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(54) **Lamp for motor-vehicles**

Leuchte für Kraftfahrzeuge

Lampe pour véhicules automobiles

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Description

[0001] The present invention relates to the field of motor-vehicle lamps, and in particular to the subject-matter of the preambles of independent claims 1 and 13. A lamp according to the preamble of claim 1 is known from EP-A-0 766 037.

[0002] In recent years, the evolution in the design of motor-vehicle bodies has led to positioning the rear lights at areas of the motor-vehicle which are not ideal in order to achieving the required lighting characteristics. Thus a number of problems have arisen in the design of vehicle lights, which must be solved while simultaneously considering the need of obtaining a structure which is relatively simple to manufacture, with a reduced bulk and at low cost.

[0003] The object of the present invention is that of solving all the above mentioned problems efficiently by providing a lamp which has a minimum bulk along the direction orthogonal to the transparent element of the lamp, which is simple and inexpensive to manufacture and ensures that a uniform light beam is obtained at the output, having the required characteristics, even in case the lamp is positioned at an area of the motor-vehicle which is not ideal in order to achieving a good rearward lighting, such as at a side edge of the rear part of the motor-vehicle.

[0004] In order to achieving this object, the invention provides a lamp for motor-vehicles comprising the features of claim 1.

[0005] The lateral areas may be also defined by a plurality of paraboloid segments located side by side along said first direction or alternatively may have a smooth surface.

[0006] The surface of the main reflective wall is optimized in order to lighten the transparent plate uniformly and the paraboloid segments are calculated in order to provide a light beam coming out of the lamp body in the required direction.

[0007] The light source with the auxiliary reflective element associated therewith is positioned on one side of the lamp body, either centrally with respect to this side, or at one end thereof, at one edge of the lamp body. This auxiliary reflective element has a cylindroid-like surface and forms, along with the light source associated therewith, a single unit provided with means for quick coupling to the lamp body.

[0008] The light source is preferably constituted by a lamp whose base is arranged transversely with respect to the optical axis of the auxiliary reflective elements and is received within a notch formed in the front edge of the auxiliary reflective element. Therefore, in order to replace the lamp, it is necessary to disengage the auxiliary element from the lamp body and then remove the electric lamp from the front notch of the auxiliary reflective element, proceeding thereafter in the opposite way in order to install the new electric lamp. This solution further reduces the bulk of the lamp according to the in-

vention.

[0009] The main reflective wall is able to give rise to a uniform light beam, having the required characteristics, without the need of providing further prisms on the transparent plate, even if of course this possibility remains available to the designer.

[0010] The lamp according to the invention solves all the above mentioned problems brilliantly, while keeping the bulk along the direction orthogonal to the transparent plate extremely reduced, which renders possible to position the lamp even at areas of the motor-vehicle where the available space is very reduced.

[0011] The invention is also directed to a light unit as set forth in claim 13.

[0012] Further features and advantages of the invention will become apparent from the description which follows with reference to the annexed drawings, given purely by way of non limiting example, in which:

figure 1 is a perspective view of a rear light unit for a motor-vehicle, including at least one lamp according to the present invention,

figure 2 is a diagrammatic cross-sectional view of the lamp of figure 1, in the plane orthogonal to the transparent plate and passing through the optical axis of the auxiliary reflective element,

figures 3, 4 show a view developed in a plane of two alternative embodiments of the main reflective wall of the lamp according to the invention,

figure 5 is a perspective view of the main reflective wall of one embodiment of the lamp according to the invention,

figure 6 is a diagram which shows the features of the light beam coming out of the lamp, in the horizontal and vertical planes,

figure 7 is a cross-sectional view of a rear light unit of a motor-vehicle, including two or more lamps according to the present invention, located side by side in a configuration adapted to minimize the bulk of the device, and

figure 8 shows a variant of the lamp according to the invention.

[0013] In figure 1, reference numeral 1 generally designates a rear light unit for a motor-vehicle, which is to be arranged along the righthand lateral edge of the rear portion of a motor-vehicle. The light unit 1 comprises a plurality of lamps 2, 3, 4, 5, 6 which are aligned vertically above each other, at least one of which is made according to the present invention. In the following, reference will be made, purely by way of example, to lamp 2.

