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(54) **PERFORATION PATTERN WITH AN IMAGE THAT DEPENDS ON THE VIEWING ANGLE**

PERFORATIONSMUSTER MIT EINEM VOM BLICKWINKEL ABHÄNGIGEN BILD

MOTIF PERFORE PRESENTANT UNE IMAGE EN FONCTION DE L'ANGLE DE VUE

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Description

[0001] The invention relates to a carrier provided with a perforation pattern arranged by laser, which perforation pattern provides an image depending on the angle of view.

[0002] Such a carrier is known from the Netherlands patent application 1012460.

[0003] The effect of an image depending on the angle of view is herein achieved by arranging perforations at an oblique angle in the carrier of a certain thickness, for instance 0.8 mm in the Netherlands passport.

[0004] This requires major structural modifications of the device for making such a pattern. For carriers of a certain thickness as stated above, the effect of the oblique arranged holes is readily visible. However the thinner the carrier becomes, the less noticeable the effect becomes.

[0005] The object of the present invention is to provide a carrier which can be thick (for instance about 0.8 mm) as well as thin (for instance about 0.1 mm), wherein such an effect can be achieved.

[0006] In this respect it is noted that WO-A-97/18 092 discloses a carrier which is provided with a perforation pattern applied by laser, wherein the perforation pattern comprises a number of perforations which perforation pattern provides an image depending on the angle of view, wherein at least some of the perforations have an oval shape.

[0007] However the axes of all oval shaped perforations extend in the same direction, so that no visible effect dependant from the angle of view is obtained.

[0008] To provide such a visible effect, which is dependant of the angle of view the present invention provides such a carrier wherein some of the perforations with an oval shape have their long axes in the different direction than other oval perforations.

[0009] Although the invention is in no way limited to application on documents representing value such as passports, driving licences, bank notes, postage stamps and cheques, the advantages of the invention are most clearly manifest in this application.

[0010] According to a further preferred embodiment, the perforations extend perpendicularly of the main plane of the carrier.

[0011] The problems of an oblique angle between laser beam and carrier are herein obviated.

[0012] According to yet another preferred embodiment, the perforations with their different longitudinal axis in the plane parallel to the main plane of the carrier have an oval shape.

[0013] An oval is a shape without acute angles, and can thus be arranged more easily with a laser.

[0014] The invention is however in no way limited to such oval openings; it is for instance possible to arrange rectangular holes with rounded ends; the effect according to the invention is herein also achieved.

[0015] It is noted here that a significant part of the se-

curity lies in the difficulty of arranging such a pattern. With usual laser equipment it is possible to arrange round perforations with dimensions which are visible when the carrier is held up to the light. Making smaller perforations is therefore pointless. In order to nevertheless increase the difficulty of copying, it is therefore attractive to arrange differently shaped holes, wherein an oval is found to be a good choice. The arranging of ovals already provides a certain degree of protection per se since the arranging of such oval openings raises a high technical threshold, while ovals provide the option of displaying the above stated effect of a changing image at a varying angle of view.

[0016] It is further pointed out here that copying is made more difficult when the perforation pattern at least partly comprises perforations with an oval area, the smallest dimension of which is smaller than the smallest dimension which can be realized with a laser light source with a wavelength of 10.6 μm .

[0017] This raises very high technical thresholds. Applying the invention on a commercial scale requires a high speed of the laser equipment. This speed can only be achieved by applying so-called AODs, i.e. acousto-optical deflectors. At the usual wavelength of 10.6 μm the use of such acousto-optical deflectors is difficult as a result of the dissipation and other adverse effects occurring therein.

[0018] By applying another wavelength, wherein these drawbacks occur in considerably smaller measure, applicant has succeeded in applying such AODs, whereby the present invention has become realizable.

[0019] The present invention thus also provides a method for arranging a laser pattern in a carrier, which method is characterized in that oval perforations are arranged and wherein use is made of a wavelength which is smaller than 10.6 μm .

[0020] The invention therefore also provides a device for arranging a laser pattern in a carrier which is characterized in that the device is adapted to arrange oval perforations, wherein the device is adapted to generate a laser beam with a wavelength which is smaller than 10.6 μm .

