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Security document with security feature

Technical Field

The invention relates to a security element for a security document, a security document with such a security element, a method for producing such a security element and a method for examining the authenticity of a security document with such a security element according to the preamble of the independent claims. The invention is particularly suited for the use in bank notes.

Background

Security elements are typically applied to security documents such as bank notes, ID cards, certificates, checks, credit cards and the like in order to secure the security document against falsification and/or adulteration. Typical security elements are for example watermarks, perforations, security strips, holograms and so on, which are only difficult to reproduce. In general, security documents are provided with a plurality of security elements, some of which can be detected with the naked eye, and some of which can only be detected using external testing equipment, for example by viewing through incident light, transmitted light or ultraviolet light.

The documents US 5,582,103 and EP 1 325 816 A2 disclose security elements for security documents, the elements revealing two different pieces of information by way of a specific combination of embossed line grids and printed line grids under two different angles of observation. When viewed straight on, the known prior art security element appears, e.g., as a uniform gray surface, whereas when viewed at an angle from a first direction a gray line appears on a bright background. Upon viewing at an angle from a second direction, the gray line appears on a dark background.

A disadvantage of the disclosed security elements is the relatively low amount of information contained therein.

Disclosure of the invention:

It is therefore an object of the invention to provide an improved security element of the mentioned type having a greater information content. Further objects include providing a security document with such a security element, a method for producing such a security element and a method for examining the authenticity of a security document with such a security element.

These objects are achieved by a security element, a security document, a method for producing such a security element and a method for examining the authenticity of such a security document with such a security element having the features of the independent claims.

The security element according to the invention correspondingly comprises a substrate, such as a film or a paper, with a surface. At least one first, one second, one third and one fourth pattern with a first, a second, a third and a fourth pattern angle are disposed on the substrate. The term pattern angle refers to an alignment or orientation of the respective pattern parallel to the surface of the substrate. The pattern angles differ from one another.

The first, the second, the third and the fourth pattern, respectively, further comprises an embossed structure of the substrate, which can be produced, for example, by means of blind embossing. The embossed structures are structured such as to make the patterns visible when the substrate surface is viewed straight on,

and such that when the substrate surface is viewed at an angle from at least one predetermined viewing direction, at least a part of at least one of the patterns is hidden by at least a part of at least one of the embossed structures such that a visual latent image effect occurs during the alternate viewing of the substrate surface between the straight on and the oblique viewing.

A first security information item is configured as a first localized distribution of the first and the second pattern. This first distribution, or first security information item, comprises a first and a second area of the substrate, for example the first area outside a symbol and the second area inside the symbol. The first pattern and the second pattern are disposed in at least part of the first or second area, respectively. This allows the first security information item to be coded by way of the parts of the first and the second area in which the first and second patterns are disposed.

A second security information item is configured as a second localized distribution of the third and the fourth pattern. This second distribution, or second security information item, comprises a third and a fourth area of the substrate, for example the third area outside a number and the fourth area inside the number. The third pattern and fourth pattern are disposed in at least part of the third or fourth area, respectively. This allows the second security information item to be coded by way of the parts of the third and the fourth area in which the third and fourth patterns are disposed.

According to the invention, the first security information item and the second security information item overlap at least partially. In other words, the first area and the third area can be designed to overlap, at least partially, and/or the second area and the fourth area can be designed to overlap, at least partially. This provides improved security of the security element since because of the overlap the amount of information in the security element can be increased.

In a preferred embodiment, at least one of the patterns further comprises a grid, in particular a printed grid with at least one dye that contrasts with the substrate. This allows the degree of contrast of the pattern or patterns to be increased, which results in better readout possibility. The grid or grids can also exhibit more than one dye that contrasts with the substrate and with each other. This enables grids to be configured specifically, which further increases security. For example, it is also possible to use fluorescing or phosphorescing dyes and/or coatings that are reflecting in at least one spectral range, which further increases security.

It is preferable for at least one of the grids and the embossed structure associated with the same pattern to run parallel to one another, at least in areas. This makes simpler implementation of the visual latent image effect possible.

In another preferred embodiment, at least one of the grids, in particular all grids, is disposed on a side of the embossed structure of the pattern associated with the respective grid. In particular, the grid is predominantly disposed on the side or even exclusively on the side of the embossed structure of the pattern associated with the respective grid, which results in a more specific configuration of the visual latent image effect and thereby improved security. For example, the patterns, together with the grids and embossed structures, are designed such that one of the grids, respectively, appears visually different (for example with the gray tone remaining the same) than the other patterns (which, for example, change from gray to dark gray or from gray to light gray depending on the "viewing elevation angle", that is to say a polar angle of the viewing direction) from certain viewing directions relative to the respective pattern angle (for example for some of the viewing directions whose projection is parallel to the pattern angle on the substrate surface). In addition, as

described above, at least one of the grids (and in particular all grids) is disposed on a side of the embossed structure associated with the respective grid. Other advantageous arrangements of at least one of the grids (and in particular all grids) predominantly on one side and/or exclusively on one side of the embossed structure associated with the respective pattern lead to a plurality of different configuration options. For concrete examples, reference is made to Figures 12, 15, 16, 17, 19, 20, 21 and 29 and the associated sections of the description of EP 1 325 816 A2, which are incorporated herein by reference. This provides a security feature which according to the invention is highly dependent on the viewing direction.

It is preferred for at least one of the patterns to have a linear shape, at least in areas, whereby a visual latent image effect is achieved that can be more easily read out.

According to the invention, the security element further comprises first grid cells. The first pattern and the second pattern are arranged within these first grid cells, and specifically exclusively therein. This makes it possible to assign the first two patterns to the first grid cells.

In addition, the security element according to the invention further comprises second grid cells. The third pattern and the fourth pattern are arranged within these second grid cells, and specifically exclusively therein. This makes it possible to assign the third and fourth patterns to the second grid cells.

The first grid cells and the second grid cells are arranged next to one another on the substrate in a non-overlapping fashion. This makes it possible to arrange the first and second grid cells next to one another on the substrate in a non-overlapping fashion and thereby to dispose the first and the second security information items on the security element by way of the respective patterns (i.e. the first and the second pattern for the first security information item and the third and the fourth pattern for the second security information item).

The first and the second grid cells are further not all designed to be identical. Thus, the group of first grid cells and the group of second grid cells both comprise first and second grid cell types that are differently designed, respectively, the cells being designed such that the first grid cell types surround the second grid cell types, in other words the second grid cell types can be arranged inside the first grid cell types. This produces a more advantageous surface coverage by the grid cells.

