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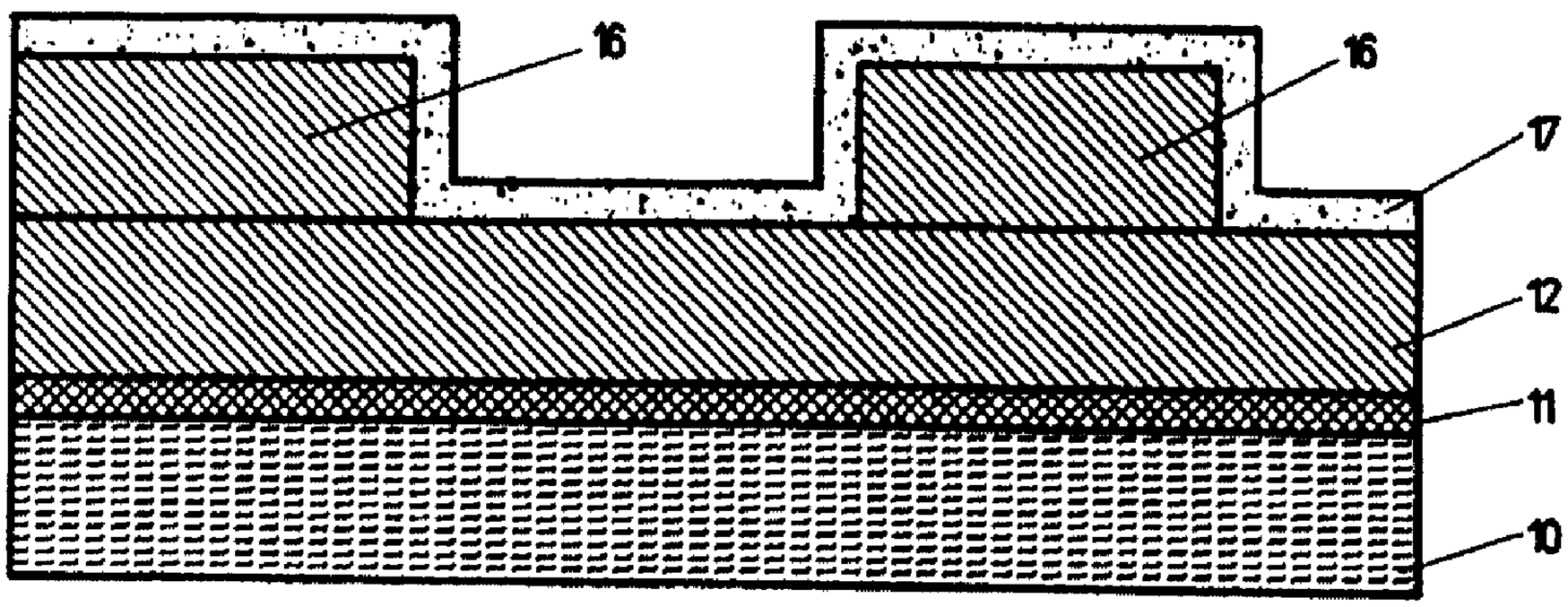
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(54) **MATERIEL D'EMBALLAGE**
(54) **PACKAGING MATERIAL**



(57) L'invention concerne des emballages ou des moyens d'emballage à garantie de première ouverture ou d'origine intégrée, faits d'un substrat (10) et d'une série de couches disposée une ou plusieurs fois sur le substrat. On peut avoir comme substrats (10) des emballages préformés en matériaux emboutis ou un matériau pelliculaire, par exemple des feuilles métalliques, des laminés plastiques, des papiers ou autres. Le substrat présente une surface (11) réfléchissant la lumière visible. On enduit une ou plusieurs fois la surface réfléchissante (11) d'une série de couches constituée d'une ou de plusieurs couches (12, 14, 16) d'un composé de formule SiO_X, par exemple, formule dans laquelle x est un nombre compris entre 1,5 et 2,0, avec une épaisseur se situant dans la plage de 50 à 2000 nm (nanomètres) et on pose, sur la surface libre de la couche en SiO_X, une couche (13, 15, 17) réfléchissante, semi-perméable à la lumière visible, d'un métal d'une épaisseur comprise entre 0,2 et 60 nm (nanomètres). La lumière incidente sur le substrat enduit est réfléchie et on perçoit cette lumière réfléchie dans différentes couleurs selon le sens ou l'angle d'observation.

(57) The invention relates to packaging or packaging devices with an integrated first- opening or authenticity guarantee, consisting of a substrate (10) and a single or multiple series of coatings applied thereto. Moulded packaging made of deep-drawn material, or foil-like material such as metal foil, plastic laminate, paper or similar, can be used as a substrate (10). Said substrate has a surface (11) which reflects visible light. This reflecting surface (11) is covered with a single or multiple series of one or more coatings (12, 14, 16), for example of a compound with formula SiO_X in which x is a number between 1.5 and 2, with a thickness of 50-2000 nm (nanometers). The free surface of the SiO_X coating has a reflecting metal coating (13, 15, 17) which is semipermeable to visible light and has a thickness of 0.2-60 nm (nanometers). Light striking the coated substrate is reflected, and the reflected light is perceived in different colours in accordance with the direction or angle of observation.