[0014] With reference also to figures 2-4, the lamp comprises a box-like body opened at the front. The front aperture of the box-like body, which is preferably made of plastic material, is closed by a transparent plate 7 (see figure 2). The wall of the hollow body of the lamp which faces the transparent plate 7 constitutes a main reflective wall 8 having a central area 8a and two lateral areas

8b.

[0015] As clearly shown in the drawings, the dimension of the lamp along the direction orthogonal to the transparent plate 7 is greatly reduced with respect to the other dimensions of the lamp. In other words, the reflective wall 8 is relatively close to the transparent plate 7. This arrangement is possible since with the lamp 2 there is associated a light source 9 which is constituted by an electric lamp which is arranged at one side of the lamp body and surrounded by an auxiliary reflective element 10.

[0016] Figures 3, 4 show two possible alternatives in which the lamp 9 is arranged at one side of the lamp body, at the center of this side (figure 3) or at one end thereof (figure 4) at one corner of the lamp body (as shown also in figure 1).

[0017] The arrangement of figure 4 is preferred to that of figure 3 since it provides a greater value of the ratio between the surface of the central area 8a and the total surface of the reflective wall 8.

[0018] The central area 8a and the lateral areas 8b of the reflective wall 8 can be made as to form a continuous surface, as shown in figure 5.

[0019] Furthermore, as shown in figures 3, 4, the electric lamp 9 has a base 9a which is arranged transversely with respect to the optical axis of the auxiliary reflective element 10 and is received within a notch 10a formed in the front edge of the reflective element 10. The reflective element 10 and electric lamp 9 form a single unit provided with means of any known type (not shown) for quick coupling to the body of lamp 2.

[0020] The arrangement shown in figure 7 minimizes the bulk of the device in the case of two or more adjacent lamps, where the auxiliary reflective element 10 of each lamp is fitted under the reflective wall 8 of the adjacent lamp. By this arrangement, the transparent plate 7 can be arranged side by side with no remaining non-illuminated gaps between adjacent lamps.

[0021] As shown in figures 5 and 8 for two alternative embodiments, the central area 8a has a number of paraboloid segments arranged side by side along the direction of the optical axis of the auxiliary reflective element 10.

[0022] The lateral areas 8b can be defined similarly to the central area 8a or alternatively may have a smooth surface in order to simplify the moulding operation of the lamp body.

[0023] The transparent plate can be provided with prisms and preferably has a peripheral edge which is shaped so as to obtain particular aesthetical effects, or iridescence effects or in order to control the light beam.

[0024] In an alternative embodiment (not shown) the transparent plate 7 has a matrix of microlenses adapted to further modify the characteristics of the light beam coming out of the device.

[0025] Figure 6 shows a diagram which shows two graphs I, II relating to the light intensity characteristics in the horizontal and vertical planes respectively.

[0026] Although the lamp is arranged on the motor-vehicle at a position such that the geometrical axis of the lamp is inclined upwardly and outwardly with respect to the longitudinal direction of the motor-vehicle, the geometrical characteristics of the reflective wall 8 are such that the light beam coming out of the device has the required direction.

[0027] As indicated in the foregoing, the wall of the lamp body is made of plastic material and is coated with aluminium at the area where it is necessary to provide reflective characteristics. The transparent plate is also made of plastic material, according to the conventional requirements.

The auxiliary reflective element which is associated with the electric lamp can be made of aluminium pressed sheet. In a possible alternative solution, the whole unit of the auxiliary reflective element is made by electroforming, a method which provides a greater precision in the manufacture, a greater flexibility in the design of the shape and a greater dissipation ability with respect to the conventional materials.

[0028] Naturally, while the principle of the invention remains the same, the details of construction and the embodiments may widely vary with respect to what has been described and illustrated purely by way of example.

[0029] For example, the paraboloid segments could be replaced by ellipsoid segments or more generally by any other type of surface obtained by rotating a conic section.

