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(54) **INFORMATION CARRIER WITH AN OPTICALLY VARIABLE STRUCTURE (VARIANT EMBODIMENTS)**

INFORMATIONSTRÄGER MIT EINER OPTISCH VARIABLEN STRUKTUR (VERSCHIEDENE AUSFÜHRUNGSFORMEN)

SUPPORT D'INFORMATIONS À STRUCTURE OPTIQUE VARIABLE (ET VARIANTES)

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RU-C2- 2 161 092 RU-C2- 2 235 021**

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Description

Field of Technology

[0001] The invention relates to data carriers with an optically variable structure verifying the authenticity of the data carrier, comprising a coating made in the form of a printed screen, and a three-dimensional screen. The optically variable structure is used as a feature testable by a person without aids, possibly alongside with other features for ascertaining the authenticity of the data carrier. The invention is especially useful for the production of security papers. Data carriers also include cards like those used for identifying persons or for carrying out transactions or services.

Background Art

[0002] A bank note (RU 2161092 C2, B32B 29/02, 27.12.2000) comprises a printed pattern formed of parallel lines, and an additional embossed three-dimensional line structure. Owing to a specific mutual arrangement of the printed and three-dimensional structures, printed lines are visible when the carrier is viewed perpendicular to the surface and concealed when the carrier is viewed at a sharp angle.

[0003] A data carrier (CA 1019012A, B32B 29/02, 11.10.1997) comprises an optically variable structure formed by a printed screen with equally spaced straight elements and a three-dimensional screen with equally spaced straight elements, the three-dimensional screen being arranged with respect to the printed screen in such a way that all printed information is visible when the data carrier is viewed perpendicular to the surface, and only the part which is not occluded by the three-dimensional screen is visible when the carrier is viewed at a sharp angle.

[0004] In a data carrier disclosed in RU 2235021 C2, 27.08.2004, relative arrangement of a printed screen and a three-dimensional screen gives rise to appearance of a moire pattern in the form of color stripes blending smoothly into each other. This data carrier is the most pertinent prior art with respect to the present invention. The object of the present invention is to enhance the protection properties of the security feature with moire effect.

[0005] Document WO 2009/139 396 discloses a data carrier according to the preamble of claim 1.

Summary of the Invention

[0006] The object and technical advantages of the invention, in particular, the improved security feature with moire effect, are attained owing to the provision of a dynamic effect that facilitates the authenticity control of the data carrier by an unskilled person. The dynamic effect manifests itself in moving the borders of color stripes as the angle of viewing at the data carrier changes. The

invention involves a data carrier according to claim 1.

[0007] On the areas with additionally colored three-dimensional screen the moire pattern exhibits a reduced saturation and contrast because of the additional color.

The additional color gives rise to further reduction in the saturation on the carrier region with colored three-dimensional screen when the inclination angle of the information carrier is increased. Therewith, the width of lines and the distance between lines of the printed screen and the three-dimensional screen and the mutual orientation of the screens are selected to create an impression of moving borders of the color stripes on the carrier when the angle of viewing the data carrier is changed.

The moving image effect is provided by the fact that the border of two colors of the printed screen is mostly disposed on the inclined areas of the three-dimensional screen, and the visible surface area changes when the inclination angle of the carrier is changed. Thus, upon changing the inclination angle of the carrier the extreme position of the visible border between two colors of the printed screen shifts, whereby the impression is created that the border of adjacent colors is moving. The moving impression is enhanced by coloring individual areas of the three-dimensional screen with translucent paints.

[0008] Depending on parameters of the printed and linear screens, their relationship, as well as the three-dimensional screen section profile (including asymmetric), various moiré patterns and further visual effects, including color-variable effects, can be created.

[0009] The printed and three-dimensional screens can be created by lines having the same and/or different width, interval, and spacing.

[0010] Lines of the screens can have various configurations (straight, curved, including concentric).

[0011] Lines of the screens can have the same or different width.

[0012] Lines of the screens can be arranged with the same or a different spacing.

[0013] Lines of the screens can be arranged with a constant or variable spacing.

[0014] Lines of the screens can have a constant or variable width.