According to the invention, for each pair of a first and a second grid cell (the pair comprising the second grid cell type and the first grid cell type surrounding the second grid cell type), either

* the first pattern and the second pattern are arranged exclusively in the first grid cell type and the third pattern and the fourth pattern are arranged exclusively in the second grid cell type, or

* the first pattern and the second pattern are arranged exclusively in the second grid cell type and the third pattern and the fourth pattern are arranged exclusively in the first grid cell type.

It is preferable for the first and the second grid cells to be designed such that a total area covered by the first grid cells is from 50 to 150%, in particular from 70 to 130%, in particular from 98 to 102% of a total area covered by the second grid cells. This results in a more even coverage of the surface by the two types of grid cells.

According to the invention, the first grid cells and the second grid cells are arranged on at least a part of the substrate in mutually alternating fashion and preferably in periodically or non-periodically repeating fashion, in a first direction parallel to the substrate and in a second direction parallel to the substrate. This results in the ability to arrange the first and second grid cells, and thereby the first and second security information items, on

the substrate in distributed fashion over the entire substrate, wherein the first/second and the third/fourth areas do not have to be designed connected with the first and second security features, respectively.

In a preferred embodiment, the security element further comprises a third security information item that is designed as a localized variation of at least the first, the second, the third or the fourth pattern, in particular of the first and the second pattern. Such a localized variation of the pattern is preferred to be created by modulating a pattern parameter, for example by modulating a line width and/or an embossed structure depth. This makes it possible to reflect a gray scale information (a gray scale image) as a third security information item, for example, the information item being used to disguise the first and second security information items so that the detection thereof is more difficult at first glance.

In another preferred embodiment, the security element further comprises a fifth pattern and a fourth security information item. This fourth security information item is designed as a combination of the fifth pattern with at least one pattern from the group of the first, the second, the third and the fourth patterns. For example, the fifth pattern can be designed as an overlapping of the first to the fourth patterns with the fifth pattern including the embossed structure and optional grid thereof, so that a Moire effect results between the fifth pattern and one of the first four patterns from a suitable direction of view. This further increases the security of the security feature.

In another preferred embodiment, the substrate is designed to be at least partially transparent and at least one of the patterns is disposed on the first substrate surface with at least one of the remaining patterns being disposed on a second substrate surface opposite the first surface. This results in transparency effects that further increase the security of the security feature.

Another disclosed aspect of the invention is a security document with a security feature as described above. Such a security document, for example a bank note, has an increased security against falsification compared to prior art security documents since the security feature contains a greater number of information items.

Another aspect of the invention is disclosed in the form of a method for producing a security element as described above, the method comprising the following steps:

- applying a first pattern at a first pattern angle, including a first embossed structure, onto at least part of a first area of a substrate,

- applying a second pattern at a second pattern angle, including a second embossed structure, onto at least part of a second area of a substrate,

- applying a third pattern at a third pattern angle, including a third embossed structure, onto at least part of a third area of a substrate,

- applying a fourth pattern at a fourth angle, including a fourth structure, onto at least part of a fourth area of a substrate.

It is preferred for the production method to comprise the further step of

- applying a first, a second, a third and/or a fourth grid, each of which is associated with one of the patterns, in particular a line grid, onto the substrate.

The above pattern/grid application steps can comprise the blind embossing of film substrates, the embossing and optionally black-and-white or color printing of paper or plastic substrates, overprinting of screen-printed elements, OVI, OVMI, Iriodin, etc.

This can make a security feature according to the invention easier to produce.

Another aspect of the invention is disclosed in the form of a method for examining the authenticity of a security element as described above, the method comprising the following steps:

- viewing the security document from a first viewing direction and comparing a first viewed intensity distribution with a first template (for example an expected "OFS" intensity distribution that is bright on a dark background),

- viewing the security document from a second viewing direction and comparing a second viewed intensity distribution with a second template (for example an expected "700" intensity distribution that is bright on a dark background), and

- using the first and the second viewed intensity distributions, classifying the security document as authentic or inauthentic.

It is preferred for the method for examining the authenticity to comprise the further steps of:

- viewing the security document from a third viewing direction and comparing a third viewed intensity distribution with a third template (for example an expected "OFS" intensity distribution that is dark on a bright background),

- viewing the security document from a fourth viewing direction and comparing a fourth viewed intensity distribution with a fourth template (for example an expected "700" intensity distribution that is dark on a bright background), and

- using the third and the fourth viewed intensity distributions, classifying the security document as authentic or inauthentic.

At this point, it is worth noting that in addition to the first to the fourth patterns other patterns can be disposed on the security element so as to provide further security information items that depend on the viewing direction. This can increase the information content even further.

The embodiments described relate equally to the device claims and to the method claims. As is obvious to a person skilled in the art, synergistic effects can arise when the features of different embodiments are combined, even though said effects may not be described in detail.

Brief description of the drawings

Other advantageous embodiments of the invention arise from the dependent claims and the exemplary embodiments illustrated below by means of the drawings. Shown are:

Fig. 1 shows a security document 100 according to the invention with a security feature 10 according to the invention, with a substrate 9 and a substrate surface O,

Fig. 2 shows a first security information item I1 with a first area B1 and a second area B2,

Fig. 3 shows the first security information item I1 from Fig. 2, the information item comprising the first area B1 with a first pattern M1, a first line grid R1 and a first embossed structure P1 and the second area B2 with a second pattern M2, a second line grid R2 and a second embossed structure P2,

Fig. 4 shows a second security information item I2 with a third area B3 and a fourth area B4,

Fig. 5 shows the second security information item I2 from Fig. 4, the information item comprising the third area B3 with a third pattern M3, a third line grid R3 and a third embossed structure P3 and the fourth area B4 with a fourth pattern M4, a fourth line grid R4 and a fourth embossed structure P4,

Fig. 6 (unclaimed) shows square grid cells RZ1, RZ2 on the substrate surface O, the grid cells being disposed in alternating fashion in a first and a second direction 99, 98, and parts of the areas B1-B4 comprising the line grids R1, R2, R3 and R4,

Fig. 7 according to the invention shows non-square grid cells RZ1, RZ2 in the areas B1/B3, wherein the grid cells RZ1, RZ2 each comprise first and second grid cell types RZA and RZB, respectively, wherein the first grid cell types RZA are designed such that they surround the second grid cell types RZB,

Fig. 8 shows the areas B1, B2, B3 and B4 in combination with the grid cells RZ1 and RZ2 from Fig. 7, wherein the patterns M1-M4 are disposed depending on grid cells RZ1, RZ2 and areas B1-B4,

Fig. 9 shows the surface O of a substrate 9 of a security feature 10 as viewed straight on, as well as schematically four different oblique viewing directions A, B, C and D,

Fig. 10 shows the surface O of the substrate 9 of the security feature from Fig. 9 in an oblique view from viewing direction A,

Fig. 11 shows the surface O of the substrate 9 of the security feature from Fig. 9 in an oblique view from viewing direction B,

Fig. 12 shows the surface O of the substrate 9 of the security feature from Fig. 9 in an oblique view from viewing direction C,

Fig. 13 shows the surface O of the substrate 9 of the security feature from Fig. 9 in an oblique view from viewing direction D,

Fig. 14 shows a third security information item I3 with a localized variation of a pattern parameter of a first grid R1, and

Fig. 15 shows the third security information item I3 from Fig. 14 with a localized variation of a pattern parameter of a second grid R2.