[0021] The present invention will now be elucidated with reference to the annexed figures, in which:

Figure 1a is a cross-sectional view of a carrier which is provided with two perforations with different dimensions in the direction of the cross-section;

Figure 1b is a view corresponding with figure 1a in a different situation;

Figure 2 is a top view of a carrier which is provided with a perforation pattern according to a first embodiment of the present invention;

Figure 3 is a cross-sectional view of a carrier with a perforation pattern according to a second embodiment of the present invention;

Figure 4a is a top view of an oval opening; and

Figure 4b is a top view of a rectangular opening with

semi-circular ends.

[0022] Figure 1a shows a carrier 1, which is for instance formed by a document representing value such as a card which is for instance incorporated in a passport. Only two openings 2a and 2b are arranged herein for the purpose of elucidation, wherein opening 2a is smaller in the direction of the shown cross-section than that of opening 2b in the same direction. In the case of a straight angle of view, wherein the light beams to be caught by the eye are shown by lines 3a respectively 3b, it has been found that the amount of transmitted light is proportional to the width of perforation 2a respectively 2b. It is assumed here - for the sake of simplicity - that the dimensions are the same in the direction transversely of the shown cross-section.

[0023] Figure 1b shows the same carrier 1 in which the same openings 2a, 2b respectively are arranged. With an oblique angle of view, which is represented by light beams 4a, 4b respectively, it has been found that both light beams are narrowed. They are narrowed by the same width. As a result of the fact that opening 2a is smaller than opening 2b, the relative decrease in the light beam width at the small opening 2a is greater than that at the opening 2b.

[0024] It will be apparent that the relation between the thickness of the carrier and the size of the openings is important. The described effect is found to still work in carriers which are as thin as a sheet of paper. Furthermore, the edge of the opening will not be wholly cylindrical when laser equipment is used; the phenomenon whereby the material is removed occurring as a result of supplying laser energy is formed on the one hand by evaporation and disintegration of the material, but also due to phenomena resembling combustion.

[0025] The removed material will hereby not have a precisely cylindrical form, whereby variations in the above outlined model result.

[0026] The invention can be implemented in a number of ways. It is thus possible to combine the preferably applied oval openings with round openings, as shown in figure 2. Figure 2 shows a pattern of 8x5 openings substantially formed by round openings. A group of openings with the configuration of the letter P is embodied as an oval opening. The longitudinal axis of these openings extends in one direction. It is herein ensured that the surface area of the oval openings is the same as the surface area of the round openings. When this pattern is thus given a sufficiently small form, the pattern of the letter P will not be visible in a straight line of view.

[0027] When the line of view is tilted, for instance in the direction parallel to the longitudinal direction of the oval openings, the amount of light which is visible through the oval openings will decrease more slowly, and later disappear completely, than that of the round openings.

[0028] In the above embodiment a letter P is used.

[0029] It will be apparent that other images, for instance representations of photos, can be used instead

of letters.

[0030] These photos can be formed by the image which is normally visible, i.e. at a straight angle of view, wherein the second image only becomes visible during tilting.

[0031] Figure 3 shows another embodiment wherein a pattern is arranged of elongate perforations 9 with a longitudinal axis in a first direction. Some of the perforations of the pattern, i.e. perforations 10, are likewise oval but have the longitudinal axis in a direction extending perpendicularly thereof.

[0032] The surface area of both types of oval opening 9, 10 is herein chosen such that at a normal, i.e. straight, angle of view, a first pattern can be seen, for instance a photo. When the carrier is tilted, whereby another angle of view is created, the second pattern becomes visible, in the present case a letter E.

[0033] Figure 4 shows a perforation pattern made up of rectangular openings with rounded ends instead of oval openings. The letter "A" herein becomes visible during tilting.

[0034] It will be apparent that numerous variations can be applied to the embodiments shown here. It is thus possible to vary the degree of ovality, i.e. the ratio between longitudinal axis and transverse axis of the openings, so as to achieve intermediate tones.

[0035] The same effect is also possible by varying the angle of the axis of the ovals. The two variation options can be combined.