[0015] Lines of the three-dimensional screen can have a constant and/or variable depth.

[0016] Lines of the printed screen can be implemented with uncolored gaps or without gaps.

[0017] Lines of the three-dimensional screen can be uncolored, colored with one or more colors.

[0018] Lines of the three-dimensional screen can be colored on the entire length and/or in individual areas.

[0019] Lines of the three-dimensional screen can have different profile, including asymmetric.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In the following some embodiments of the invention will be explained with reference to the following figures.

Figure 1 shows a schematic view of superimposition of a three-dimensional screen and a printed screen according to first and second embodiments.

Figure 2 shows an image according to a first embodiment where the carrier is viewed at different inclination angles.

Figure 3 shows an image according to a second embodiment where the carrier is viewed at different inclination angles.

Figures 4, 5 illustrate the impact of additional coloring of the three-dimensional screen on the impression of moving borders of color stripes.

Figure 6 and 7 show an image according to a third embodiment where the carrier is viewed at different inclination angles.

Figures 8 to 11 show examples of various visual effects created by changing parameters of the printed and/or three-dimensional screen.

Best Way of Implementing the Invention

[0021] Figure 1 shows a schematic view of superimposition of a three-dimensional screen and a printed screen. Printed screen 1 is formed by different color lines (1a and 1b). Three-dimensional screen 2 consists of an uncolored region 2a and a region 2b with additionally colored areas. Parameters of the printed and three-dimensional screens are matched to create a moiré pattern. When the carrier is viewed perpendicular to the surface the printed screen is fully visible in region 2a, and the field appears single-colored (the field color is formed by the combination of colors making the printed screen). In region 2b the colored areas of the three-dimensional screen occlude (fully or partially) areas of the printed screen and the moiré pattern is visible when the carrier is viewed perpendicular to the surface.

[0022] Figure 2 shows an image according to a first embodiment where the carrier is viewed at different inclination angles. When the carrier is tilted, due to the three-dimensional screen the viewer sees the part of the printed screen, which is disposed on the three-dimensional screen faces facing the viewer, whereby the moiré pattern becomes visible. Depending on the inclination angle of the carrier a visible border 3 of the moiré color stripes appears to move because of changes in the size of visible surface 4 of the three-dimensional screen faces.

[0023] Figure 3 shows an image according to a second embodiment where the carrier is viewed at different inclination angles. When the data carrier is tilted, the viewer sees the part of the printed screen, which is disposed on the three-dimensional screen faces facing the viewer. Therewith, depending on the inclination angle of the carrier the visible border 3 of the moiré color stripe appears to move because of changes in the size of the visible surface 4 of the three-dimensional screen faces. The presence of color on raised areas of the three-dimensional screen leads to reduction in the image contrast when the carrier is tilted and to merging the colored areas

of the three-dimensional screen and to complete occlusion of the moiré pattern when the carrier is viewed at small angles.

[0024] Figures 4 and 5 illustrate the impact of additional coloring of the three-dimensional screen on the impression of moving borders of color stripes of the moiré pattern.

[0025] When the carrier is tilted the thickness of paint layer 5, through which light passes to reach the printed screen, increases. As the additional paint layer absorbs light, border 6 of the area, in which the viewer discerns the color of the printed screen when the data carrier is viewed from different angles, changes to a greater extent than without coloring of the three-dimensional screen.

[0026] Figures 6, 7 show a data carrier containing a region with additionally colored three-dimensional screen and a region with uncolored three-dimensional screen. When the carrier is viewed perpendicular to the surface a moiré pattern is visible in the region with additionally colored three-dimensional screen and invisible in the region with uncolored three-dimensional screen. When the carrier is tilted the moiré pattern becomes visible in both regions of the carrier, and the moiré pattern in the region with colored three-dimensional screen spreads to the region with uncolored three-dimensional screen without shifting or tearing.

[0027] Figure 8 shows a profile and image according to the first embodiment with 2:1 ratio of periods of the printed screen and the three-dimensional screen when viewing the data carrier at different inclination angles. The printed screen lines of two colors are disposed on similarly oriented areas of the three-dimensional screen; therefore the moiré stripe colors visible upon tilting are mixed.