Claims

1. Motor-vehicle lamp, comprising:

- a hollow body (2) having a front aperture closed by a transparent plate (7), and a main reflective wall (8) facing the transparent plate (7), said hollow body (2) having a relatively reduced dimension along the direction orthogonal to the transparent plate (7),
- a light source (9) located at one side of the hollow body (2), with which there is associated an auxiliary reflective element (10), for directing light rays emitted by the source (9) in a first direction substantially parallel to the transparent plate (7), towards the main reflective wall (8), said main reflective wall (8) being adapted to reflect these rays in the direction of the transparent plate (7), so that a uniform light beam having the required characteristics is obtained coming out from said transparent plate (7),

characterized in that said main reflective wall (8) has a central area (8a) defined by a stair-like arrangement of segments located side by side along said first direction and each having a focus in

the light source, **in that** the segments of the central area (8a) have surfaces obtained by rotating a conic section, and **in that** the main reflective wall (8) further has two lateral areas (8b) located on opposite sides of the central area (8a).

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2. Lamp according to claim 1, **characterized in that** the light source (9), along with the auxiliary reflective element (10) associated therewith, is positioned at the center at one side of the lamp body (2). 10
3. Lamp according to claim 1, **characterized in that** the light source (9) along with the auxiliary reflective element (10) associated therewith is positioned at one end of one side of the lamp body (2), at one corner of the lamp body (2). 15
4. Lamp according to claim 1, **characterized in that** the auxiliary reflective element (10) has a cylinder-like surface. 20
5. Lamp according to claim 1, **characterized in that** the light source (9) along with the reflective element (10) associated therewith forms a single unit provided with means for quick coupling to the lamp body (2). 25
6. Lamp according to claim 5, **characterized in that** the light source (9) is constituted by an electric lamp whose base (9a) is arranged transversely to the optical axis of the auxiliary reflective element (10) and is received within a notch (10a) formed on the front edge of the auxiliary reflective element. 30
7. Lamp according to claim 1, **characterized in that** the segments of the central area (8a) are paraboloid segments. 35
8. Lamp according to claim 7, **characterized in that** the transparent element (7) has a peripheral edge shaped in such a way as to provide iridescence effects or effects affecting the light beam. 40
9. Lamp according to claim 1, **characterized in that** the transparent element (7) has a matrix of micro-lenses. 45
10. Lamp according to claim 1, **characterized in that** a coloured filter is associated with the light source. 50
11. Lamp according to claim 1, **characterized in that** said lateral areas (8b) have a smooth surface.
12. Lamp according to claim 1, **characterized in that** said lateral areas (8b) are each defined by a stair-like arrangement of paraboloid segments. 55
13. Light unit-for motor-vehicles, including two or more

lamps according to claim 1, **characterized in that** the reflective element (10) of each lamp is fitted under the reflective wall (8) of the adjacent lamp.

Patentansprüche

1. Kraftfahrzeugleuchte, umfassend:

- einen Hohlkörper (2) mit einer vorderen Öffnung, die durch eine transparente Platte (7) verschlossen ist, und einer Haupt-Reflexionswand (8), die der transparenten Platte (7) gegenüberliegt, wobei der Hohlkörper (2) eine Abmessung entlang der zur transparenten Platte (7) senkrechten Richtung aufweist, welche relativ abnimmt,
- eine an einer Seite des Hohlkörpers (2) angeordnete Lichtquelle (9), der ein Hilfs-Reflexionselement (10) zugeordnet ist, um von der Lichtquelle (9) emittierte Lichtstrahlen in eine erste Richtung im wesentlichen parallel zur transparenten Platte (7) zu der Haupt-Reflexionswand (8) hin zu lenken, wobei die Haupt-Reflexionswand (8) so ausgelegt ist, dass sie diese Strahlen in die Richtung der transparenten Platte (7) reflektiert, so dass ein aus der transparenten Platte (7) austretendes einheitliches Lichtbündel mit den erforderlichen Eigenschaften erhalten wird,

dadurch gekennzeichnet, dass die Haupt-Reflexionswand (8) einen zentralen Bereich (8a) aufweist, der durch eine treppenartige Anordnung von entlang der ersten Richtung nebeneinander angeordneten Segmenten definiert ist, von denen jedes einen Brennpunkt in der Lichtquelle hat, dass die Segmente des zentralen Bereichs (8a) durch Rotieren einer konischen Form erhaltene Oberflächen aufweisen, und dass die Haupt-Reflexionswand (8) weiterhin zwei seitliche Bereiche (8b) aufweist, die an gegenüberliegenden Seiten des zentralen Bereichs (8a) liegen.

2. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die Lichtquelle (9) zusammen mit dem ihr zugeordneten Hilfs-Reflexionselement (10) an einer Seite des Leuchtenkörpers (2) mittig angeordnet ist.
3. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die Lichtquelle (9) zusammen mit dem ihr zugeordneten Hilfs-Reflexionselement (10) an einem Ende einer Seite des Lampenkörpers (2) an einer Ecke desselben angeordnet ist.
4. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** das Hilfs-Reflexionselement (10) eine ei-

nem elliptischen Zylinder ähnliche Oberfläche aufweist.

5. Leuchte nach Anspruch 5, **dadurch gekennzeichnet, dass** die Lichtquelle (9) zusammen mit dem ihr zugeordneten Reflexionselement (10) eine einzelne Einheit bildet, welche mit Mitteln für ein schnelles Koppeln an den Lampenkörper (2) versehen ist. 5
6. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die Lichtquelle (9) aus einer elektrischen Lampe gebildet ist, deren Sockel (9a) quer zur optischen Achse des Hilfs-Reflexionselementes (10) angeordnet und in einer am vorderen Rand des Hilfs-Reflexionselementes ausgebildeten Ausnehmung (10a) aufgenommen ist. 10 15
7. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die Segmente des zentralen Bereichs (8a) parabolische Segmente sind. 20
8. Leuchte nach Anspruch 7, **dadurch gekennzeichnet, dass** das transparente Element (7) einen peripheren Rand aufweist, der so geformt ist, dass er irisierende Effekte oder Effekte, die das Lichtbündel beeinflussen, erzeugt. 25
9. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** das transparente Element (7) eine Matrix aus Mikrolinsen aufweist. 30
10. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** der Lichtquelle ein farbiger Filter zugeordnet ist. 35
11. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die seitlichen Bereiche (8b) eine glatte Oberfläche aufweisen. 40
12. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die seitlichen Bereiche (8b) jeweils durch eine treppenartige Anordnung parabolischer Segmente gebildet werden. 45
13. Leuchtaggregat für Kraftfahrzeuge, umfassend zwei oder mehr Leuchten nach Anspruch 1, **dadurch gekennzeichnet, dass** das Reflexionselement (10) jeder Leuchte unter der Reflexionswand (8) der benachbarten Lampe montiert ist. 50

Revendications

1. Lampe de véhicule à moteur, comprenant :
un corps creux (2) ayant une ouverture avant fermée par une plaque transparente (7) et une paroi réfléchissante principale (8) tournée vers

la plaque transparente (7), le corps creux (2) ayant une dimension relativement réduite en direction perpendiculaire à la plaque transparente (7), et

une source de lumière (9) disposée d'un premier côté du corps creux (2) et à laquelle est associé un élément réfléchissant auxiliaire (10) destiné à diriger des rayons lumineux émis par la source (9) dans une première direction pratiquement parallèle à la plaque transparente (7) vers la paroi réfléchissante principale (8), la paroi réfléchissante principale (8) étant destinée à réfléchir ces rayons dans la direction de la plaque transparente (7), afin qu'un faisceau uniforme de lumière ayant les caractéristiques nécessaires soit obtenu à la sortie de la plaque transparente (7),

caractérisée en ce que la paroi réfléchissante principale (8) possède une région centrale (8a) délimitée par un arrangement en marches d'escalier formé des segments disposés côte à côte dans la première direction et ayant chacun un foyer à la source lumineuse,

en ce que les segments de la région centrale (8a) ont des surfaces obtenues par rotation d'une section conique, et **en ce que** la paroi réfléchissante principale (8) a en outre deux régions latérales (8b) disposées sur des côtés opposés de la région centrale (8a).

2. Lampe selon la revendication 1, **caractérisée en ce que** la source de lumière (9), avec l'élément réfléchissant auxiliaire (10) qui lui est associé, est positionnée au centre d'un premier côté du corps de lampe (2).
3. Lampe selon la revendication 1, **caractérisée en ce que** la source de lumière (9), avec l'élément réfléchissant auxiliaire (10) qui lui est associé, est positionnée à une extrémité d'un côté du corps de lampe (2), à un coin du corps de lampe (2).
4. Lampe selon la revendication 1, **caractérisée en ce que** l'élément réfléchissant auxiliaire (10) a une surface analogue à un cylindre.
5. Lampe selon la revendication 1, **caractérisée en ce que** la source de lumière (9), avec l'élément réfléchissant (10) qui lui est associé, forme une unité unique ayant un dispositif de raccordement rapide au corps de lampe (2).