PCT

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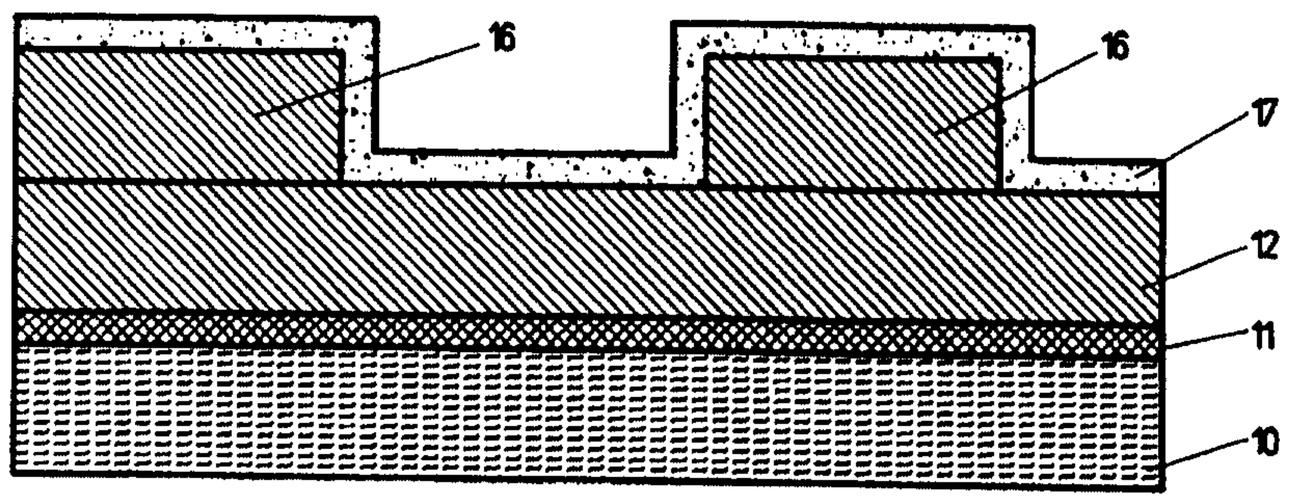
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(54) Title: PACKAGING MATERIAL

(54) Bezeichnung: VERPACKUNGSMATERIAL



(57) Abstract

The invention relates to packaging or packaging devices with an integrated first– opening or authenticity guarantee, consisting of a substrate (10) and a single or multiple series of coatings applied thereto. Moulded packaging made of deep–drawn material, or foil–like material such as metal foil, plastic laminate, paper or similar, can be used as a substrate (10). Said substrate has a surface (11) which reflects visible light. This reflecting surface (11) is covered with a single or multiple series of one or more coatings (12, 14, 16), for example of a compound with formula SiO_x in which x is a number between 1.5 and 2, with a thickness of 50–2000 nm (nanometers). The free surface of the SiO_x coating has a reflecting metal coating (13, 15, 17) which is semipermeable to visible light and has a thickness of 0.2–60 nm (nanometers). Light striking the coated substrate is reflected, and the reflected light is perceived in different colours in accordance with the direction or angle of observation.

Forms of Packaging and Packaging Aid

The present invention relates to forms of packaging or packaging aids having an integral guarantee of first-time opening and/or of original pack containing a substrate with a reflecting surface and a process for manufacturing such forms of packaging or packaging aids.

It is known to make forms of packaging or packaging aids secure against falsification using holograms, colour codes or invisible features. In order to be able to determine whether a package has already been opened, either with or without permission, a guarantee of first-opening is provided on the package itself. This guarantee enables the customer to see if the purchased item has actually been produced and packaged by the desired manufacturer and is not an imitation or falsification. The first-opening guarantee may e.g. be in the form of a label, stamp or sealing strip etc. which is positioned e.g. over a closure on a bottle or wide necked glass, over the seam joining the lid and a container or over the tear-off closure on a pouch. On opening the packaging in question, the label, stamp or sealing strip is broken, showing that the package has already been opened. It is also possible to transfer or enclose items on repackaging such that - by means of characteristic, unmistakable features that cannot be copied – it is clear which supplier packaged the goods in question.

In practise holograms e.g. have found use for this purpose. Examples of this are hologram labels or lidding foils with integral holograms. It is, however, extremely expensive to produce holograms. In view of the fact that forms of packaging and packaging aids are employed for short-lived products that are used only once, efforts are being made to provide forms of packaging or packaging aids that are cost-favourable to produce, but cannot be easily falsified.

That objective is achieved by way of the invention in that, provided on the reflecting surface (11) of metal or on the metallic reflecting surface (11) is a single or plurality of layers of one or more ceramic layers (12, 14, 16) containing or comprising a compound having the formula SiO_x, where x represents a number from 1.5 to 2.0, each layer having a thickness of 50 to 2000 nm (nanometre), and over the surface of the ceramic layer or over at least one of the surfaces of the ceramic layers, a layer (13, 15, 17) which is semi-permeable for visible light is provided, said layer being of metal and having a thickness of 0.2 to 60 nm (nanometre), and is such that light striking the coated substrate is reflected and the reflected light is seen as different colours depending on the direction or angle at which it is observed.

