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(54) **Security element**

(57) Security elements with patterns and/or characters and the like being defined by an opaque coating or by recesses in an opaque coating are disclosed The

opaque coating is formed by screen printing or screened partial metallization.

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Description

[0001] The invention relates to security elements with a pattern in variable contrast ratio forming visible indicia.

[0002] Security elements with patterns, characters and the like being defined by recesses in a coating are widely used.

[0003] A security element in the form of a thread or band having patterns, characters and the like that are visible in transmitted light and readable to the naked eye and/or by machine is known from EP 330 733. Said security element comprises a transparent plastic film, which has an opaque coating extending over the element with recesses in the form of patterns and/or characters or the like. At least in the areas congruent to the recesses the security element contains colouring and/or luminescent substances which cause the patterns and/or characters to differ from the opaque coating by colour contrast under suitable light conditions.

[0004] EP 319 157 B discloses a security paper with a security device which shows characters, signs and the like that are sufficiently large to be visible with the naked eye, obtained using a partially metallised strip, thereby essentially maintaining the strong optical variation impact of a continuous metallised strip.

[0005] This effect is in particular achieved using a waterproof and flexible substrate, with a layer of metal on either side thereof, with a continuous metallic sector lengthwise on one of its sides having non-metallic areas that take up between 10 and 50% of the surface and obtained using a stencil, design or reiterative drawing, at least part of the transverse non-metallic areas being wholly surrounded with metal.

[0006] Spanish patent applications Nr. 200400255 and 2075787 disclose a security band and a security paper. In order to avoid counterfeiting the security band is constituted by several sectors showing a discontinuous background providing enhanced security against forgery. This discontinuous background consists of a printed dot section.

[0007] It is an object of the invention to provide security elements which may be at least partially embedded into substrates or applied thereon, which appear similar to known security elements having patterns, characters or the like, which may be defined by recesses in a coating or by the opaque coating itself..

[0008] Object of the invention are therefore security elements with patterns and/or characters and the like being defined by an opaque coating or by recesses in an opaque coating, characterized in that the opaque coating is formed by screen printing or screened partial metallization.

[0009] Suitable as a carrier substrate for the security element according to the invention are, for example, carrier films, preferably flexible plastics films, for example of PI, PP, MOPP, PE, PPS, PEEK, PEK, PEI, PSU, PAEK, LCP, PEN, PBT, PET, PA, PC, COC, POM, ABS, PVC. The carrier films preferably have a thickness of 5

- 700 μm , preferably 5 - 200 μm , particularly preferably 5 - 50 μm .

[0010] Furthermore, metal foils, for example Al, Cu, Sn, Ni, Fe or stainless-steel foils with a thickness of 5 - 200 μm , preferably 10 to 80 μm , particularly preferably 20 - 50 μm , can be used as a carrier substrate. The foils can also be surface treated, coated or laminated, for example to plastics, or varnished.

[0011] Furthermore, paper or composites with paper, for example, composites with plastics with a grammage of 20 - 500 g/m², preferably 40 - 200 g/m², can be used as carrier substrates.

[0012] Furthermore, fabrics or nonwovens, such as endless fibre nonwovens, staple fibre nonwovens and the like, which may possibly be needled or calendered, can be used as carrier substrates. Such fabrics or nonwovens preferably consist of plastics, such as PP, PET, PA, PPS and the like, but fabrics or nonwovens of natural, possibly treated fibres, such as viscose fibre nonwovens, can also be used. The fabrics or nonwovens used have a grammage of about 20 g/m² to 500 g/m². If appropriate, the fabrics or nonwovens can be surface-treated.

[0013] The security features are preferably printed on the carrier substrate by conventional printing techniques such as letterpress, photogelatine printing, offset printing, offset lithography, gravure printing, intaglio gravure printing seamless and sheet fed, Intaglio printing, screen printing, flexo printing, digital printing. Digital printing is used in an impact and non-impact way and with different toners and inks like dry or wet toner, water based, solvent based or UV inks.

[0014] The design of the screen is to be fine enough to build an opaque appearance when viewed at a certain distance with the naked eye, e.g. from 15 cm or more, or if viewed if embedded in or applied to paper or other substrates, but if viewed under a magnifying glass the screen can be detected.

[0015] This screen will normally shape the background of letters or symbols incorporated in the security element, which will adjust to it due to the absence of dots.