6. Lampe selon la revendication 5, **caractérisée en ce que** la source de lumière (9) est constituée par une lampe électrique dont la base (9a) est disposée transversalement à l'axe optique de l'élément réfléchissant auxiliaire (10) et est logée dans une enco-

che (10a) formée au bord avant de l'élément réfléchissant auxiliaire.

7. Lampe selon la revendication 1, **caractérisée en ce que** les segments de la région centrale (8a) sont des segments de paraboloïde. 5
8. Lampe selon la revendication 7, **caractérisée en ce que** l'élément transparent (7) a un bord périphérique dont la forme est telle qu'il donne des effets d'iridescence ou des effets affectant le faisceau de lumière, 10
9. Lampe selon la revendication 1, **caractérisée en ce que** l'élément transparent (7) possède une matrice de micro-lentilles. 15
10. Lampe selon la revendication 1, **caractérisée en ce qu'un** filtre coloré est associé à la source de lumière. 20
11. Lampe selon la revendication 1, **caractérisée en ce que** les régions latérales (8b) ont une surface lisse. 25
12. Lampe selon la revendication 1, **caractérisée en ce que** les régions latérales (8b) sont délimitées chacune par un arrangement en marches d'escalier de segments de paraboloïde. 30
13. Unité à lampes pour véhicule à moteur, comprenant deux ou plusieurs lampes selon la revendication 1, **caractérisée en ce que** l'élément réfléchissant (10) de chaque lampe est monté sous la paroi réfléchissante (8) de la lampe adjacente. 35

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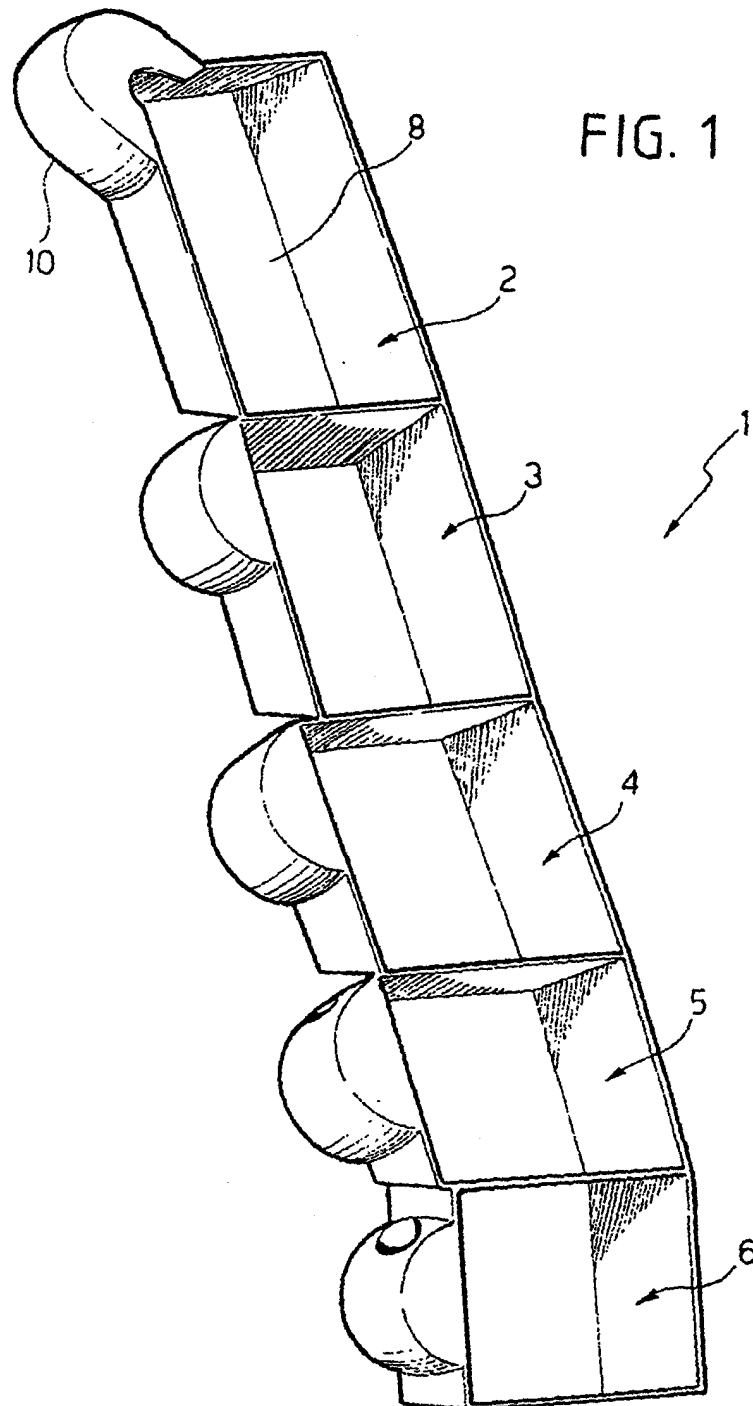


