierenden Metallschicht (4);
- Ausführung eines Prägevorgangs an der Hologrammschicht mit einer holographischen Matrix, um das Hologramm zu erhalten;
- Beschichtung der reflektierenden Metallschicht (4) mit der Schicht mit heiß zu verwendendem Haftmittel (5);
- Entfernung der Ablöse-, holographischen Aufzeichnungs-, reflektierenden Metallschicht (2; 3; 4) und der Schicht mit dem heiß zu verwendenden Haftmittel (5) von den Bereichen außerhalb des Hologramms; und
- Ausbildung der Schicht (6) aus selbstklebendem Haftmittel unter der transparenten Schicht (1), wobei die Schicht (6) aus selbstklebendem Haftmittel die Ablöse-, holographische Aufzeichnungs-, reflektierende Metallschicht (2; 3; 4) sowie die Schicht aus heiß zu verwendendem Haftmittel (5) umgibt.

Revendications

1. Film de sécurité destiné à être appliqué sur un document contenant des informations à protéger à l'encontre d'une obturation ou d'une falsification, comportant :

- une couche transparente (1) ;
- une couche (6) constituée d'une colle autoadhésive et agencée sous ladite couche transparente (1) ;
- une couche d'hologramme constituée d'une couche de libération (2), d'une couche d'enregistrement holographique (3) agencée sous ladite couche de libération (2), d'une couche métallique réfléchissante (4) agencée sous ladite couche d'enregistrement holographique (3), la couche d'hologramme comportant des hologrammes parfaitement visibles ; et
- une couche d'adhésif à application à chaud (5) agencée sous ladite couche métallique réfléchissante (4) et ayant la même extension que celle-ci,

ladite couche d'hologramme et ladite couche adhésive à application à chaud (5) étant entourées par ladite couche (6) constituée de colle auto-adhésive et étant agencée le long de zones prédéterminées, lesdites zones étant positionnées à proximité de l'information à protéger sans la recouvrir et répétées aux bords du film.

2. Film de sécurité selon la revendication 1, dans lequel lesdits hologrammes visibles comportent une information invisible à l'oeil nu pouvant être détectée en utilisant des instruments de lecture à laser, de sorte que l'altération des hologrammes due à des essais pour détacher ledit film dudit document ou de l'objet à protéger entraîne une altération de la lumière réfléchie par ladite couche métallique réfléchissante (4) et donc des changements de l'information détectée par lesdits instruments de lecture à laser.

3. Procédé pour réaliser le film de sécurité selon la revendication 1 ou 2, comportant les étapes consistant à :

- étaler de la couche de libération (2) sur la couche transparente (1) ;
- étaler ladite couche d'enregistrement holographique (3) sur ladite couche de libération (2) ;
- recouvrir ladite couche d'enregistrement holographique (3) par la couche métallique réfléchissante (4) ;
- effectuer sur la couche d'hologramme un processus de réalisation de protubérances à l'aide d'une matrice holographique pour obtenir l'hologramme ;
- étaler sur ladite couche métallique reflechissante (4) la couche adhésive à application à chaud (5) ;
- enlever lesdites couches de libération, d'enregistrement holographique, métallique réfléchissante et adhésive à application à chaud (2 ; 3 ; 4 ; 5) desdites zones extérieures à l'hologramme ; et
- étaler la couche (6) constituée de colle autoadhésive sous ladite couche transparente (1), ladite couche (6) constituée de colle autoadhésive entourant lesdites couches de libération, d'enregistrement holographique, métallique réfléchissante et adhésive à application à chaud (2 ; 3 ; 4 ; 5).