[0016] One of the advantages achieved is that the shape of the background by means of a discontinuous pattern instead of a continuous background makes it more difficult to be copied by optical means, therefore obtaining a higher security.

[0017] Moreover, the shaping of the background by means of a screen allows the addition of fluorescent, phosphorescent, luminescent or magnetic elements, either in the dots and/or in the space between them, either making out the dots area from the space using different colour fluorescent materials.

[0018] It is possible, by means of simple printing techniques, to obtain the discontinuous dot pattern with the reported standards as far as counterfeiting difficulty is concerned, while a background viewed as continuous is simulated.

[0019] The dot screen will show a distribution of the dots that shape it according to the following geometrical

features:

The dots will be spread in lines which form a lining ranging between 30 and 200 lines per centimetre, within the usual lining angles.

The minimum distance between the centres of the dots which are spread in the same diagonal stands between 10 and 270 microns."

The screen may be of any desired appearance, for example, points, microletters and the like.

[0020] Preferably the recesses defined by screened printing may be outlined by fine continuous structures or lines, so as to sharpen the contours of the recesses. These continuous outlines may be of same material or outlook as the screened printed portions or may have different e.g. optical appearance

[0021] These screen printed layers, which appear opaque under the conditions described above may be layers which have optical properties, such as colour, or layers which have other (additional) functional properties, such as, for example, fluorescent, phosphorescent, luminescent, magnetic or electrically conductive properties.

[0022] The optical properties of a layer may be influenced by visible dyestuffs or pigments, luminescent dyestuffs or pigments which fluoresce or phosphoresce in the visible, in the UV range or in the IR range, effect pigments, such as liquid crystals, pearl lustre, bronzes and/or multilayer colour-change pigments and heat-sensitive colours or pigments. These can be employed in all possible combinations. In addition, phosphorescent pigments can also be employed on their own or in combination with other dyestuffs and/or pigments.

[0023] Furthermore, electrically conductive layers can also be present on the substrate or applied subsequently, for example electrically conductive polymer layers or conductive ink or varnish layers.

[0024] In order to set the electrical properties, the ink to be applied or the varnish to be applied can have added to it, for example, graphite, carbon black, conductive organic or inorganic polymers, metal pigments (for example copper, aluminium, silver, gold, iron, chromium and the like), metal alloys like copper-zinc or copper-aluminium or else amorphous or crystalline ceramic pigments such as ITO, ATO, FTO and the like. Furthermore, doped or non-doped semiconductors, such as silicon, germanium, doped or non-doped polymer semiconductors or ion conductors such as amorphous or crystalline metal oxides or metal sulphides can also be used as an additive. Furthermore, in order to set the electrical properties of the layer, polar or partially polar compounds such as surfactants, or non-polar compounds such as silicone additives or hygroscopic or non-hygroscopic salts can be used or added to the varnish.

[0025] As a layer with electrical properties, a whole-area or partial metal layer can also be applied, it being possible for the partial application to be carried out by

means of an etching process (application of a whole-area metal layer and subsequent partial removal by etching) or by means of a demetallization process.

When a demetallization process is used, an ink which is soluble in a solvent is preferably applied in a first step (if appropriate in the form of inverse coding), and then, if appropriate following activation of the carrier substrate by means of a plasma or corona treatment, the metal layer is applied, whereupon the soluble ink layer is separated by means of treatment with a suitable solvent, together with the metallization present in these regions.

[0026] Furthermore, an electrically conductive polymer layer can also be applied as the electrically conductive layer. The electrically conductive polymers can be, for example, polyaniline or polyethylene dioxythiophene.

[0027] It is also possible to add carbon black or graphite, for example, to the magnetic ink used, by which means a simultaneously magnetic and also electrically conductive layer with defined coding can be produced particularly advantageously in accordance with the method of the invention.

[0028] The carrier substrate can, however, already additionally have a varnish or ink layer, which can be unstructured or structured, for example embossed. The varnish layer can be, for example, a transfer varnish layer which is capable of release, it can be cross-linked or cross-linkable by radiation, for example UV radiation, and can be finished so as to be scratch-resistant and/or anti-static. Both aqueous and solid varnish systems are suitable, in particular varnish systems based on polyester-acrylate or epoxy acrylate, or colophonium, acrylate, alkyd, melamine, PVA, PVC, isocyanate, urethane systems, which can be conventionally or reactively curing (mixture or radiation-curing).