Modes for carrying out the invention

Fig. 1 shows a security document 100 according to the invention (in this case a bank note) with a security feature 10 according to the invention. The security feature 10 comprises a substrate 9 with a substrate surface O and schematically a printed value of the bank note "700" Swiss Francs.

Fig. 2 shows a first security information item I1 ("ofs" lettering) with a first area B1 outside the lettering (white area) and a second area B2 inside the lettering (black area).

Fig. 3 shows the first security information item I1 from Fig. 2. Here, the first area B1 of the substrate 9 is provided with a first pattern M1 comprising a printed line grid R1 (vertical grid when viewing the figure normally) on the substrate surface O and an embossed structure P1 (indicated as sectional view in the lower part of the figure) of the substrate 9. The embossed structure P1 has a variable embossing depth inside the embossing lines and between the embossing lines (neither are shown). Pattern M1 has a grid width of 35 lines per centimeter and a grid angle phi1 = 0° (measured relative to a vertical side of the substrate 9 counterclockwise) and is printed at a resolution of 8000 dpi onto the substrate. Other resolutions are also possible. The second area B2 of the substrate 9 is provided with a second pattern M2 comprising a printed line grid R2 (horizontal grid when viewing the figure normally) on the substrate surface O and an embossed structure P2 (not shown) of the substrate 9. Pattern M2 has a grid width of 50 lines per centimeter and a grid angle phi2 = 90° (measured relative to a vertical side of the substrate 9 counterclockwise).

Fig. 4 shows a second security information item I2 ("700" lettering) with a third area B3 outside the lettering (white area) and a fourth area B4 inside the lettering (black area).

Fig. 5 shows the second security information item I2 from Fig. 4. Here, the third area B3 of the substrate 9 is provided with a third pattern M3 comprising a printed line grid R3 (tilted to the lower right when viewing the figure normally) on the substrate surface O and an embossed structure P3 (not shown) of the substrate 9. Pattern M3 has a grid width of 50 lines per centimeter and a grid angle phi3 = 45° (measured relative to a vertical side of the substrate 9 counterclockwise). The fourth area B4 of the substrate 9 is provided with a fourth pattern M4 comprising a printed line grid R4 (tilted to the lower left when viewing the figure straight on) on the substrate surface O and an embossed structure P4 (not shown) of the substrate 9. Pattern M4 has a grid width of 50 lines per centimeter and a grid angle phi2 = 135° (measured relative to a vertical side of the substrate 9 counterclockwise).

Fig. 6 shows square grid cells RZ1, RZ2 on the substrate surface O of substrate 9, the grid cells disposed in alternating fashion in a first and a second direction 99, 98. The embodiment of Fig. 6 is not claimed but facilitates the understanding of the invention. Areas B1 and B3 as well as B2 and B4 from Figures 2-5 partially overlap one another. To explain the security feature according to the invention, eight grid cells RZ1, RZ2 are shown. It is shown that the grid cells RZ1 and RZ2 are arranged next to one another in non-overlapping fashion on the substrate and that the first and second patterns M1, M2 (and the associated line grids R1, R2 and embossed structures P1, P2) are arranged exclusively in the first grid cells RZ1. The third and fourth patterns M3, M4 (and the associated line grids R3, R4 and embossed structures P3, P4) are arranged exclusively in the second grid cells RZ2.

Fig. 7 according to the invention shows non-square first and second grid cells RZ1, RZ2 in areas B1/B3 (in other words outside the lettering), wherein the grid cells RZ1 and RZ2 each comprise first and second grid cell types RZA and RZB. The first grid cell types RZA are designed such that they surround the second grid cell types RZB. The grid cell types RZA and RZB only refer to the shape of the grid cells and must not be confused with the "contents" thereof, in other words the association thereof with the first grid cells RZ1 and RZ2. Since the grid cells shown are those in areas B1/B3, they are shown together with patterns M1 and M3. The contour lines of grid cells RZ1, RZ2 are not printed, but only serve to provide clarity here.

Fig. 8 shows a combination of the grid cells of Figure 6 distributed according to the invention with the grid cells of Figure 7, and it illustrates the areas B1, B2, B3 B4 with patterns M1, M2, M3, M4, line grids L1, L2, L3, L4 and embossed structures P1, P2, P3, P4. As described above, this also shows that pattern M1 is disposed in the first grid cells RZ1 of both grid cell types RZA and RZB in area B1 and pattern M2 is disposed in the second area B2. In the second grid cells RZ2 of both grid cell types, pattern M3 is disposed in the third area B3 and pattern M4 is disposed in the fourth area B4. The arrangement of patterns M1-M4 implies the arrangement of the respective embossed structures P1-P4 and line grids R1-R4. The areas B1-B4 are indicated by dotted contour lines with letter "f" for security information item I1 and letter "0" for security information item I2.

Fig. 9 shows the surface O of a substrate 9 of a security feature 10 according to the invention when viewed straight on (from above). Here, a third security information item I3 is identifiable (gray-scale distribution in the background image). Also schematically shown are four different oblique viewing directions A, B, C and D. A polar angle measured from the surface O of viewing directions A-D is between 5 and 35

degrees, for example, but can also take other values depending on the embossed structures. A first and second security information item I1 and I2 are also shown schematically, but they are not observable when viewed straight on. It should be noted at this point that that the azimuth angles phi1, phi2, phi3 and phi4 of patterns M1, M2, M3, M4 discussed so far do not correspond to the viewing directions A, B, C and D in this embodiment. Also, the white borders of security information items I1, I2 are only shown for purposes of clarity and are of course not printed.

Fig. 10 shows the surface O of the substrate 9 of the security feature 10 of Fig. 9 from an oblique view from viewing direction A. Here, the first security information item "OFS" is clearly identifiable as a lighter area on a darker background.

Fig. 11 shows the surface O of the substrate 9 of the security feature 10 of Fig. 9 from an oblique view from viewing direction B. Here, the second security information item "700" is clearly identifiable as a darker area on a lighter background.

Fig. 12 shows the surface O of the substrate 9 of the security feature 10 of Fig. 9 from an oblique view from viewing direction C. Here, the second security information item "OFS" is again clearly identifiable as a darker area on a lighter background.