FIG.1

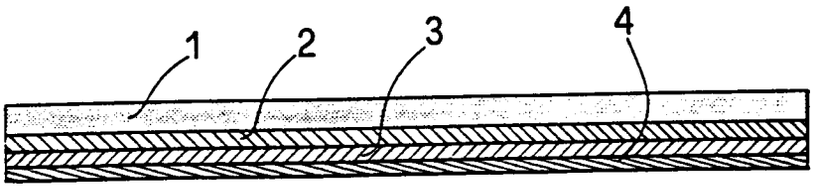


FIG.2

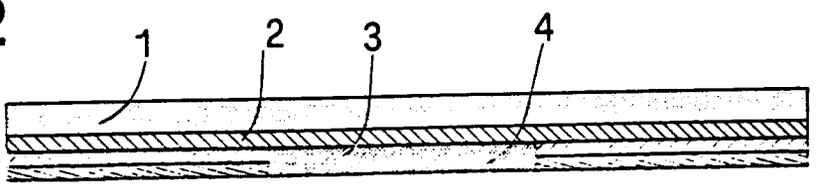


FIG.3

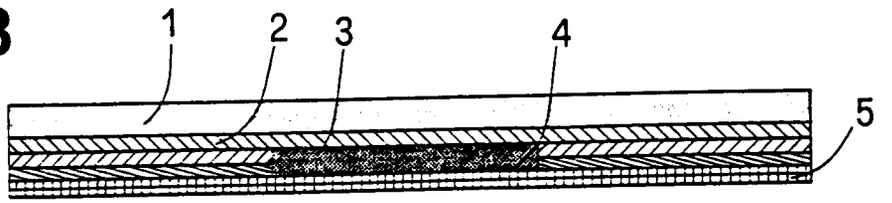


FIG.4

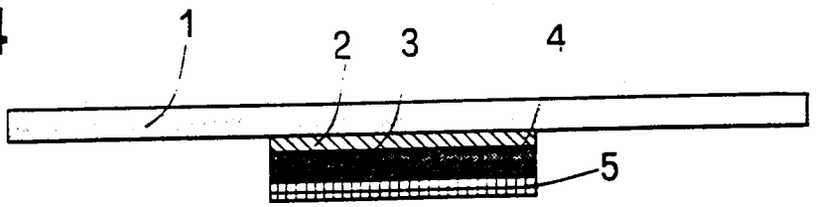


FIG.5

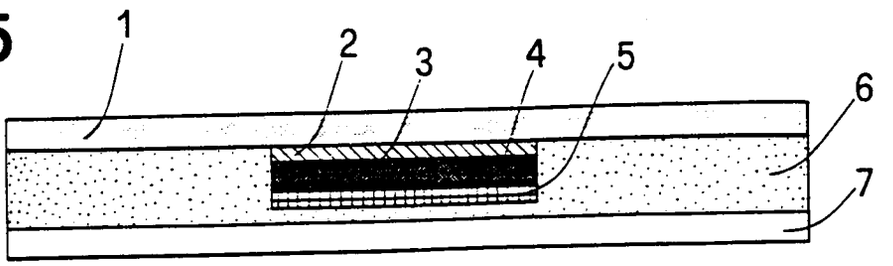
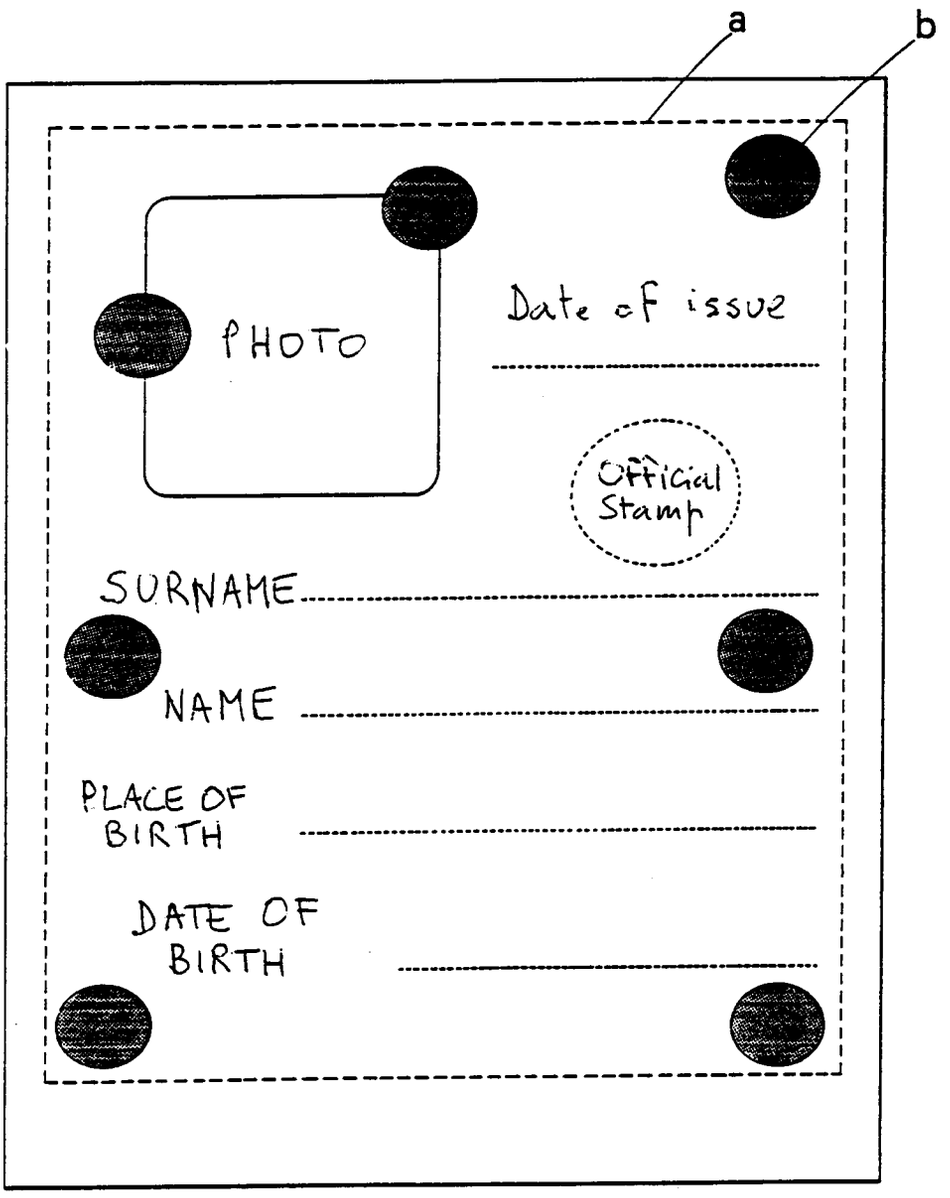


FIG.6


a
b
PHOTO
Date of issue
Official Stamp
SURNAME
NAME
PLACE OF BIRTH
DATE OF BIRTH