FIG. 2

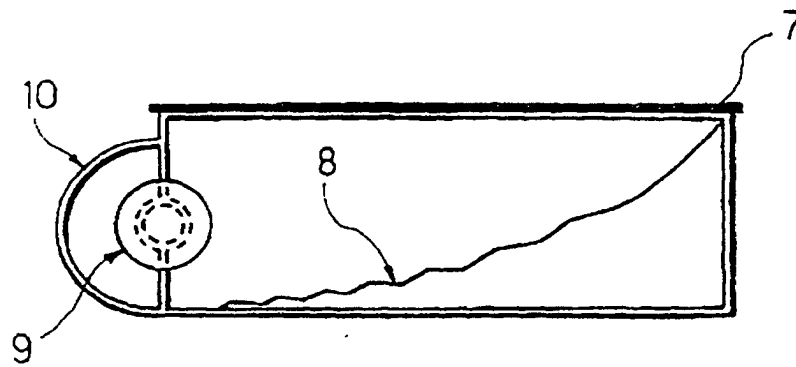
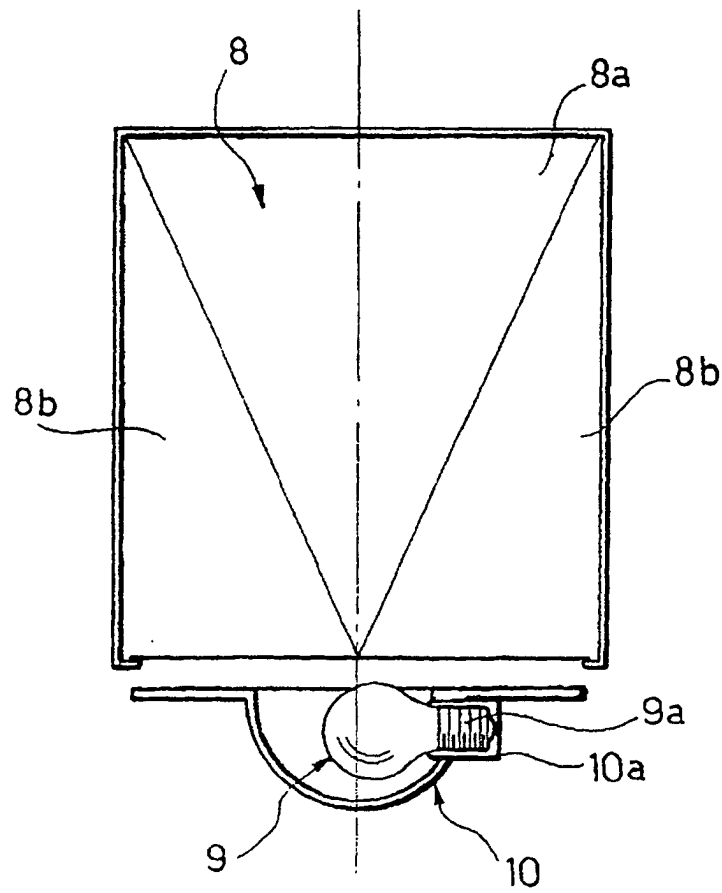