[0036] It is also possible to make a combination of the embodiment shown here of substantially cylindrical perforations extending transversely of the main direction of the carrier, and perforations extending at an oblique angle.

Claims

1. Carrier (1, 7, 8) provided with a perforation pattern applied by laser, wherein the perforation pattern comprises a number of perforations (2A, 2B, 5, 6, 9, 10) which perforation pattern provides an image depending on the angle of view, wherein at least some of the perforations (5,9,10) have an oval shape, **characterized in that** some of the perforations (9) with an oval shape have their long axes in the different direction than other oval perforations (10).
2. Carrier (1,7,8) as claimed in claim 1, **characterized in that** the carrier (1,7,8) is a document representing value.
3. Carrier (1,7,8) as claimed in claim 1 or 2, **characterized in that** the perforations (2A, 2B, 5, 6, 9,10) extend perpendicularly of the main plane of the carrier.
4. Carrier (1, 7, 8) as claimed in any of the preceding

claims, **characterized in that** the perforation pattern displays a first image at a line of a view (3A, 3B) extending perpendicularly of the carrier (1, 7, 8) and that the perforation pattern displays a second image at a line of view (4A, 4B) differing therefrom.

5. Carrier (1, 7, 8) as claimed in any of the preceding claims **characterized in that** the perforation patterns comprises round perforations (6) and that the part of the number of perforations (5) with a different longitudinal axis in the plane parallel to main plane has an oval shape.

6. Carrier (1, 7, 8) as claimed in any of the claims 1-5, **characterized in that** the perforation pattern comprises oval perforations (9) with a longitudinal axis in a first direction and that the part of the number of perforations (10) is oval with a longitudinal axis in a second direction differing from the first direction.

7. Carrier (1, 7, 8) as claimed in any of the preceding claims, **characterized in that** the perforations pattern at least partly comprised perforations (5, 9, 10) with an oval area, the smallest dimension of which is smaller than the smallest dimension which can be realized with a laser light source with a wavelength of 10.6 μm .

8. Method of arranging a laser pattern in a carrier as claimed in any of the preceding claims, **characterized in that** use is made of wavelength which is smaller than 10.6 μm .

9. Device for arranging a laser pattern in a carrier as claimed in any of the claims 1-7, **characterized in that** the device is adapted to arrange oval perforations and that the device is adapted to generate a laser beam with a wavelength which is smaller than 10.6 μm .

Patentansprüche

1. Träger (1, 7, 8) mit einem durch einen Laser angebrachten Perforationsmuster, worin das Perforationsmuster eine Anzahl Perforationen (2A, 2B, 5, 6, 9, 10) umfasst, welches Perforationsmuster abhängig vom Betrachtungswinkel ein Bild liefert, worin zumindest einige der Perforationen (5, 9, 10) eine ovale Form haben, **dadurch gekennzeichnet, dass** einige der Perforationen (9) mit einer ovalen Form ihre Längsrichtung in einer anderen Richtung haben als andere ovale Perforationen (10).

2. Träger (1, 7, 8) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Träger (1, 7, 8) ein Dokument ist, das einen Wert verkörpert.

3. Träger (1, 7, 8) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Perforationen (2A, 2B, 5, 6, 9, 10) sich senkrecht zur Hauptebene des Trägers erstrecken.

4. Träger (1, 7, 8) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Perforationsmuster ein erstes Bild bei einer Betrachtungslinie (3A, 3B), die sich senkrecht zum Träger (1, 7, 8) erstreckt, zeigt, und dass das Perforationsmuster ein zweites Bild bei einer Betrachtungslinie (4A, 4B), die hiervon abweicht, zeigt.

5. Träger (1, 7, 8) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Perforationsmuster runde Perforationen (6) umfassen, und dass der Anteil der Perforationen (5) mit einer unterschiedlichen Längsachse in der Ebene parallel zur Hauptebene eine ovale Form hat.

6. Träger (1, 7, 8) nach einem der vorhergehenden Ansprüche 1-5, **dadurch gekennzeichnet, dass** das Perforationsmuster ovale Perforationen (9) mit einer Längsachse in einer ersten Richtung umfasst und dass der Anteil der Perforationen (10) oval ist mit einer Längsachse in einer zweiten Richtung, die von der ersten Richtung abweicht.