[0028] Figure 9 shows a profile and image according to the first embodiment with an asymmetric profile of the three-dimensional screen when the carrier is viewed from different sides. Owing to different length of sides of the three-dimensional screen the colors of moiré stripes viewed from the side of long faces are mixed, while the colors of moiré stripes viewed from the side of short faces are clean.

[0029] Figures 10-11 show an image of the carrier according to the first embodiment visible at direct viewing of the carrier when the printed screen is used to form the image. When the carrier is tilted, a moiré pattern is superimposed on the image visible at direct viewing.

Industrial Applicability

[0030] The invention provides a forgery-proof data carrier with an image that allows visual control even by an unskilled person. The invention is suitable for the production of various types of security papers, as well as plastic cards and other data carriers protected from forgery.

Claims

1. A data carrier with an optically variable structure verifying the authenticity of the data carrier, comprising a coating made in the form of a printed screen, the printed screen consists of lines (1a, 1b) which are positioned adjacent each other, and a three-dimensional screen, wherein the width of lines and the distance between lines of the printed and three-dimensional screens and the mutual orientation of the screens are selected to create a moire image in the form of color stripes; **characterized in that** the printed screen consists of lines of different colors and **in that** three-dimensional screen consists of uncolored areas (2a) and colored areas (2b); when the carrier is viewed perpendicular to the surface of the carrier the moire image is recognizable on the colored areas of the three-dimensional screen and the moire image is unrecognizable on the uncolored areas of the three-dimensional screen; and when the carrier is inclined, the parts of the printed screen which are disposed on the faces of the three-dimensional screen facing the viewer and not occluded for the viewer by elements of the three-dimensional screen are visible, whereby the moire image becomes visible on the uncolored areas of the three-dimensional screen; the moire stripes on the colored areas of the three-dimensional screen blend without shifting into stripes of the moire image on the uncolored areas of the three-dimensional screen; when the inclination angle of the carrier is changed, the borders of color stripes of moire image appear to move on the colored areas of the three-dimensional screen on the carrier.
2. A data carrier according to claim 1, wherein the printed screen is formed by lines creating an image visible at direct viewing of the product.
3. A data carrier according to claim 1, wherein lines of the printed and three-dimensional screens have the same and/or different, and constant and/or variable width, interval and spacing.
4. A data carrier according to claim 1, wherein lines of the printed and three-dimensional screens have various configurations including straight, curved and concentric.
5. A data carrier according to claim 1, wherein lines of the three-dimensional screen have a constant and/or variable depth.
6. A data carrier according to claim 1, wherein lines of the three-dimensional screen have various profiles, including asymmetric.
7. A data carrier according to claim 1, wherein lines of the printed screen are implemented in one or more

colors.

8. A data carrier according to claim 1, wherein lines of the printed screen are implemented with uncolored gaps or without gaps.
9. A data carrier according to claim 1, wherein parameters of the printed and three-dimensional screens create various moire patterns and further visual effects, including color-variable effects.
10. A data carrier according to claim 1, wherein lines of the three-dimensional screen are colored in one or more colors.