FIG. 3



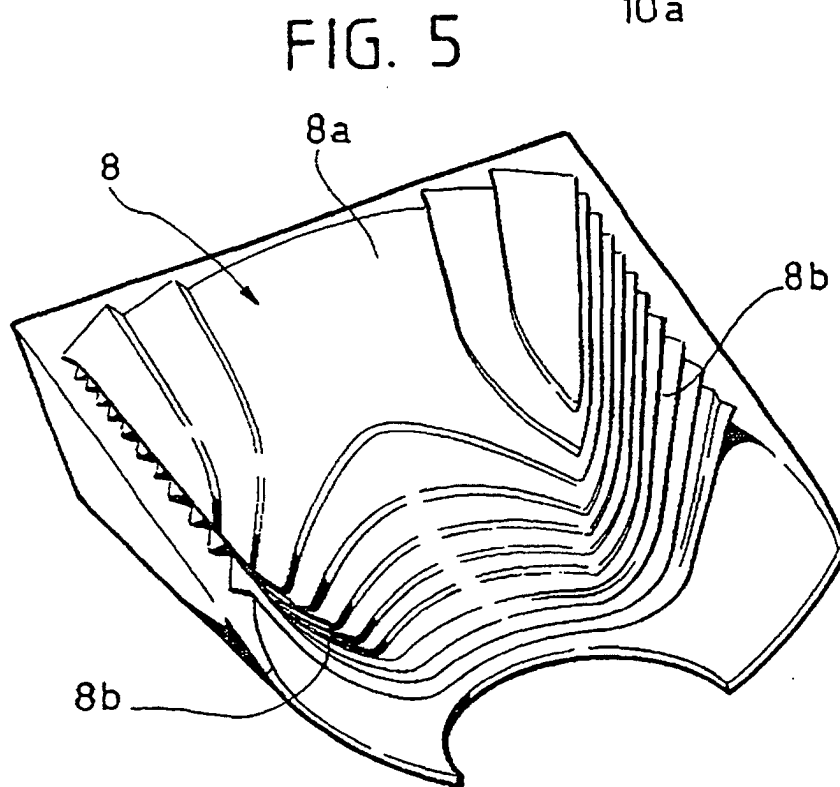
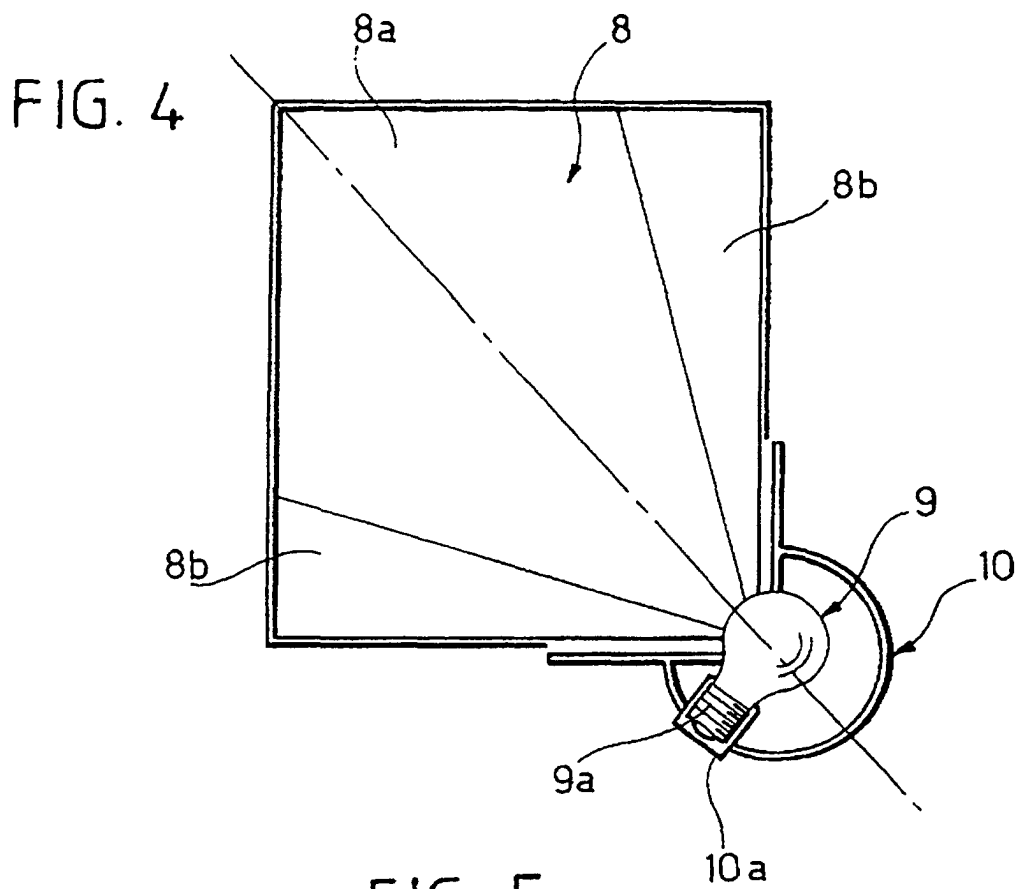