The integral guarantee of first-time opening and/or of origin on the packaging or packaging aid according to the present invention can always be recognised by the observer under day-light or artificial light, directly and without the assistance of any kind of apparatus. The colour or shade of colour seen by the observer depends on the direction or angle at which the package or packaging aid is viewed.

The substrate employed may e.g. be any kind of packaging material of choice. The packaging material may be rigid, semi-rigid or flexible and may be a shaped body or, in particular, a film or foil-type material. Examples of shaped bodies are blown, deep-drawn and/or stretch-drawn or deepened shaped bodies such as bottles, wide-necked containers, beakers, dishes or base parts of push-through packs. Examples of foil-type materials are metal foils of aluminium, steel, copper, silver or gold. Other examples of foil-type materials are paper such as tissue paper with a weight per unit area of 20 to 30 g/m^2 or highly whitened paper having a weight per unit area of 40 to 60 g/m^2, cardboard, semi-cardboard or the like. Important are in particular films containing plastic e.g. plastics based on polyolefins, polyethylenes or polypropylenes, polyamides, polyvinylchloride, polyesters such as polyalkylene-terephthalates and in particular polyethylene-terephthalate. The films containing plastic may be mono-films of plastics, laminates of two or more plastic films, laminates of metal foils and plastic films, laminates of two or more plastic films, laminates of metal and plastic films, laminates of papers and plastic films or laminates of papers and metal foils and plastic films. The individual plastic films may be e.g. from 12 to 100 µm thick and the metal foils from 12 to 100 µm thick. Substrates and also laminates may be e.g. of papers, semi-cardboard, card-board and metal foils. The individual layers of foil type materials may be joined together by means of adhesives, laminating agents, bonding agents an/or by extrusion coating, co-extrusion or laminating etc.

Preferred substrates are non-oriented or singly or biaxially oriented monofilms or laminates of two or more non-oriented or singly or biaxially oriented plastic films based on polyolefins such as polyethylenes or polypropylenes, polyamides, polyvinylchloride, polyesters such as polyalkylene-terephthalates and in particular polyethylene-terephthalate. For example mono-films acting as the basic substrate may be provided with the layers according to the invention and, in subsequent processing steps, the monofilms deposited in further layers until the final substrate has been formed.

Further typical examples of substrates have the following make up:

a) a first layer containing a non-oriented, singly or biaxially oriented monofilm or a laminate of two or more non-oriented, singly or biaxially oriented films of plastics based on polyolefins such as polyethylenes or polypropylenes, polyamides, polyvinylchloride, polyesters such as such as polyalkylene-terephthalates and in particular polyethylene-terephthalate and/or a paper such as tissue paper with a weight per unit area of 20 to 30 gm/m^2 or a highly whitened paper of 40 to 60 gm/m^2, or a protective layer of organic coating ,

b) a second layer such as a metal foil and in particular aluminium foil,

c) a third layer in the form of a deposited layer of hot sealing organic material;

or

a) a first layer, as described above,

b) the second, layer as described above,

c) a third layer of non-oriented, singly or biaxially oriented monofilm or a laminate of two or more non-oriented, singly or biaxially oriented films of plastics based on polyolefins, such as polyethylenes or polypropylenes, polyamides, polyvinylchloride, polyesters such as such as polyalkylene-terephthalates and in particular polyethylene-terephthalate or a cast polyethylene coating;

or

a) this layer omitted,

b) a first layer, such as a metal foil and in particular an aluminium foil,

c) a second layer containing one or more singly or biaxially oriented monofilm or a laminate of two or more non-oriented, singly or biaxially oriented films of plastics based on polyolefins, such as polyethylenes or polypropylenes, polyamides, polyvinylchloride, polyesters such as such as polyalkylene-terephthalates and in particular polyethylene-terephthalate, and/or a paper such as a tissue paper with a weight per unit area of 20 to 30 g/m^2 or highly whitened paper having a weight per unit area of 40 to 60 g/m^2, or a protective organic coating.

As a rule the first layer a) faces outwards from the packaging or is itself the outward facing side of the packaging. Accordingly, the reflecting surface is situated on the free surface of layer a) or the free side of layer b) represents the reflecting surface. On using available packaging material e.g. as lidding material for covering transparent containers, such as

transparent base parts of blister packs or transparent beakers or the like, a reflecting surface and the series of layers according to the invention deposited thereon may be directed towards the inside of the package and be visible through the transparent base part, beaker or the like.

The substrate must exhibit the outer lying surface that reflects visible light. For that reason it is necessary for the paper, cardboard or semi-cardboard, monofilms or laminates with outer lying plastic layers to feature a reflecting surface layer. In the case of metal foils the reflecting layer can be the metal foil itself. Metal foils acting as reflecting layer can already exhibit a shiny to highly reflecting surface. If such a metal foil is not present on the substrate, or if the metal foil is embedded between other layers, or if the reflecting properties of the metal foil are inadequate, then a reflecting layer may be deposited, for example by chemical, wet chemical or physical deposition of a metal. The deposition of the metal can take place preferably by a vacuum thin film deposition process such as chemical vapour deposition (CVD) or physical vapour deposition (PVD) or by sputtering. If the substrate is a material that can be bent, then this coating may be performed continuously inn a coil treatment process.