Patentansprüche

1. Datenträger mit einer optisch variablen Struktur, die die Authentizität des Datenträgers verifiziert, umfassend eine Beschichtung, die in Form eines gedruckten Rasterbildes, wobei das gedruckte Rasterbild aus Zeilen (1a, 1b) besteht, die benachbart zueinander positioniert sind, und eines dreidimensionalen Rasterbildes hergestellt ist, wobei die Breite von Zeilen und der Abstand zwischen Zeilen der gedruckten und dreidimensionalen Rasterbilder und die wechselseitige Orientierung der Rasterbilder ausgewählt sind, um ein Moiré-Bild in Form von Farbstreifen zu erzeugen, **dadurch gekennzeichnet, dass** das gedruckte Rasterbild aus Zeilen mit unterschiedlichen Farben besteht und dass das dreidimensionale Rasterbild aus nichtfarbigen Bereichen (2a) und farbigen Bereichen (2b) besteht; wenn der Träger senkrecht zur Oberfläche des Trägers betrachtet wird, das Moiré-Bild auf den farbigen Bereichen des dreidimensionalen Rasterbildes erkennbar ist und das Moiré-Bild auf den nichtfarbigen Bereichen des dreidimensionalen Rasterbildes nicht erkennbar ist; und, wenn der Träger geneigt ist, die Teile des gedruckten Rasterbildes, die auf den Seiten des dreidimensionalen Rasterbildes angeordnet sind, die zum Betrachter gewandt sind und nicht für den Betrachter durch Elemente des dreidimensionalen Rasterbildes verdeckt sind, sichtbar sind, wodurch das Moiré-Bild auf den nichtfarbigen Bereichen des dreidimensionalen Rasterbildes sichtbar wird; die Moiré-Streifen auf den farbigen Bereichen des dreidimensionalen Rasterbildes verschmelzen, ohne in Streifen des Moiré-Bildes auf den nichtfarbigen Bereichen des dreidimensionalen Rasterbildes überzugehen; wenn der Neigungswinkel des Trägers geändert wird, sich die Grenzen von Farbstreifen des Moiré-Bildes auf den farbigen Bereichen des dreidimensionalen Rasterbildes auf dem Träger zu bewegen scheinen.
2. Datenträger nach Anspruch 1, wobei das gedruckte Rasterbild durch Zeilen gebildet ist, die ein Bild er-

zeugen, das bei direkter Betrachtung des Produkts sichtbar ist.

3. Datenträger nach Anspruch 1, wobei Zeilen der gedruckten und dreidimensionalen Rasterbilder dieselbe/dasselbe/denselben und/oder unterschiedliche/unterschiedliches/unterschiedlichen und konstante/konstantes/konstanten und/oder variable/variables/variablen Breite, Intervall und Abstand aufweisen. 5
4. Datenträger nach Anspruch 1, wobei Zeilen der gedruckten und dreidimensionalen Rasterbilder verschiedene Konfigurationen, enthaltend geradlinig, gekrümmt und konzentrisch, aufweisen. 10
5. Datenträger nach Anspruch 1, wobei Zeilen des dreidimensionalen Rasterbildes konstante und/oder variable Tiefe aufweisen. 15
6. Datenträger nach Anspruch 1, wobei Zeilen des dreidimensionalen Rasterbildes verschiedene Profile, einschließlich asymmetrisch, aufweisen. 20
7. Datenträger nach Anspruch 1, wobei Zeilen des gedruckten Rasterbildes in einer oder mehreren Farben implementiert sind. 25
8. Datenträger nach Anspruch 1, wobei Zeilen des gedruckten Rasterbildes mit nichtfarbigen Spalten oder ohne Spalte implementiert sind. 30
9. Datenträger nach Anspruch 1, wobei Parameter der gedruckten und dreidimensionalen Rasterbilder verschiedene Moiré-Muster und weitere optische Effekte, einschließlich farbveränderliche Effekte, erzeugen. 35
10. Datenträger nach Anspruch 1, wobei Zeilen des dreidimensionalen Rasterbildes in einer oder mehreren Farben koloriert sind. 40

Revendications

1. Support de données avec une structure optiquement variable servant à vérifier l'authenticité d'un support de données, comportant un revêtement réalisé sous la forme d'un écran imprimé, l'écran imprimé étant constitué de lignes (1a, 1b) qui sont positionnées de manière adjacente les unes par rapport aux autres, et d'un écran tridimensionnel, dans lequel la largeur des lignes et la distance entre les lignes des écrans imprimé et tridimensionnel et l'orientation mutuelle des écrans sont sélectionnées pour créer une image de moiré sous la forme de bandes de couleur ; **caractérisé en ce que** l'écran imprimé est constitué de lignes de différentes couleurs et **en ce que** l'écran 50