FIG. 6

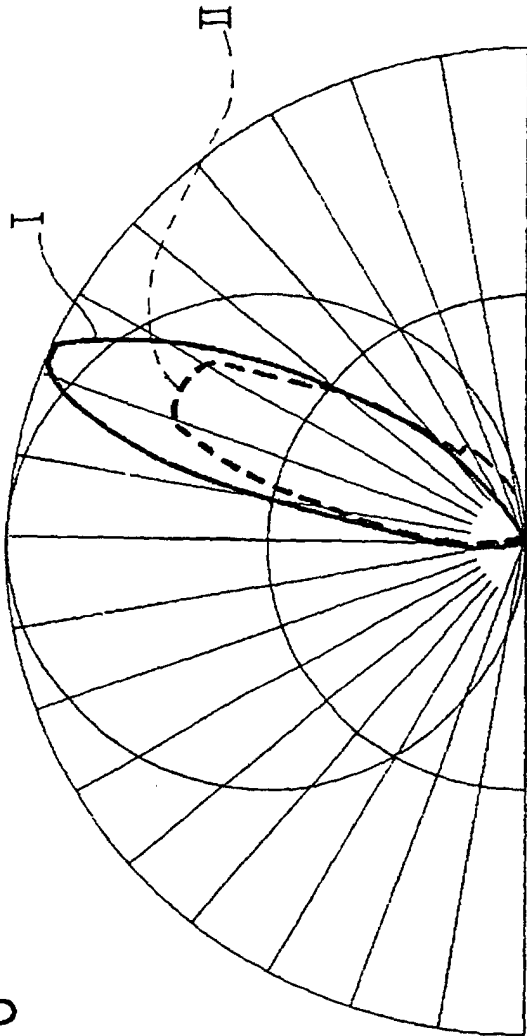


FIG. 7

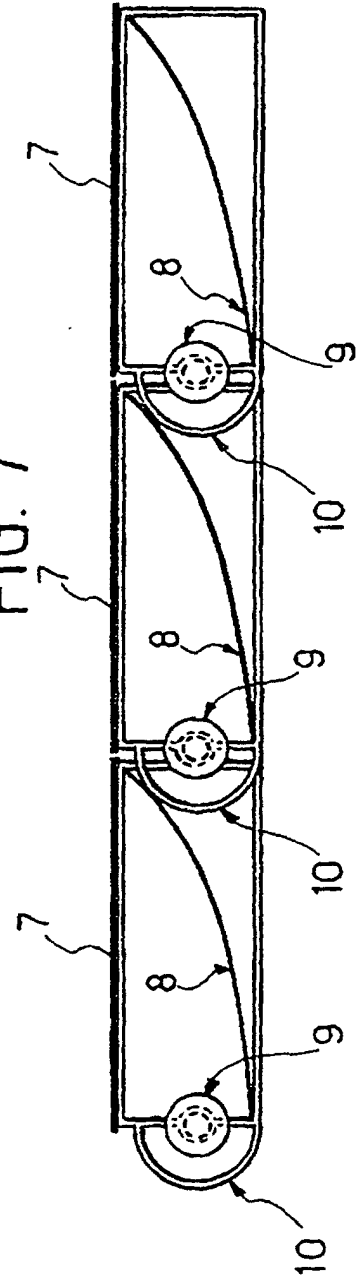


FIG. 8