7. Träger (1, 7, 8) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Perforationsmuster zumindest teilweise Perforationen (5, 9, 10) mit einer ovalen Fläche umfasst, wovon die kleinste Abmessung kleiner ist als die kleinste Abmessung, die mit einer Laserquelle mit einer Wellenlänge von 10,6 μm erzielt werden kann.

8. Verfahren zur Anordnung eines Lasermusters in einem Träger nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** von einer Wellenlänge Gebrauch gemacht wird, die kleiner als 10,6 μm ist.

9. Vorrichtung zur Anordnung eines Lasermusters in einem Träger nach einem der vorhergehenden Ansprüche 1-7, **dadurch gekennzeichnet, dass** die Vorrichtung zur Anordnung von ovalen Perforationen ausgelegt ist, und dass die Vorrichtung geeignet ist, einen Laserstrahl mit einer Wellenlänge, die kleiner als 10,6 μm beträgt, zu erzeugen.

Revendications

1. Support (1, 7, 8) pourvu d'un agencement de perforations appliquées par laser, en sachant que l'agencement de perforations comprend un certain nombre de perforations (2A, 2B, 5, 6, 9, 10), lequel agencement de perforations produit une image dépendant

de l'angle de visualisation, en sachant que au moins certaines des perforations (5, 9, 10) ont une forme ovale, **caractérisé en ce que** certaines des perforations (9) ayant une forme ovale ont leur grand axe orienté différemment de celui d'autres perforations ovales (10).

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caractérisé en ce que le dispositif est adapté pour aménager des perforations ovales et **en ce que** le dispositif est adapté pour produire un faisceau laser ayant une longueur d'onde qui est inférieure à 10,6 μm .

2. Support (1, 7, 8) selon la revendication 1, **caractérisé en ce que** le support (1, 7, 8) est un document présentant de la valeur. 10
3. Support (1, 7, 8) selon la revendication 1 ou 2, **caractérisé en ce que** les perforations (2A, 2B, 5, 6, 9, 10) s'étendent perpendiculairement au plan principal du support. 15
4. Support (1, 7, 8) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'agencement des perforations présente une première image selon un axe de visualisation (3A, 3B) s'étendant perpendiculairement au support (1, 7, 8) et **en ce que** l'agencement des perforations présente une seconde image selon un axe de visualisation (4A, 4B) en différant. 20
25
5. Support (1, 7, 8) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'agencement des perforations comprend des perforations rondes (6) et **en ce que** la partie du nombre de perforations (5) ayant un axe longitudinal différent dans le plan parallèle au plan principal a une forme ovale. 30
6. Support (1, 7, 8) selon l'une quelconque des revendications 1-5, **caractérisé en ce que** l'agencement des perforations comprend des perforations ovales (9) ayant un axe longitudinal dans une première direction et **en ce que** la partie du nombre de perforations (10) est ovale avec un axe longitudinal dans une seconde direction différant de la première direction. 35
40
7. Support (1, 7, 8) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'agencement des perforations comprend au moins en partie des perforations (5, 9, 10) ayant une aire ovale dont la plus petite dimension est plus petite que la plus petite dimension qui peut être réalisée avec une source de lumière laser ayant une longueur d'onde de 10,6 μm . 45
50
8. Procédé d'aménagement d'un motif laser dans un support selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** est fait usage d'une longueur d'onde qui est inférieure à 10,6 μm . 55
9. Dispositif pour aménager un motif laser dans un support selon l'une quelconque des revendications 1-7,