Fig. 13 shows the surface O of the substrate 9 of the security feature 10 of Fig. 9 from an oblique view from viewing direction D. Here, the first security information item "700" is again clearly identifiable as a lighter area on a darker background.

The color changes of the security information items are achieved by way of the arrangement of line grids on the sides of the embossed structures.

Fig. 14 shows a third security information item I3 (lettering "CH") with a localized variation of a pattern parameter. Here, a line thickness of a vertical line grid R1 is increased inside the lettering.

Fig. 15 shows the third security information item I3 from Fig. 14 with a localized variation of a pattern parameter. Here, a line thickness of a horizontal line grid R2 is increased inside the lettering.

This allows the third security information item to be arranged independently of the first and second security information items, and is used to disguise the first two security information items.

It should again be noted at this point that any shown highlightings of the contours of the grid cell areas are only shown for reasons of clarity and are not printed in the security feature.

While there are shown and described presently preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

BIZTONSÁGI DOKUMENTUM BIZTONSÁGI ELEMMEL

Szabadalmi igénypontok

1. Biztonsági elem (10) biztonsági dokumentumhoz (100), ahol a biztonsági elem (10) tartalmaz

- felülettel (O) rendelkező hordozót (9),
- legalább első, második, harmadik és negyedik mintázatot (M1, M2, M3, M4) rendre első, második, harmadik és negyedik mintázatszöggel (phi1, phi2, phi3, phi4), mindegyik mintázat (M1, M2, M3, M4) a hordozó (9) dombornyomott struktúráját (P1, P2, P3, P4) tartalmazza, ahol a dombornyomott struktúrák

(P1, P2, P3, P4) olyan módon vannak kiképezve, hogy a hordozófelület (O) merőleges megtekintésekor a mintázatok (M1, M2, M3, M4) láthatók és a hordozófelület (O) legalább egy előre meghatározott megtekintési irányból ferdén történő megtekintésekor a mintázatok (M1, M2, M3, M4) legalább egyikének legalább egy részét a dombornyomott struktúrák (P1, P2, P3, P4) legalább egyikének legalább egy része olyan módon fedi el, hogy a hordozófelület (O) merőleges és ferde megtekintésének váltogatásakor optikai rejtett kép („Kippeffekt") jelentkezik,

- első biztonsági információt (I1), amely az első és a második mintázat (M1, M2) lokális eloszlásaként van kialakítva, ami a hordozó (9) első résztartományát (B1) és második résztartományát (B2) foglalja magában, ahol az első mintázat (M1) az első résztartomány (B1) legalább egy részén van elrendezve, továbbá a második mintázat (M2) a második résztartomány (B2) legalább egy részén van elrendezve, valamint

- második biztonsági információt (I2), amely a harmadik és a negyedik mintázat (M3, M4) lokális eloszlásaként van kialakítva, ami a hordozó (9) harmadik résztartományát (B3) és negyedik résztartományát (B4) foglalja magában, ahol a harmadik mintázat (M3) a harmadik résztartomány (B3) legalább egy részén van elrendezve, továbbá a negyedik mintázat (M4) a negyedik résztartomány (B4) legalább egy részén van elrendezve, ahol az első biztonsági információ (I1) és a második biztonsági információ (I2) legalább részlegesen átlapolón vannak elrendezve,

ahol a biztonsági elem (10) tartalmaz továbbá

- első rasztercellákat (RZ1), ahol az első mintázat (M1) és a második mintázat (M2) kizárólag az első rasztercellákban (RZ1) van elrendezve, és

- második rasztercellákat (RZ2), ahol a harmadik mintázat (M3) és a negyedik mintázat (M4) kizárólag a második rasztercellákban (RZ2) van elrendezve,

ahol az első rasztercellák (RZ1) és a második rasztercellák (RZ2) a hordozón (9) nem átlapolón vannak egymás mellett elrendezve,

ahol az első rasztercellák (RZ1) és a második rasztercellák (RZ2) a hordozóval (9) párhuzamos első és második irányban (99, 98) a hordozó (9) legalább egy részén egymással váltakozón vannak a hordozón (9) elrendezve, ahol legalább az első rasztercellák (RZ1) és a második rasztercellák (RZ2) minden esetben első rasztercellatípusokat (RZA) és második rasztercellatípusokat (RZB) tartalmaznak,

ahol az első rasztercellatípusok (RZA) a második rasztercellatípusokat (RZB) körülvevőn vannak kialakítva, és

ahol valamennyi olyan pár esetén, melyet egy első és egy második rasztercella (RZ1, RZ2) alkot, a pár a második rasztercellatípust (RZB) és az ezen második rasztercellatípust körülvevő első rasztercellatípust (RZA) tartalmazza, továbbá vagy

* az első mintázat (M1) és a második mintázat (M2) kizárólag első rasztercellatípusban (RZA) van elrendezve, valamint a harmadik mintázat (M3) és a negyedik mintázat (M4) kizárólag második rasztercellatípusban (RZB) van elrendezve, vagy

* az első mintázat (M1) és a második mintázat (M2) kizárólag második rasztercellatípusban (RZB) van elrendezve, valamint a harmadik mintázat (M3) és a negyedik mintázat (M4) kizárólag első rasztercellatípusban (RZA) van elrendezve.

2. Az 1. igénypont szerinti biztonsági elem (10), ahol az első résztartomány (B1) és a harmadik résztartomány (B3) legalább részben átlapolón vannak kiképezve és/vagy ahol a második résztartomány (B2) és a negyedik résztartomány (B4) legalább részben átlapolón vannak kiképezve.

3. Az előző igénypontok bármelyike szerinti biztonsági elem (10), ahol a mintázatok (M1, M2, M3, M4) legalább egyike legalább egy a hordozótól (9) elütő színű rasztert (R1, R2, R3, R4), kiváltképp nyomórasztert (R1, R2, R3, R4) is tartalmaz.

4. A 3. igénypont szerinti biztonsági elem (10), ahol a raszterek (R1, R2, R3, R4) legalább egyike a hordozótól (9) és egymástól elütő legalább két színnel rendelkezik.

5. A 3. vagy a 4. igénypont szerinti biztonsági elem (10), ahol a raszterek (R1, R2, R3, R4) legalább egyike, kiváltképp a raszterek (R1, R2, R3, R4) mindegyike, a megfelelő raszterrel (R1, R2, R3, R4) társított dombornyomott struktúra (P1, P2, P3, P4) egyik oldalán, kiváltképp annak túlnyomórészt egyik oldalán, kiváltképp annak kizárólag egyik oldalán van elrendezve.