On the reflecting surface are one or more ceramic layers in the form of a compound having the formula SiO_x or containing a compound having the formula SiO_x, where x is a number from 1.5 to 2.0, usefully a number from 1.5 to 1.9, and preferably a number from 1.5 to 1.8. Such ceramic layers have low refractive indices, preferably with values smaller than 1.6. The ceramic layers may be obtained by methods such as vacuum thin film deposition techniques, usefully based on electron-beam vaporisation or resistance heating or inductive heating of the materials to be vaporised, known e.g. as target materials or targets. Preferred is electron-beam vaporisation. The described processes may be reactive and/or be assisted by ion beam bombardment. These processes are carried out in such a manner that the materials to be vaporised e.g. mixtures of silicon dioxide and the semi-metal silicon are vaporised in vacuum in a vacuum chamber. In the vacuum chamber a ceramic layer of, or containing, compounds of the formula SiO_x is deposited over the whole of the surface of the substrate and forms the ceramic layer on the side of the substrate exposed to the vaporised material. The desired value x may be arrived at e.g. by adjusting the stoichiometric ratio of SiO_2 to Si or SiO_2 to Si and other additives. The ratio of quantities of the oxygen-containing compound to semi-metal Si may in accordance with the invention represent a deficit in oxygen amounting to 10 to 30% with reference to the pure oxide in the vaporised material.

The present invention relates therefore to a process for manufacturing forms of packaging and/or packaging aids with integral guarantee of first opening and/or origin, containing a substrate with a surface that reflects visible light. According to the process, a vacuum thin film deposition process is employed to deposit onto the reflecting surface - simultaneously in vacuum – silicon dioxide (SiO_2) and the semi-metal silicon (Si) as material to be vaporised, at least a 50 to 2000 nm (nanometre) thick ceramic layer comprising or containing a compound having the formula SiO_x, where x represents a number of 1.5 to 2.0 and, subsequently, a 0.2 to 60 nm (nanometre) thick reflecting layer of a metal that is semi-permeable to visible light is deposited - for example by sputtering - on the free surface of the ceramic layer.

Further additives such as Al_2O_3, B_2O_3 and/or MgO may be added to the SiO_2 for vaporisation in amounts of e.g. up to 50 mol%, usefully at least 5 mol% and advantageously up to 30 mol%, in each case with reference to the amount of SiO_2. Further materials that may also be added for vaporisation to the SiO_2 are materials such as Al, B and/or Mg, in pure form or as a Si alloy, containing Al, B and/or Mg. The additions of Al, B and/or Mg may be in amounts of e.g. up to 50 mol%, usefully at least 5 mol % and advantageously up to 30 mol%, in each case with reference to the amount of Si. The quantitative ratios of the oxygen-containing compounds such as SiO_2, Al_2O_3, B_2O_3 and MgO to the metals or semi-metals are selected e.g. such that in the vaporised material there is a stoichiometric deficit of oxygen amounting to 10 to 30% - referred to the sum of pure oxides (SiO_2 and possibly Al_2O_3, B_2O_3 and/or MgO).

The coating process is controlled via the rate of vaporisation of the material in the crucible, the deposition rate on the substrate and the duration for which the substrate is exposed to the atmosphere in the vacuum chamber, and such that a 50 nm (nanometre) to 2000 nm thick, usefully 100 to 1000 nm thick, preferably 150 to 500 nm thick layer of ceramic material is deposited. These layer thicknesses define the colour effect that can be achieved.

Over the whole or part of the surface of the first ceramic layer may be deposited a second layer or a plurality of layers of the above mentioned ceramic materials e.g. materials comprising or containing compounds having the general formula SiO_x, each layer having a thickness of the thicknesses given for the first ceramic layer. In the case of partial coverage, the second layer may have the form of a pattern such a logo, a character, series of lines etc. Visual effects can be created by the reflection of the incident radiation by the layers of different thickness.

A further layer of a metal of thickness 0.2 to 60 nm (nanometre), usefully 1 to 40 nm and preferably 2 to 20 nm, is provided over the ceramic layer or layers. This additional layer reflects the visible light in a semi-transparent manner and comprises or contains e.g. one or more of the following metals viz., stainless steels, Ni, Al, Cu, Ag, Au and preferably Cr. The semi-transparent layer of metal may be deposited using a further vacuum thin film deposition process, such as described above, with one of the above mentioned metals as the material to be vaporised or by sputtering with one of the above mentioned metals as the target. The target may e.g. be one of the following metals viz., stainless steel, nickel, aluminium, copper, silver, gold and preferably chromium or mixtures or alloys thereof containing or comprising the above mentioned metals. In continuous coating processes the substrate may be coated with the ceramic layer in a first chamber, then passed through a slit-type gate and into a further chamber where the semi-transparent layer of metal is deposited by sputtering.