[0029] In each case an extremely wide range of compositions can be used as the ink or varnish layers. The composition of the individual layers can in particular vary in accordance with their task, that is to say whether the individual layers are exclusively to serve decoration purposes or are to be a functional layer or whether the layer is to be both a decorative and a functional layer.

[0030] These layers can be pigmented or non-pigmented. The pigment used can be all known pigments, such as titanium dioxide, zinc sulphide, kaolin, ITO, ATO, FTO, aluminium, chromium and silicon oxide and also coloured pigments. Here, varnish systems containing solvent and also systems without solvent can be used.

[0031] Various natural or synthetic binders are suitable as binders.

[0032] Furthermore, further surface relief structures, for example diffraction gratings, holograms and the like, are also suitable as additional security features, it being possible for these structures, if appropriate, also to be metallized or partially metallized.

[0033] For the production of such surface structures, first of all a UV-curable thermoformable varnish is applied. Then, for example, by demoulding from a die, a surface structure can be produced in this varnish which,

at the time of demoulding, has been pre-cured as far as the gel point, the radiation-curable varnish then being cured completely following the application of the surface structure.

[0034] As a result of using the UV-curable varnish, following curing, the layers applied thereto, and also a surface structure which may be introduced if appropriate, are stable even under temperature stress.

[0035] The radiation-curable varnish can be, for example, [lacuna] a radiation-curable varnish system based on a polyester system, an epoxy system or a polyurethane system which contains two or more different photo initiators familiar to those skilled in the art and which, at different wavelengths, can initiate curing of the varnish system to a different extent. For example, a photo initiator can be capable of activation at a wavelength of 200 to 400 nm, the second photo initiator then at a wavelength of 370 to 600 nm. Between the activation wavelengths of the two photo initiators, a sufficient difference should be maintained in order that excessive excitation of the second photo initiator does not take place while the first is being activated. The region in which the second photo initiator is excited should lie in the transmission wavelength range of the carrier substrate used. For the main curing (activation of the second photo initiator), electron radiation can also be used.

[0036] A varnish that can be diluted with water can also be used as a radiation-curable varnish. Varnish systems based on polyester are preferred.

[0037] Furthermore, the security elements according to the invention can be provided with a protective varnish layer on one or both sides. The protective varnish can be pigmented or non-pigmented, it being possible for all known pigments or dyestuffs, for example TiO_2 , ZnS, kaolin, ATO, FTO, aluminium, chromium and silicon oxide or, for example, organic pigments such as phthalocyanin blue, i-indolide yellow, dioxazine violet and the like to be used. Furthermore, luminescent dyestuffs or pigments which fluoresce or phosphoresce in the visible, in the UV range or in the IR range, effect pigments such as liquid crystals, pearl lustre, bronzes and/or multilayer colour-change pigments and heat-sensitive colours or pigments can be added. These can be employed in all possible combinations. In addition, phosphorescent pigments can be employed on their own or in combination with other dyestuffs and/or pigments.

[0038] Furthermore, the security element according to the invention can be provided with a hot-melt or cold-seal adhesive or a self-adhesive coating for application to the valuable document to be protected or a package.

[0039] It is also possible to laminate the security elements to a further carrier substrate which, if appropriate, has further functional layers.

[0040] The security elements according to the invention, if appropriate following appropriate tailoring (for example to form threads, ribbons, strips, patches or other formats), are therefore used as security features in data carriers, in particular valuable documents such as identity

papers, cards, banknotes or labels, seals and the like, but also in packaging materials for sensitive goods, such as pharmaceuticals, foodstuffs, cosmetics, data carriers, electronic components and the like. Furthermore, the security elements can be applied to packaging materials for an extremely wide range of goods, for example to films, paper, boxes, cartons and the like.

10 Claims

1. Security elements with patterns and/or characters and the like being defined by an opaque coating or by recesses in an opaque coating, **characterized in that** the opaque coating is formed by screen printing or screened partial metallization.
2. Security elements according to claim 1, **characterized in that** the opaque coating appears continuous when viewed from a distance of about 15 cm and more or if embedded in paper.
3. Security elements according to one of the claims 1 or 2, **characterized in that** the screen is in the form of dots, points, microletters and the like.
4. Security elements according to one of claims 1 to 3, **characterized in that** the minimum distance between the centres of the dots, points or microletters is 10 to 270 μm .
5. Security elements according to one of claims 1 to 4, **characterized in that** the opaque coating or the recesses the opaque coating are outlined by fine lines.
6. Security elements according to claim 5, wherein the outlines have the same visual appearance as the opaque coating.
7. Security elements according to claim 6, wherein the outlines have a different visual appearance compared to the opaque coating.
8. Security supports, such as data carriers, banknotes, cheques, valuable documents having a security element according to claims 1 to 7 at least partially embedded therein or applied thereon.