6. Az előző igénypontok bármelyike szerinti biztonsági elem (10), ahol a mintázatok (M1, M2, M3, M4) legalább egyike olyan módon van kiképezve, hogy legalább szakaszonként vonalalakú.

7. Az előző igénypontok bármelyike szerinti biztonsági elem (10), ahol az első rasztercellák (RZ1) és második rasztercellák (RZ2) a hordozóval (9) párhuzamos első és második irányban (99, 98) a hordozó (9) legalább egy részén periodikusan ismétlődően vannak a hordozón (9) elrendezve.

8. Az előző igénypontok bármelyike szerinti biztonsági elem (10), ahol az első és a második rasztercellák (RZ1, RZ2) olyan módon vannak kiképezve, hogy az első rasztercellák (RZ1) által fedett összterület a második rasztercellák (RZ2) által fedett összterületnek 50-150%-a, kiváltképp 70-130%-a, kiváltképp 98-102%-a.

9. Az előző igénypontok bármelyike szerinti biztonsági elem (10), ahol az első, a második, a harmadik és/vagy a negyedik mintázat (M1, M2, M3, M4) mintázatszélessége 30 és 60 vonal/centiméter között, kiváltképp 40 és 60 vonal/centiméter között, kiváltképp 48 és 52 vonal/centiméter között van.

10. Az előző igénypontok bármelyike szerinti biztonsági elem (10), ahol az első és a második mintázatszög (phi1, phi2) közötti, a második és a harmadik mintázatszög (phi2, phi3) közötti, valamint a harmadik és a negyedik mintázatszög (phi3, phi4) közötti szögeltérés legalább 15°.

11. A 10. igénypont szerinti biztonsági elem (10), ahol az első és a második mintázatszög (phi1, phi2) közötti, valamint a harmadik és a negyedik mintázatszög (phi3, phi4) közötti szögeltérés 90°, továbbá a második és a harmadik mintázatszög (phi2, phi3) közötti szögeltérés 45°.

12. Az előző igénypontok bármelyike szerinti biztonsági elem (10), amely tartalmaz továbbá harmadik biztonsági információt (I3), ahol a harmadik biztonsági információ (I3) legalább az első, a második, a harmadik vagy a negyedik mintázat (M1, M2, M3, M4), kiváltképp az első és a második mintázat (M1, M2) lokális váltakozásaként van kiképezve.

13. A 12. igénypont szerinti biztonsági elem (10), ahol a mintázatok (M1, M2, M3, M4) váltakozása mintázatparaméter modulációjaként, kiváltképp vonalszélesség és/vagy dombornyomottstruktúra-mélység modulációjaként van kiképezve.

14. Az előző igénypontok bármelyike szerinti biztonsági elem (10), amely tartalmaz továbbá ötödik mintázatot (M5) és negyedik biztonsági információt (I4), ami az ötödik mintázatnak (M5) és az első, a második, a harmadik és a negyedik mintázat (M1, M2, M3, M4) alkotta csoport legalább egyik mintázatának (M1, M2, M3, M4) a kombinációjaként van kiképezve.

15. Biztonsági dokumentum (10) egy az előző igénypontok bármelyike szerinti biztonsági elemmel (1).

16. Eljárás egy az 1-14. igénypontok bármelyike szerinti biztonsági elem (1) előállítására, amelynél

- hordozó (9) első résztartományának (B1) legalább egy részére első mintázatszögű (phi1) első mintázatot (M1) és első dombornyomott struktúrát (P1) viszünk fel,
- hordozó (9) második résztartományának (B2) legalább egy részére második mintázatszögű (phi2) második mintázatot (M2) és második dombornyomott struktúrát (P2) viszünk fel,
- hordozó (9) harmadik résztartományának (B3) legalább egy részére harmadik mintázatszögű (phi3) harmadik mintázatot (M3) és harmadik dombornyomott struktúrát (P3) viszünk fel,
- hordozó (9) negyedik résztartományának (B4) legalább egy részére negyedik mintázatszögű (phi4) negyedik mintázatot (M4) és negyedik dombornyomott struktúrát (P4) viszünk fel.

17. A 16. igénypont szerinti eljárás, amelynél

- a hordozóra (9) első, második, harmadik és/vagy negyedik rasztert (R1, R2, R3, R4) viszünk fel, melyek mindegyike a mintázatok (M1, M2, M3, M4) egyikével van társítva.

18. Eljárás egy az 1-14. igénypontok bármelyike szerinti biztonsági elemet (1) tartalmazó, 15. igénypont szerinti biztonsági dokumentum (10) eredetiségének vizsgálatára, amelynél

- a biztonsági dokumentumot (10) első megtekintési irányból (A) megtekintjük és első megfigyelt intenzitáseloszlást első sablonnal hasonlítunk össze,
- a biztonsági dokumentumot (10) második megtekintési irányból (B) megtekintjük és második megfigyelt intenzitáseloszlást második sablonnal hasonlítunk össze,
- az első és második megfigyelt intenzitáseloszlások alapján a biztonsági dokumentumot (10) eredetinek vagy hamisnak minősítjük.