Additionally, it is also possible to print over part of the semi-transparent reflecting layer of metal using any coloured printing material of choice. The printing may take the form of an image such as a logo, a character, patterns of lines etc. in one or more colours. In order to achieve the effectiveness of the layer system according to the invention, the printed image may be deposited only over part of the surface area.

A printed image, for characterising the packaging and packaging aid and protecting the same from falsification, may be deposited directly onto the reflecting layer of the substrate in another or additional manner. The printing may take the form of an image such as a logo, a character, patterns of lines etc. in one or more colours with the provision that the colour white is not employed. Transparent printing colours and clear organic materials are especially suitable and, as a result of the small amount of pigment or colorant, form a transparent or translucent covering. The image printed directly onto the reflecting surface using by way of preference a transparent printing material may be in one or more colour tones and the colour tones correspond especially to those colours that are created by the layer system according to the invention when observed at a particular angle. On viewing the packaging or packaging aid at the particular angle the printed image disappears as the colour of the image and the colour created by reflection of the light through the different layers is the same.

The reflecting layer may be also be provided with a logo, character, pattern of lines etc. by chemical means such as etching and the like. The ceramic layer then lies on the printed image or etched pattern. Before or after depositing the layers, it is also possible to emboss into the substrate a pattern such as a logo, a character, pattern of lines, this in particular when

employing a metal foil substrate, i.e. for example by using embossing rolls or embossing stamps. Before or after the printing according to the invention, it is also possible, for example when the substrate in the form of a film, to stretch the substrate into the shape of a form of packaging e.g. using deep drawing or stretch drawing or a process combining deep drawing and stretch drawing. The embossing and stretching processes do not influence the colour effect, or if so then only slightly, and the colour effect is still retained.

The already mentioned processes of vacuum thin layer deposition based on electro-beam vaporisation and sputtering may be refined for the purpose of coating the substrates in question. By continuously measuring the reflection spectrum of the coated substrate, and with that the colour of the layer system on the substrate, the power of the electron beam can be raised or lowered as required until the desired layer thickness or colour is achieved. The control may be made via an automatic control system. In continuous processes the deposition rate may in some cases be controlled via the rate of advance of the substrate. The process and the choice of the described material for vaporisation or target material employed to create the layers of the mentioned ceramic materials enable e.g. high throughput rates of up to 100 m/min while coating strip shaped substrates, or coating rates of up to 200 m^2/min. Particularly clear ceramic layers, free of yellowness, are obtained by appropriately choosing the material for vaporisation or target materials and creating ceramic layers of or containing the compounds having the general formula SiO_x, where x represents a value between 1.5 to 2.0. The formation of oxygen, which has to be pumped off continuously in order to maintain the vacuum, is reduced as a result of the fractions of Si, Al, B or Mg in the materials to be vaporised. This leads on the whole to high vaporisation rates.

The series of layers according to the invention may finally be covered over by a protective, outer or hot sealing layer or in particular with a transparent plastic film or laminate or plastic extrudate e.g. in order to protect it from damage due to abrasion or the likes. Typical films, laminates or extrudates for that purpose contain e.g. polyolefins such as polypropylene.

The substrate treated as described above may form the packaging or packaging aid according to the invention. For example by stamping out and sealing it is possible to manufacture e.g. pouches, sachets, wraps, bags etc. from film-shaped substrates. Using deep drawing and/or stretch drawing methods, films may be shaped into shaped packaging forms such as base parts for push-through packs or blister packs, or wide-necked containers, menu dishes goblets, beakers etc. For example tubes (laminate tubes) or lids for shaped forms of packaging may be manufactured from the films. From substrates containing e.g. carton it is

possible to make boxes such as collapsible boxes. It is also possible to employ e.g. bottles from blown plastics, or pre-formed shaped packaging as substrates and to deposit the series of layers according to the invention onto them. Closures, openings, seams, seams between a base part and the related lid etc. can be provided with a packaging aid according to the invention in the form of a label, sealing strip, stamp, guarantee seal or covering seal. As a rule the latter packaging aids are in film form and are attached to the container in question across an opening and to the surrounding part of the container e.g. by adhesive bonding, welding, flanging or shrinking etc. The packaging aid features the layer structure according to the invention that protects against falsification. This layer structure, in some cases including the additional measure of a printed or etched pattern, shows e.g. a readily recognised identification mark on the package typical of the manufacturer. The layer structure results in the desired reflection of the incident light and colour displacement of the reflected light according to the angle of viewing. Falsification by photocopying the packaging aid and use of the photocopy as a guarantee of original pack and manufacturer would be immediately and easily recognisable as the reflection and colour displacement would be missing. In order that the packaging aid, e.g. sealing strip or stamp, may be more easily broken by the consumer, it may be expedient to provide aids to tearing such as weaknesses, notches or pull-off tabs. It is also possible to employ as substrate easy-to-tear or push-through films, such as plastic films containing filler materials or films of two poorly compatible plastics. Other substrates are shrink films.

The figures 1 to 3 show by way of example cross-sections through the layers of a packaging or packaging aid according to the invention.