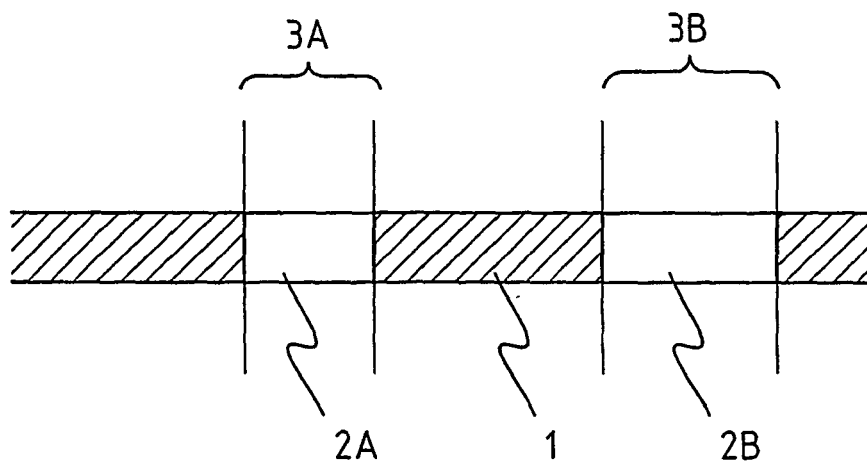


FIG. 1A

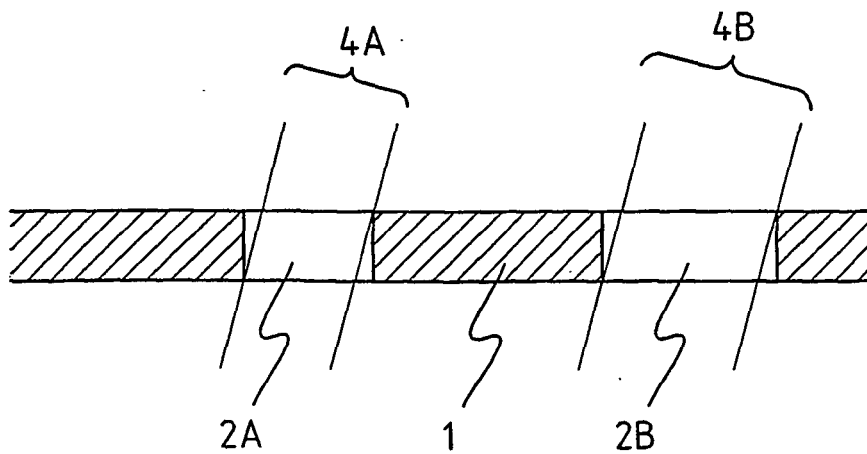


FIG. 1B

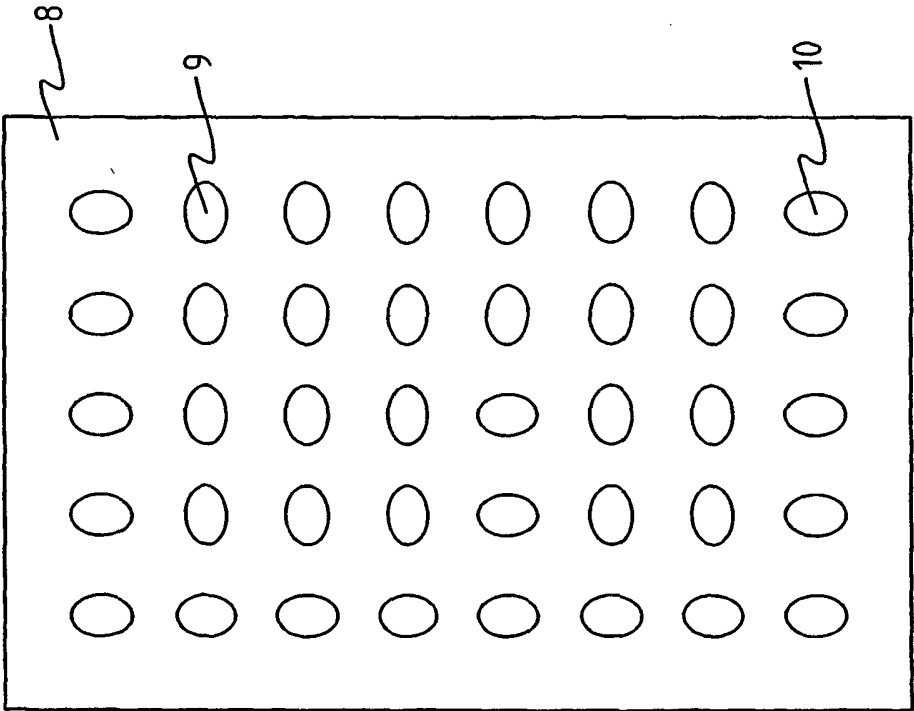


FIG. 3