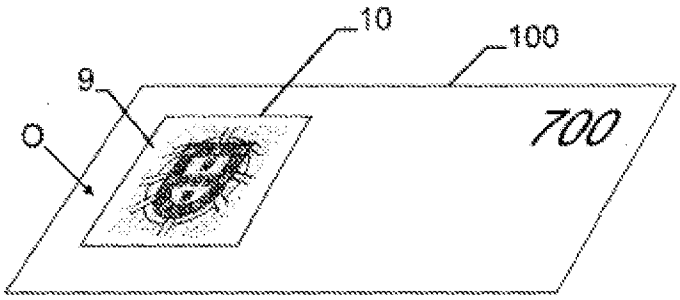

Fig. 1

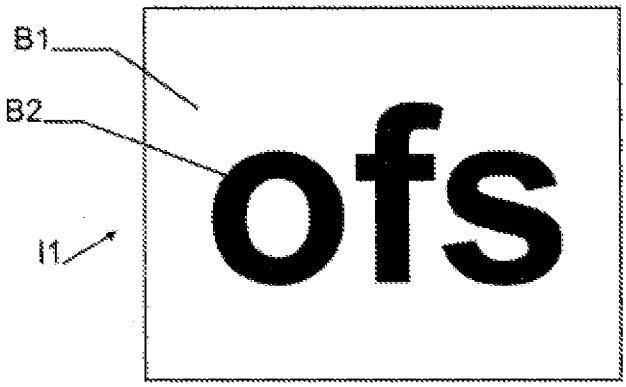

Fig. 2

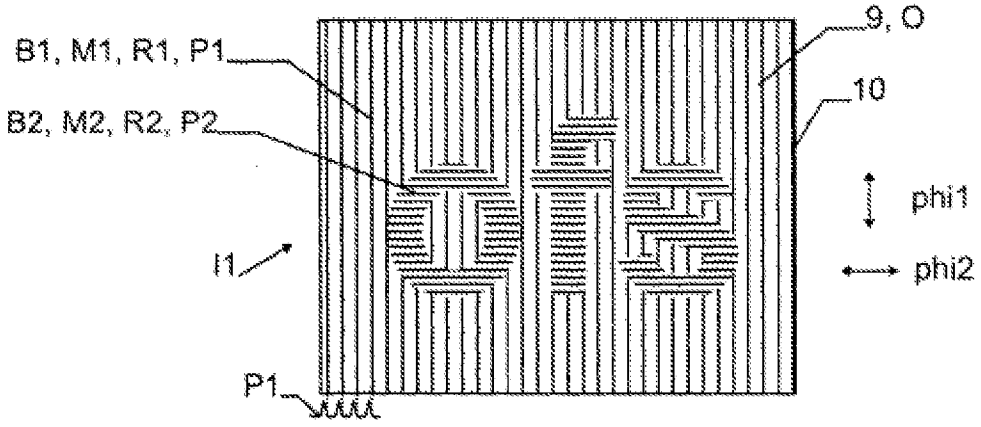

Fig. 3

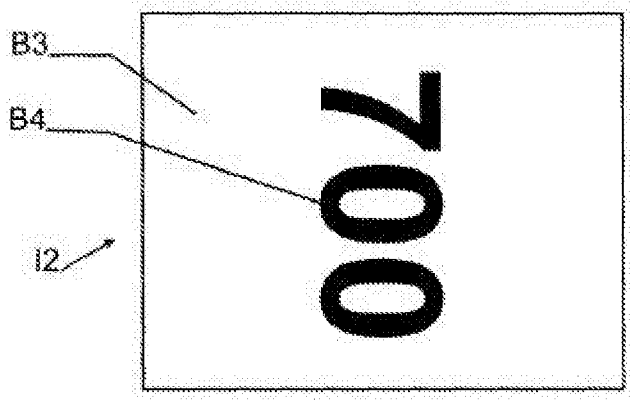

Fig. 4

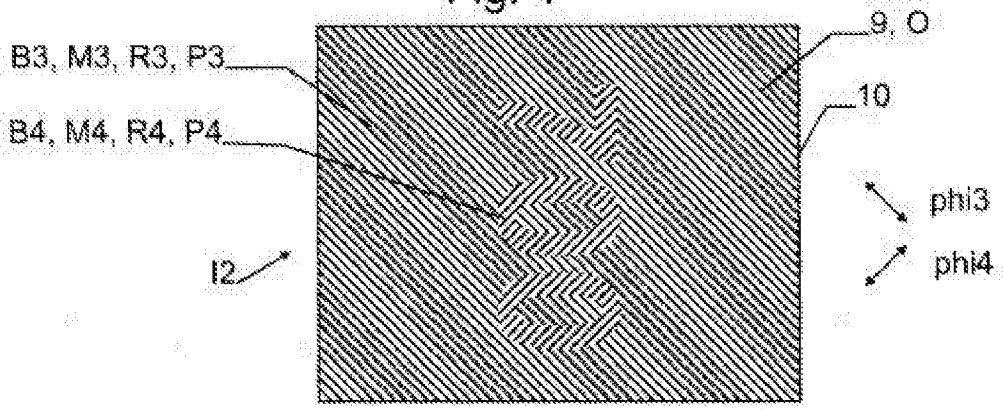

Fig. 5

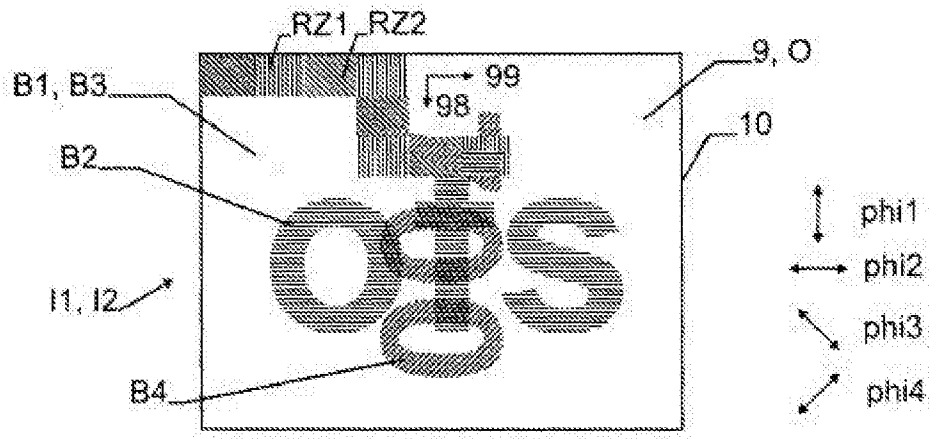

Fig. 6

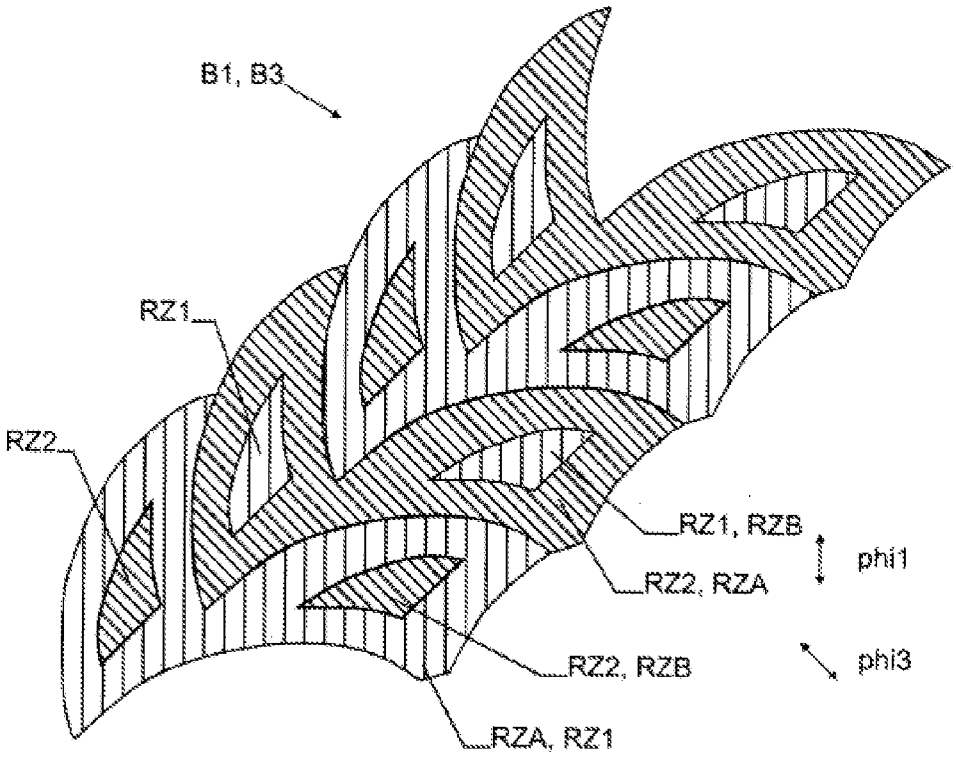

Fig. 7

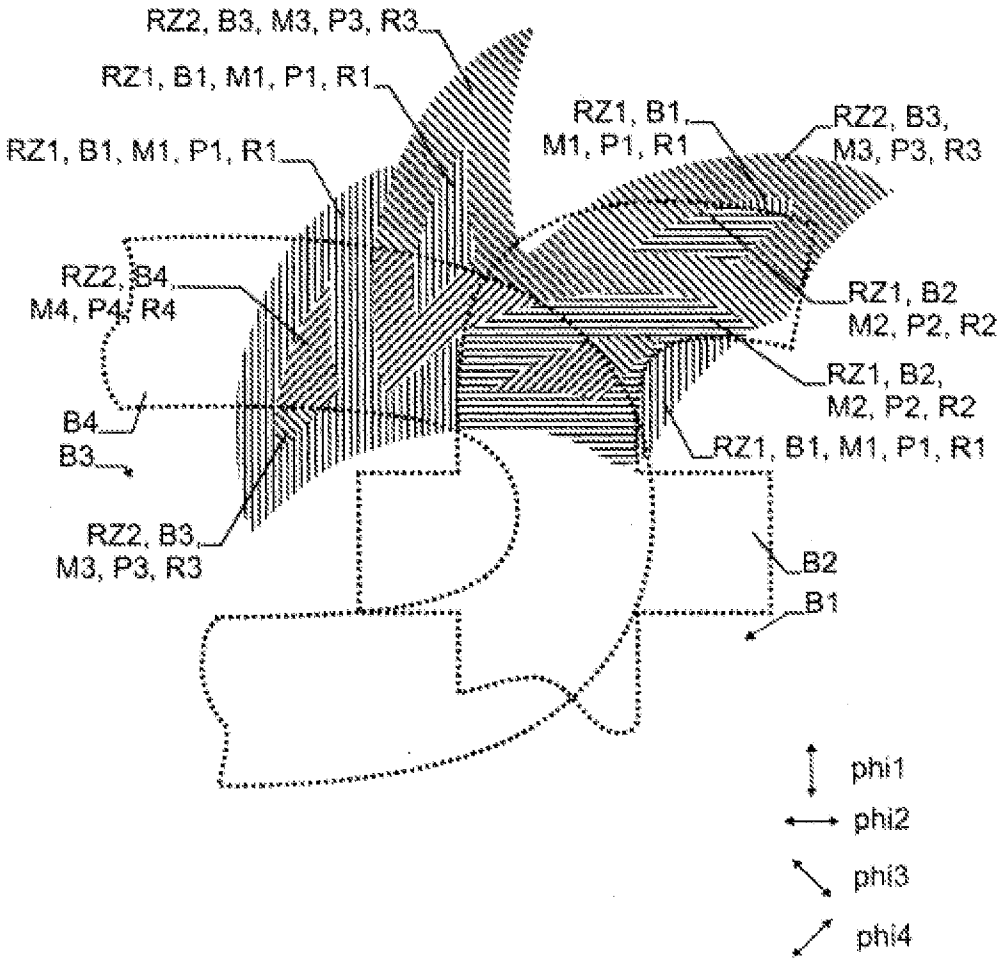