Shown in figure 1 is a substrate (10) such as a laminate of plastics having a reflecting surface (11), for example covered with a layer e.g. an aluminium layer deposited by sputtering. On top of the reflecting layer (11) is the series of layers comprising two layers (12, 16) of a compound having the formula SiO_x, where x is a number from 1.5 to 2, each layer having a thickness in the range 50 to 2000 nm (nanometre) and, on top of the free surface of the SiO_x layers (12, 16), a 0.2 to 60 nm thick reflecting layer (17) of metal which is semi-transparent to electromagnetic radiation in the visible light range. The layer (16) of a compound having the formula SiOx represents a deposit which is only partially covering in the form of a pattern such a pattern of lines. In a first process step the layer (12) is deposited over the whole of the surface and in a second step parts of the first layer (12) are masked e.g. by structured vapour deposition of oils (such as is known from the manufacture of capacitor foils) or covered by a template etc. and the second layer (16) vapour deposited onto it. On removing the covering,

the layer (16) is retained as an image of the spaces between the covering and the first layer (12).

Figure 2 shows a substrate (10), for example a laminate of plastics, a reflecting surface (11), for example a reflecting layer of e.g. aluminium produced by sputtering. Over the reflecting surface (11) is a series of layers comprising a 50 to 2000nm (nanometre) thick layer (12) of a compound having the formula SiO_x, where x is a number from 1.5 to 2.0, and on top of the free surface of the SiOx layer a 0.2 to 60 nm (nanometre) thick reflecting layer (13) of metal, that is semi-transparent to electromagnetic radiation in the visible light range.

Shown in figure 3 is a substrate (10), for example a laminate of plastics covered by a reflecting layer e.g. of aluminium as reflecting surface (11). On top of the reflecting surface (11) is a series of layers repeated twice each comprising a 50 to 2000nm (nanometre) thick layer (12, 14) of a compound having the formula SiO_x, where x is a number from 1.5 to 2.0, and on top of the free surface of the SiO_x layers a 0.2 to 60 nm (nanometre) thick reflecting layer (13, 15) of metal, that is semi-transparent to electromagnetic radiation in the visible light range.

Instead of the laminates mentioned in the examples, it is possible to employ any of the other mentioned substrates. If a substrate (10) with a reflecting surface (11) is employed, then the reflecting layer may be omitted. A coloured printed image and/or several additional layers, for example a film or extrudate of a transparent material such as polyethylene or polymers with ethyl-acrylic acid (EAA) may be deposited on the free side of the of the uppermost semi-transparent reflecting layer (13, 15, 17). A printed image may be provided directly on the reflecting surface (11) facing the layer (12), said printed image being made using a clear organic coating or in particular a transparent printing material. The reflecting surface (11) may also be characterised by way of an embossed or etched image.

Claims

1. Forms of packaging or packaging aids having integral guarantee of first-time opening and/or of original pack containing a substrate (10) with a reflecting surface (11),

characterised in that,

on the reflecting surface (11) of metal or on the metallic reflecting surface (11) there is provided a single or plurality of layers of one or more ceramic layers (12, 14, 16) containing or comprising a compound having the formula SiO_x, where x represents a number from 1.5 to 2.0, each layer having a thickness of 50 to 2000 nm (nanometre) and, over the surface of the ceramic layer (12) or over at least one of the surfaces of the ceramic layers(12, 14, 16), a reflecting layer (13, 15, 17) which is semi-permeable to visible light is provided, said layer (13, 15, 17) being of metal and having a thickness of 0.2 to 60 nm (nanometre), and is such that light striking the coated substrate is reflected and the reflected light is seen as different colours depending on the direction or angle at which it is observed.

2. Forms of packaging or packaging aids according to claim 1, characterised in that on the reflecting surface (11) is provided a plurality of layers of two or more ceramic layers (12, 16), containing or comprising a compound having the formula SiO_x, where x represents a number from 1.5 to 2.0, each layer having a thickness of 50 to 2000 nm (nanometre), and over the free surface of the ceramic layer (12, 16) a reflecting layer (17) which is semi-permeable to visible light, is of metal and has a thickness of 0.2 to 60 nm (nanometre).

3. Forms of packaging or packaging aids according to claim 1, characterised in that on the reflecting surface (11) is provided a plurality of layers comprising a ceramic layer (12), containing or comprising a compound having the formula SiO_x, where x represents a number from 1.5 to 2.0, each layer having a thickness of 50 to 2000 nm (nanometre), and over the free surface of the ceramic layer (12) a reflecting layer (13) which is semi-permeable to visible light, is of metal and has a thickness of 0.2 to 60 nm (nanometre).

4. Forms of packaging or packaging aids according to claim 1, characterised in that on top of the reflecting surface (11) is provided a plurality of layers repeated twice each

comprising a 50 to 2000nm (nanometre) thick ceramic layer (12, 14), containing or comprising a compound having the formula SiO_x, where x is a number from 1.5 to 2.0, and on top of the free surface of each of the SiO_x layers is a 0.2 to 60 nm (nanometre) thick reflecting layer (13, 15) which is of metal and is semi-transparent to electromagnetic radiation in the visible light range.