tridimensionnel est constitué de zones non colorées (2a) et de zones colorées (2b) ; quand le support est vu de manière perpendiculaire par rapport à la surface du support, l'image de moiré est en mesure d'être reconnue sur les zones colorées de l'écran tridimensionnel et l'image de moiré n'est pas en mesure d'être reconnue sur les zones non colorées de l'écran tridimensionnel ; et quand le support est incliné, les parties de l'écran imprimé qui sont disposées sur les faces de l'écran tridimensionnel orienté vers l'observateur et qui ne sont pas cachées pour l'observateur par des éléments de l'écran tridimensionnel sont visibles, ce par quoi l'image de moiré devient visible sur les zones non colorées de l'écran tridimensionnel ; les bandes de moiré sur les zones colorées de l'écran tridimensionnel fusionnent sans passer dans des bandes de l'image de moiré sur les zones non colorées de l'écran tridimensionnel ; quand l'angle d'inclinaison du support est changé, les bordures des bandes de couleur de l'image de moiré semblent se déplacer sur les zones colorées de l'écran tridimensionnel sur le support.

2. Support de données selon la revendication 1, dans lequel l'écran imprimé est formé par des lignes créant une image visible lors de la visualisation directe du produit.
3. Support de données selon la revendication 1, dans lequel des lignes des écrans imprimé et tridimensionnel ont des largeur, intervalle et espacement identiques et/ou différents, et constants et/ou variables.
4. Support de données selon la revendication 1, dans lequel des lignes des écrans imprimé et tridimensionnel ont diverses configurations y compris droite, courbe et concentrique.
5. Support de données selon la revendication 1, dans lequel des lignes de l'écran tridimensionnel ont une profondeur constante et/ou variable.
6. Support de données selon la revendication 1, dans lequel des lignes de l'écran tridimensionnel ont divers profils, y compris asymétrique. 45
7. Support de données selon la revendication 1, dans lequel des lignes de l'écran imprimé sont mises en oeuvre en une ou plusieurs couleurs.
8. Support de données selon la revendication 1, dans lequel des lignes de l'écran imprimé sont mises en oeuvre avec des espaces non colorés ou sans espace.
9. Support de données selon la revendication 1, dans lequel des paramètres des écrans imprimé et tridi- 55

mensionnel créent divers motifs de moiré et d'autres effets visuels, y compris des effets de couleur variable.

10. Support de données selon la revendication 1, dans lequel des lignes de l'écran tridimensionnel sont colorées en une ou plusieurs couleurs.

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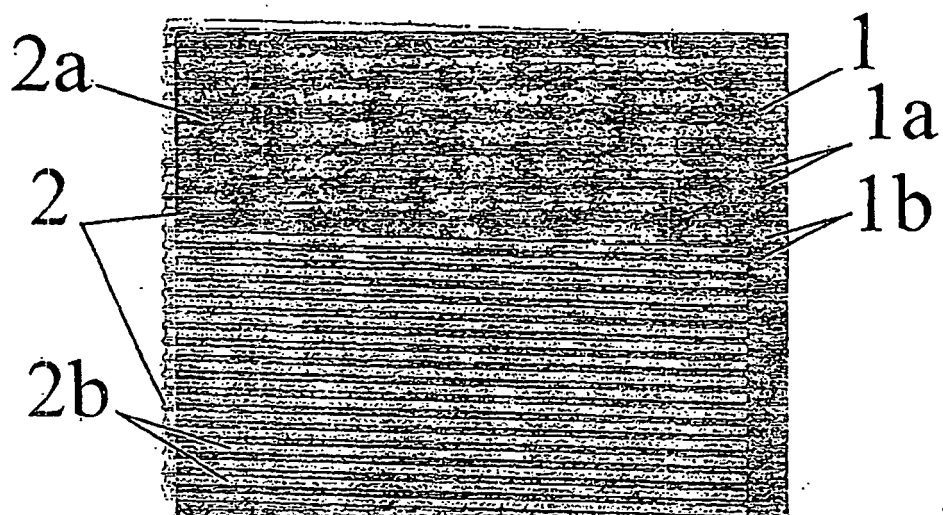