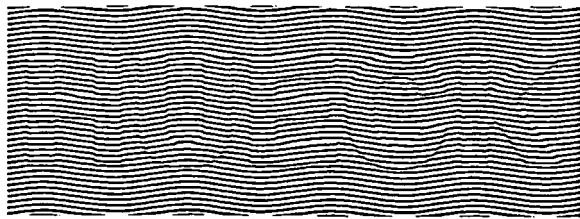


Fig. 1

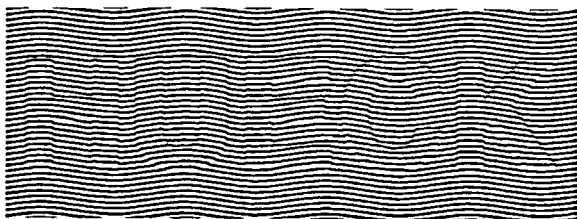


Fig. 2

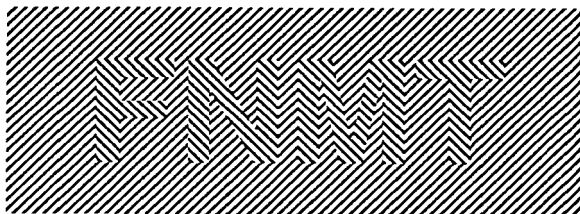


Fig. 3

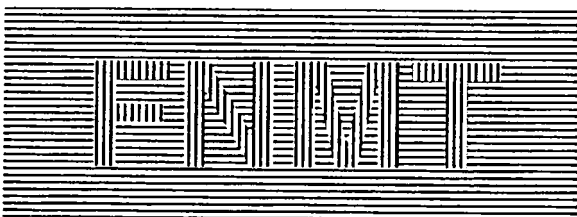


Fig. 4

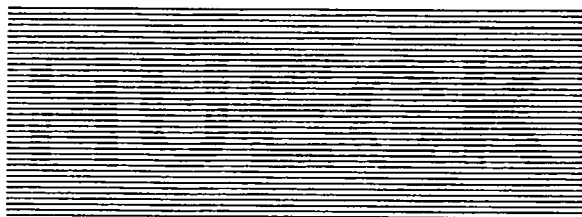


Fig. 5

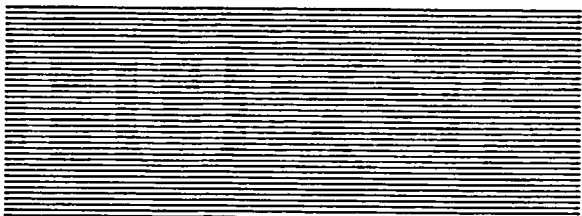


Fig. 6

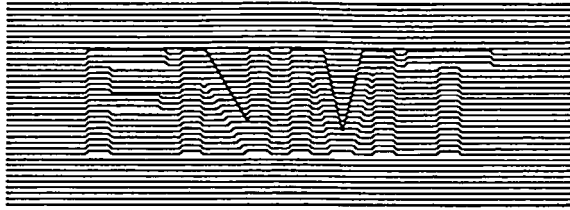


Fig. 7

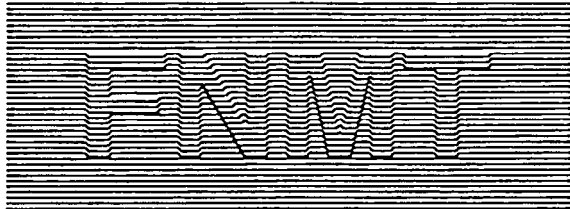


Fig. 8

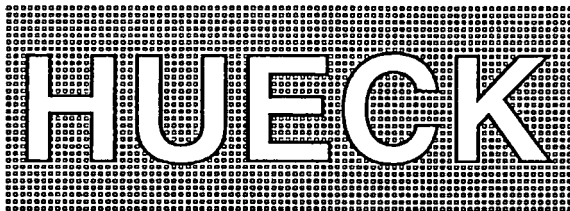


Fig. 9

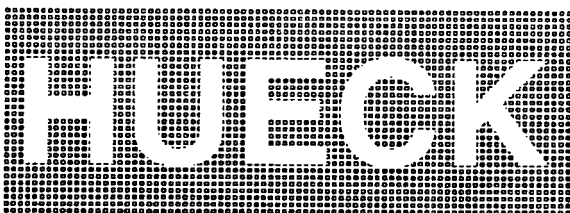


Fig. 10

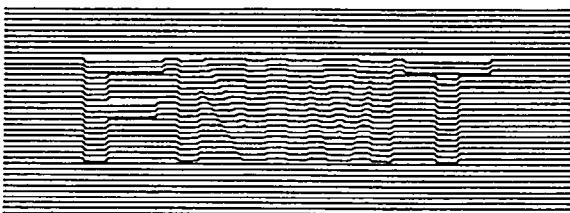


Fig. 11

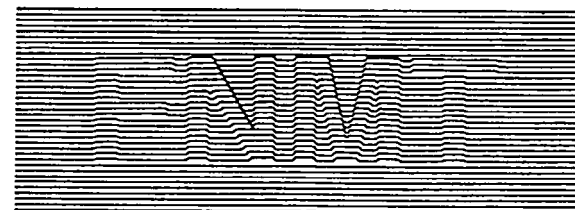


Fig. 12

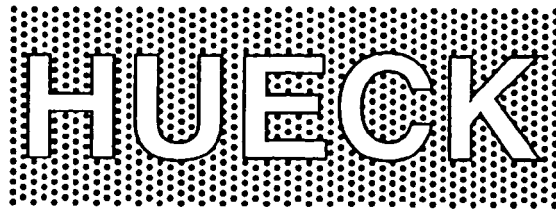


Fig. 13

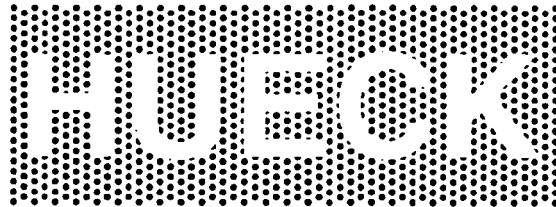


Fig. 14

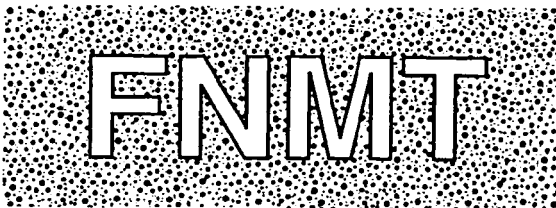