RZ2, B3, M3, P3, R3
RZ1, B1, M1, P1, R1
RZ1, B1, M1, P1, R1
RZ1, B1, M1, P1, R1
RZ2, B3, M3, P3, R3
RZ2, B4, M4, P4, R4
RZ1, B2 M2, P2, R2
RZ1, B2, M2, P2, R2
B4
B3
RZ1, B1, M1, P1, R1
RZ2, B3, M3, P3, R3
B2
B1
phi1
phi2
phi3
phi4

Fig. 8

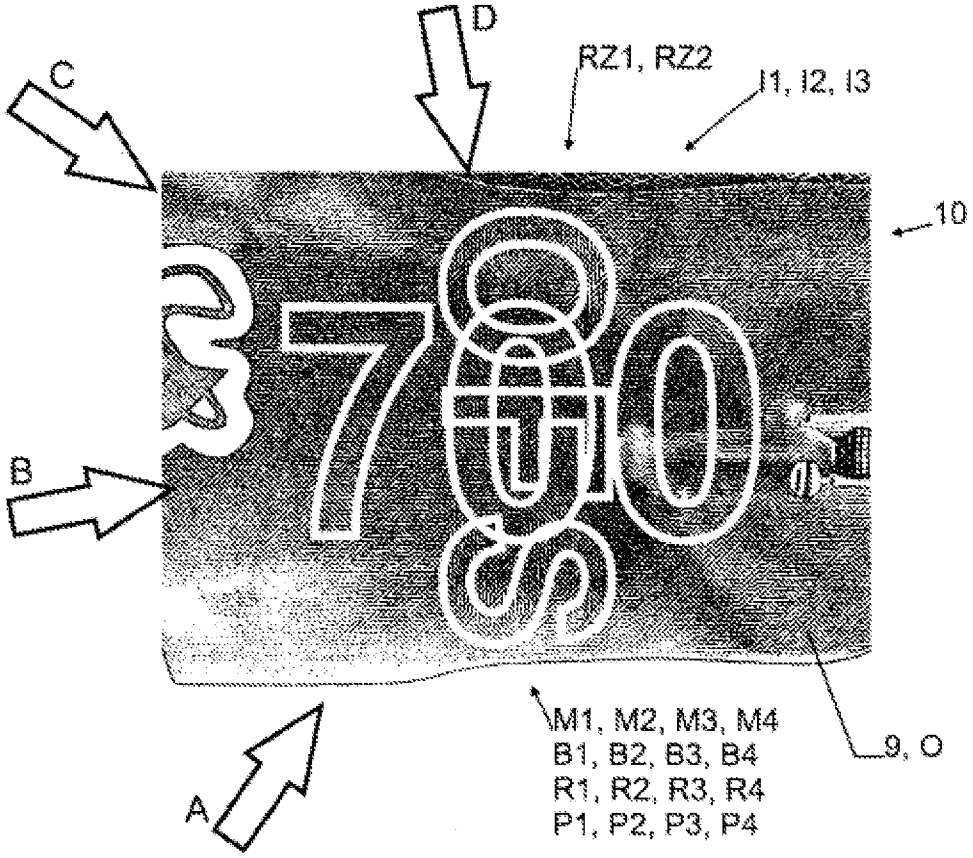
D
C
RZ1, RZ2
I1, I2, I3
10
B
M1, M2, M3, M4
B1, B2, B3, B4
R1, R2, R3, R4
P1, P2, P3, P4
9, O
A