Fig. 1

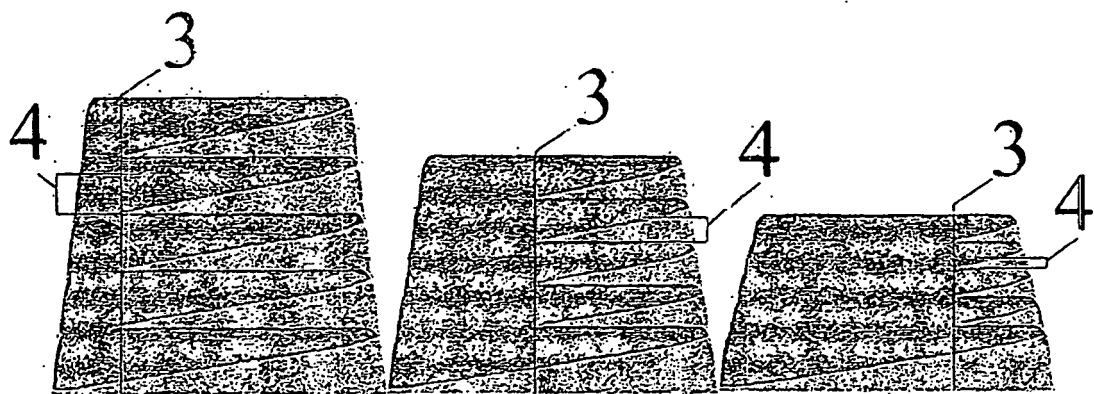


Fig.2

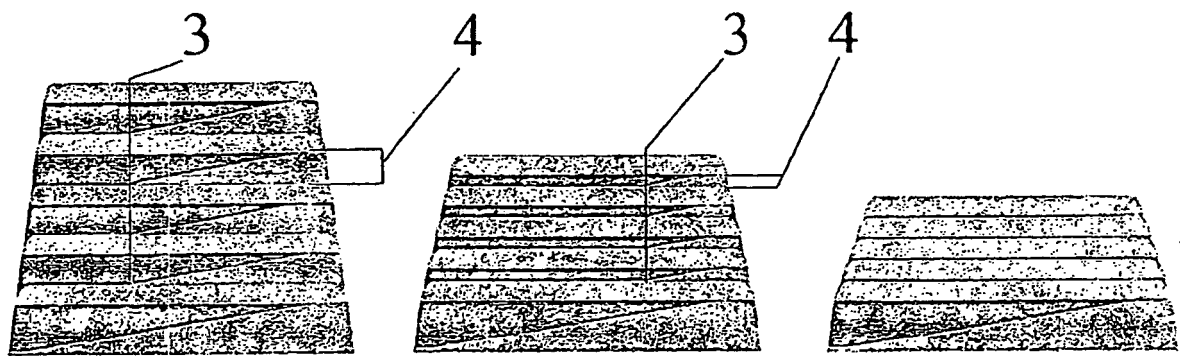


Fig. 3

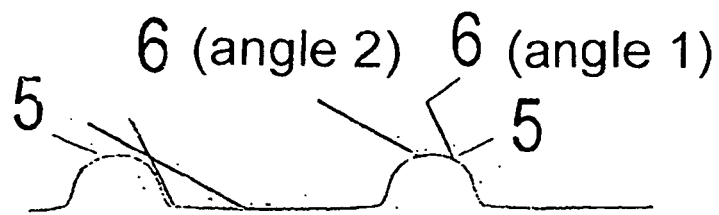


Fig. 4

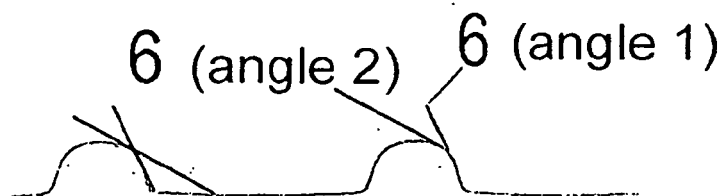