5. Forms of packaging or packaging aids according to claim 1, characterised in that the reflecting surface (11) contains or comprises a metal layer and the metal layer preferably contains or comprises Al, Cr, Ni, Au or Ag or mixtures or alloys thereof.

6. Forms of packaging or packaging aids according to claim 1, characterised in that the substrate (10) is a single or multilayer material and is preferably a foil-shaped material.

7. Forms of packaging or packaging aids according to claim 1, characterised in that the ceramic layer (12, 14, 16) is a layer produced in a vacuum thin film deposition process, contains or is comprised of SiO_x , said ceramic layer being produced in vacuum by simultaneously vaporising a mixture containing SiO_2 and Si from a vaporisation source.

8. Forms of packaging or packaging aids according to claim 1, characterised in that a first ceramic layer (12) completely covers the reflecting surface (11) and a second or a second and further ceramic layers (16) completely or partially cover the first ceramic layer, thereby creating a pattern.

9. Forms of packaging or packaging aids according to claim 1, characterised in that the semi-transparent reflecting layer (13, 15, 17) contains or comprises a metal viz., stainless steel, Al, Al, Cu, Ag Au and preferably Cr.

10. Forms of packaging or packaging aids according to claim 1, characterised in that a printed image of preferably transparent printing material is deposited directly onto the reflecting surface (11) in one or more colour tones, one, some or all of which correspond to the colours which are created by the system of deposited layers according to the angle of viewing, and such that on viewing the packaging or packaging aid at the particular angle the printed image disappears from view to the

observer, as the colour of the printed image and the colour of the reflected light due to the different layers is the same.

11. Forms of packaging or packaging aids according to claim 1, characterised in that a printed image of one or more printing colours is deposited on the free side of the semi-transparent reflecting layer of metal (13,15,17).

12. Process for manufacturing forms of packaging or packaging aids with integral guarantee of first-opening or original pack, containing a substrate (10) with a surface (11) that reflects visible light, according to claim 1,

characterised in that,

a ceramic layer, which is at least 50 to 2000nm thick, containing or comprising a compound having the formula SiO_x, where x is a number from 1.5 to 2.0, is deposited onto the reflecting surface (11) of metal or the metallic reflecting surface (11) using a vacuum thin film deposition process by simultaneously vaporising in vacuum silicon dioxide (SiO_2) and metallic silicon as material to be vaporised and subsequently a layer of metal of thickness 0.2 to 60 nm which is semi-permeable to visible light is deposited on the free surface of the ceramic layer.

13. Process for manufacturing forms of packaging or packaging aids according to claim 12, characterised in that further additions, usefully Al_2O_3, B_2O_3 and/or MgO in amounts up to 50 mol%, advantageously at least 5 mol% and usefully up to 30 mol%, in each case with reference to SiO_2, are made the material to be vaporised.

14 Process for manufacturing forms of packaging or packaging aids according to claim 12, characterised in that further additions, usefully Al, B and/or Mg in amounts up to 50 mol%, usefully at least 5 mol% and advantageously up to 30 mol%, in each case with reference to SiO_2, are made the material to be vaporised.

15. Process for manufacturing forms of packaging or packaging aids according to claim 12, characterised in that the quantitative ratios of the oxygen-containing compound SiO2 to the amount of Si stoichiometrically represent a deficit in oxygen of 10 to 30% with respect to the pure oxygen in the vaporised material.

16. Process for manufacturing forms of packaging or packaging aids according to claim 13, characterised in that the quantitative ratios of the oxygen-containing compounds SiO_2, Al_2O_3, B_2O_3 and MgO to the metals or semi-metals Si, Al, B and Mg represent a stoichiometric deficit of oxygen amounting to 10 to 30% - referred to the sum of pure oxides in the vaporised material.

17. Process for manufacturing forms of packaging or packaging aids according to claim 12, characterised in that a reflecting layer that is semi-permeable to visible light is deposited on the ceramic layer or layers, said reflecting layer containing or comprising stainless steel, nickel, aluminium, copper, gold and preferably chromium or mixtures or alloys thereof, deposited by sputtering a target containing the metal in question.