Fig. 9

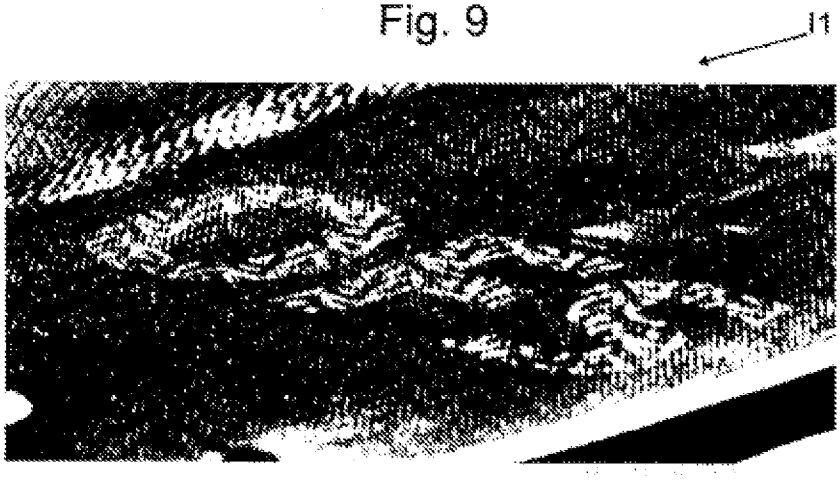
I1

Fig. 10

Fig. 11

Fig. 12

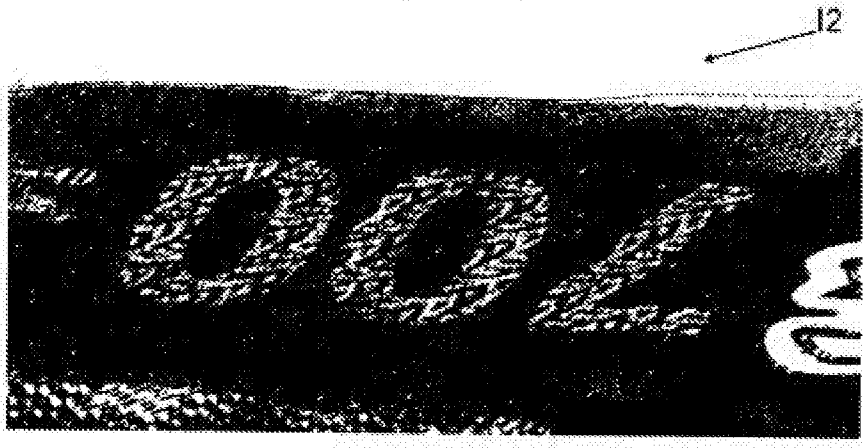

Fig. 13

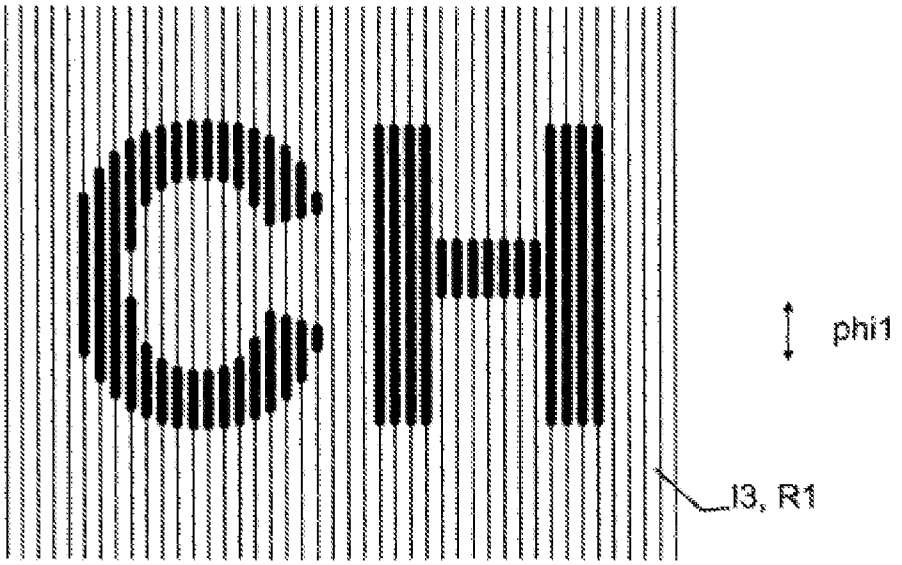

Fig. 14

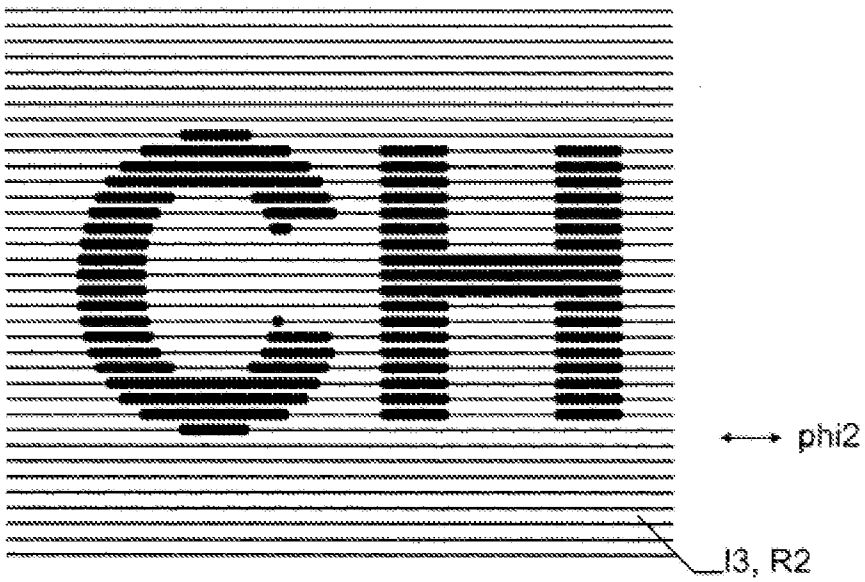

Fig. 15