Fig. 5

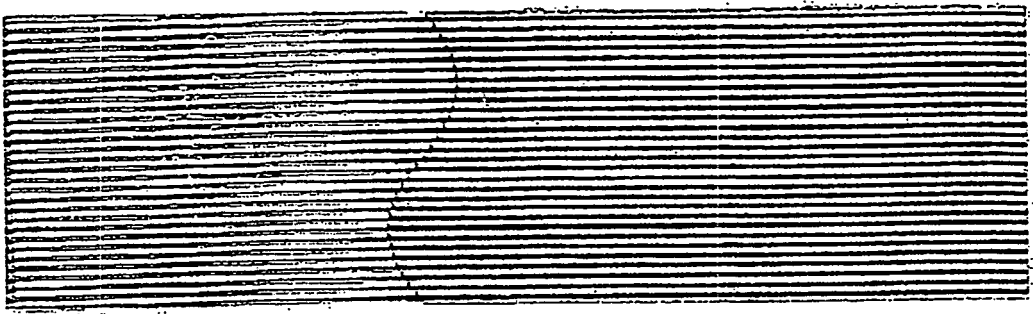


Fig. 6

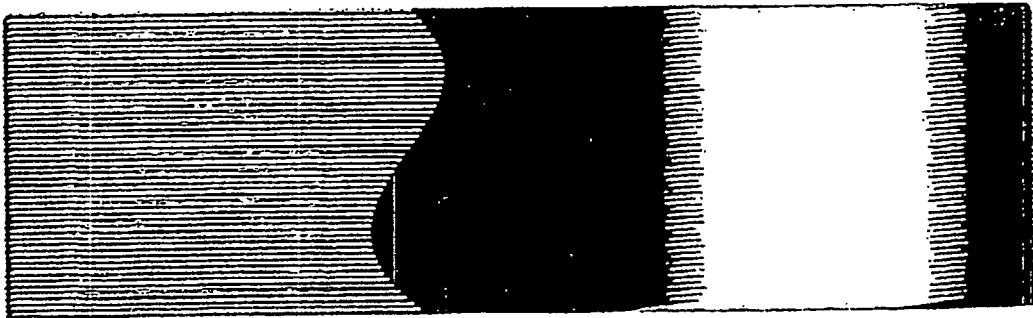


Fig. 7

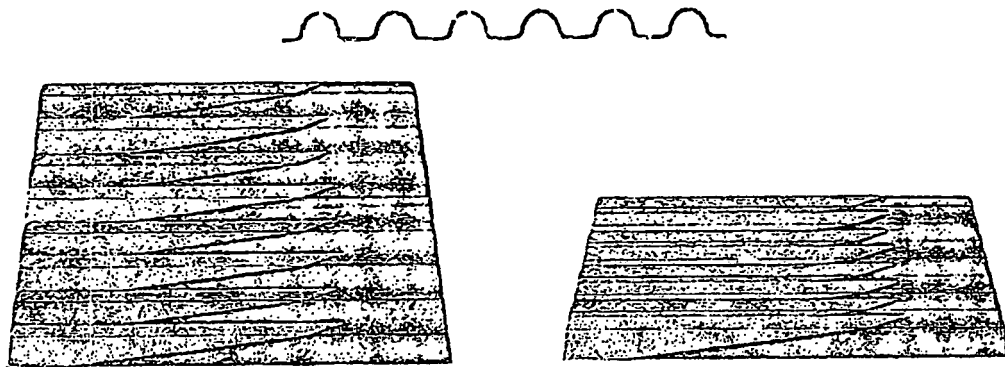


Fig. 8

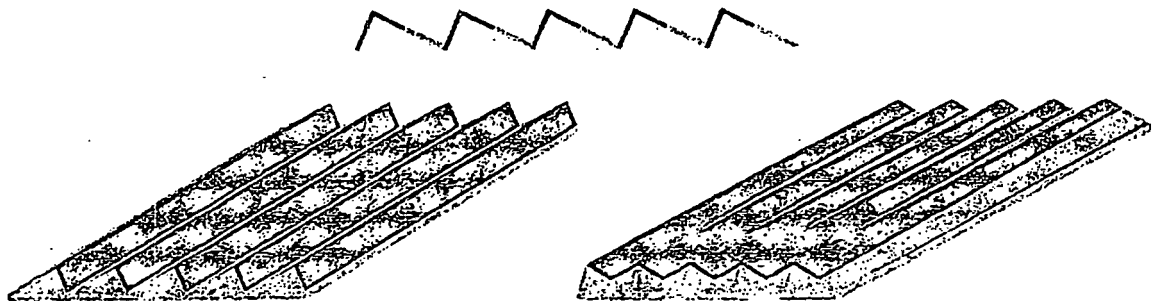