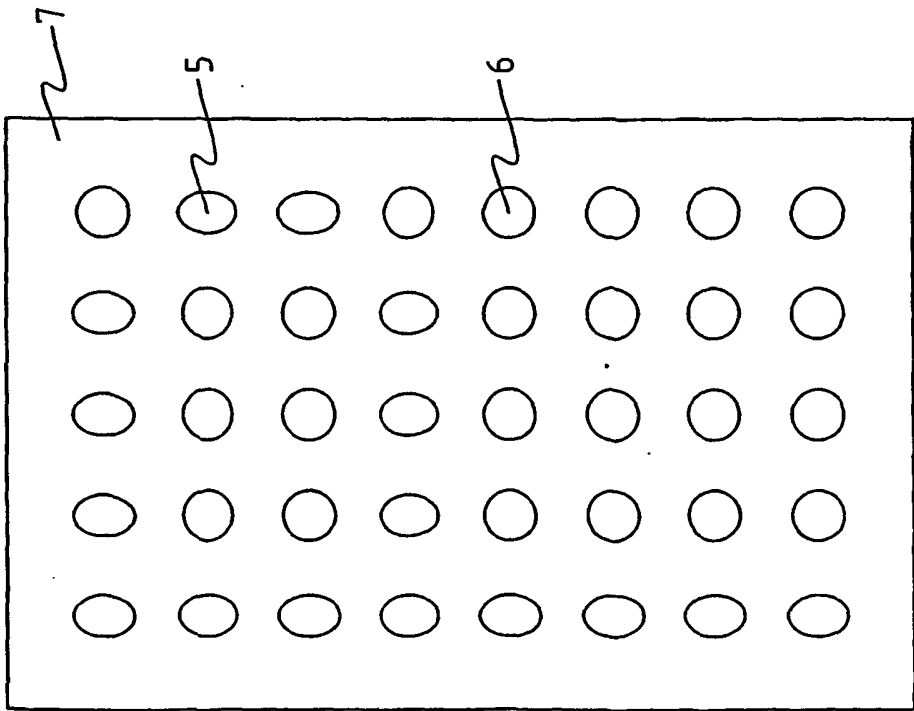


FIG. 2

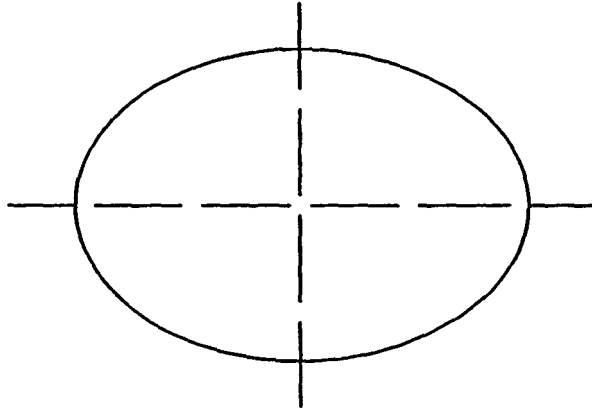


FIG. 4A

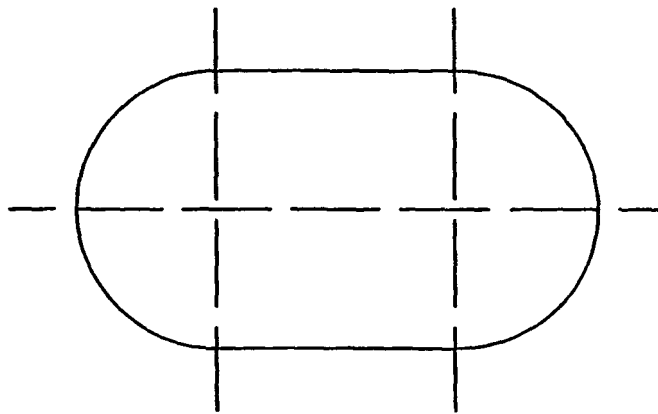


FIG. 4B