Fig. 15



Fig. 16

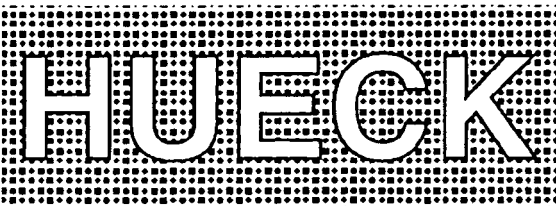


Fig. 17



Fig. 18

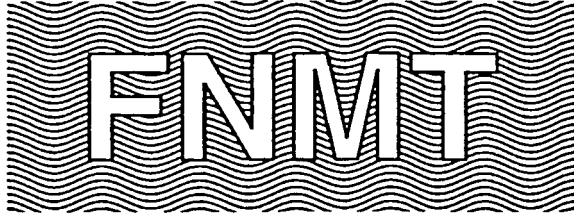


Fig. 19

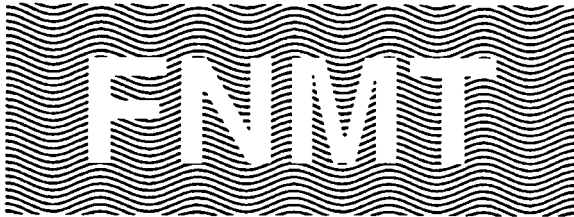


Fig. 20

HUECK

Fig. 21



Fig. 22



Fig. 23



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Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 5716

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 April 2005	Examiner Acton, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)



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EUROPEAN SEARCH REPORT

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Place of search Munich		Date of completion of the search 6 April 2005	Examiner Acton, P
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