Fig. 9

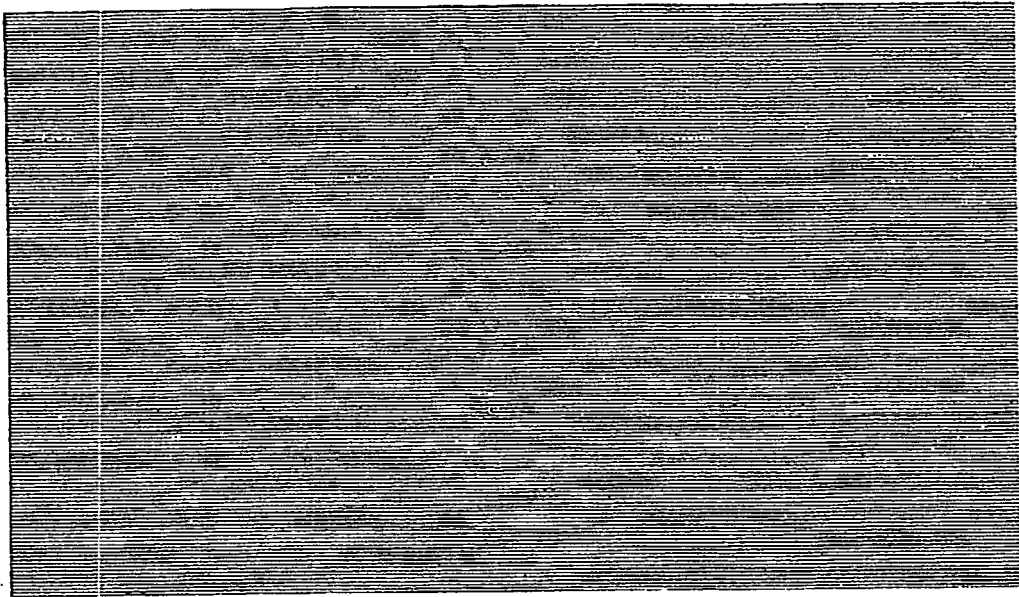


Fig. 10

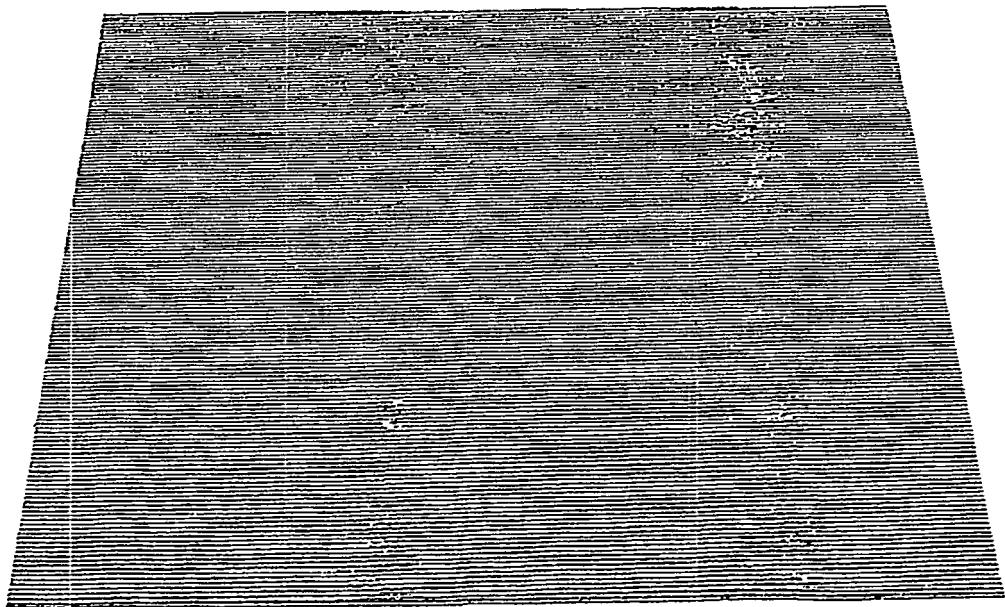


Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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