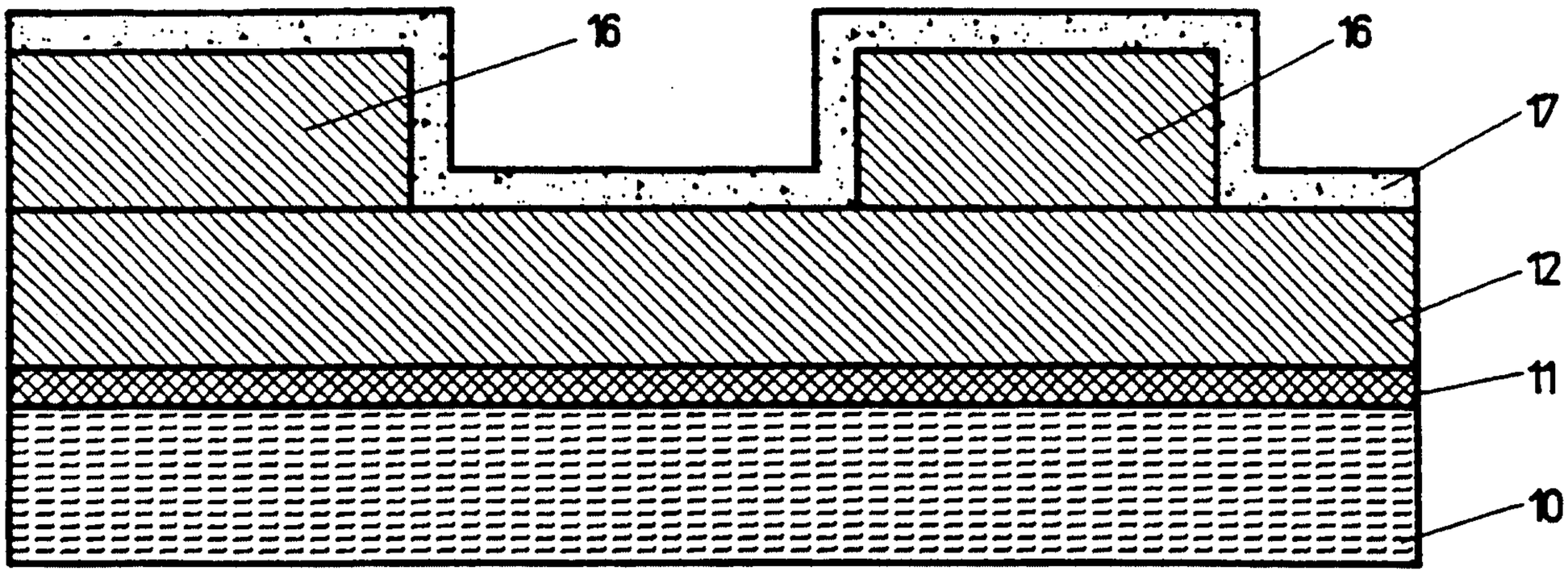
18. Process for manufacturing forms of packaging or packaging aids according to claim 12, characterised in that a printed image of preferably transparent printing material is deposited directly onto the reflecting surface in one or more colour tones, and one, some or all of these colour tones correspond to the colours which are created by the system of deposited layers according to the angle of viewing, and such that on viewing the packaging or packaging aid at the particular angle the printed image disappears from view to the observer, as the colour of the printed image and the colour of the reflected light due to the different layers is the same.

19. Process for manufacturing forms of packaging or packaging aids according to claims 12 and 17, characterised in that the coating processes are carried out continuously and that the substrate obtains the ceramic layer in a first chamber, is passed through a slit-type gate and into a further chamber where the metal layer is deposited on it by sputtering.

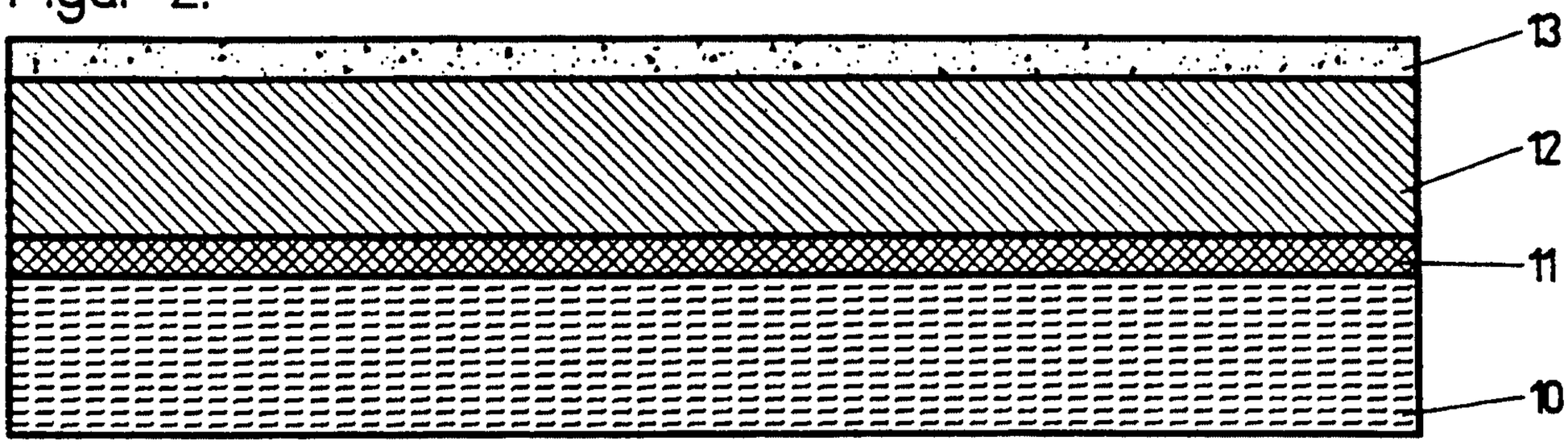
20. Process for manufacturing forms of packaging or packaging aids according to claim 12, characterised in that the substrate, in particular a substrate containing a metal foil, is embossed before or after depositing the layers.

21. Forms of packaging or packaging aids according to claim 1, characterised in that the substrate , especially a substrate containing a metal foil, is embossed.

Figur 1:



Figur 2:



Figur 3:

