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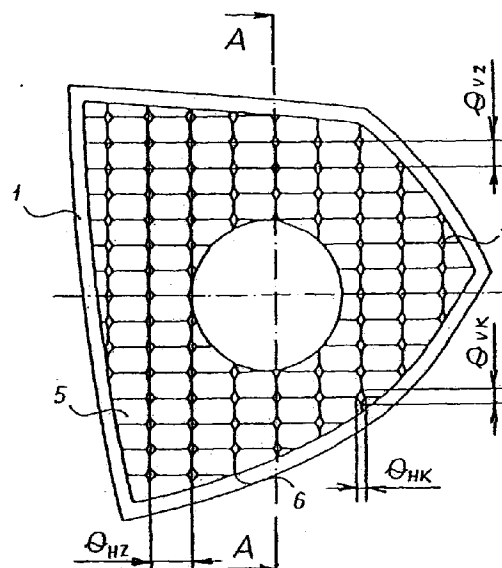
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AL LT LV MK RO SI(30) Priority: **19.05.1997 CZ 151897**(71) Applicant: **AUTOPAL S.R.O.****CZ-741 11 Novy Jicin (CZ)**

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(57) A lamp for motor vehicles comprised of a reflector, a refractor and a light source, where said reflector (1) having the basic surface (10) spherical, ellipsoidal, parabolical or hyperboloidal is provided with convex or concave basic reflexive elements (5) having their working surface (16) of Bézier's type or it is a circle or a sphere in horizontal and vertical sections, and in corners (6) of the basic reflexive elements (5) it is provided with concentrating reflexive elements (4) that have their vertical dimension (θ_{VK}) smaller or equal to the vertical dimension (θ_{VP}) of basic reflexive elements (5) and their horizontal dimension (θ_{HK}) is smaller or equal to the horizontal dimension (θ_{HP}) of the basic reflexive elements (5), the reflexive surface (11) of the concentrating reflexive elements (4) has said creating curves in the shape of conics and it is of a cylindrical, or a toroidal shape or in the shape of a parabolical cylinder with a vertical or horizontal cylinder axis position, whereby said refractor (2) is provided with optical elements (15) of low deviation or decorative optics situated on its functional surface (12), whereby the deviation can be either vertical or horizontal or both vertical and horizontal and the light source (3) is of cylindrical shape with the cylinder axis situated laterally with regard to the lamp axis (14) in the focus (F) vicinity of the reflector (1).

**FIG. 1****EP 0 879 989 A2**

Description

This invention relates to a lamp for motor vehicles with a reflector having a basic geometric surface spherical, paraboloidal, ellipsoidal or hyperboloidal and it is provided with convex or concave basic reflexive elements. The working surface of the basic reflexive elements is of Bézier's type or this surface has the shape of a circle or an ellipse in horizontal and vertical section. The basic surface is provided with concentrating reflexive elements in all or in part of all corners of the basic reflexive elements. The lamp is destined to be used for signalisation of position and movement of a motor vehicle. In this lamp, creating of a concentrated luminous intensity distribution with increased luminous intensity into the direction with the highest probability and frequency of effective signalization that is into the direction around the lamp reference axis is solved.

Classical lamps with a reflector formed by a smooth parabola and with optics on refractor or with optics formed by basic reflexive elements on reflector are characterized in having a flat curve of luminous intensity distribution that may not be able to provide an optimal reaction of an observer to the lamp signalization.

The above mentioned drawbacks are removed in case of a lamp according to the present invention, which is comprised of a reflector, a refractor and a light source, whereby, said reflector having its basic surface spherical, paraboloidal, ellipsoidal or hyperboloidal, is provided with convex or concave basic reflective elements. Corners of said basic reflexive elements are placed on the basic reflector surface, the working surface of said basic reflective elements is of Bézier's type or this surface has a shape of a circle or an ellipse in the horizontal and vertical sections. In the corners of said basic reflexive elements said reflector is provided with concentration elements. The reflexive surface of said concentration elements has the creating curve in a conic shape, whereby, said curve can be rotationally symmetrical or it is cylindrical, toroidal or in the shape of parabolic cylinders with horizontal or vertical position of the cylinder axis. The refractor is provided with optical elements of low deviation or with decorative optics on the functional surface, eventually with optical elements with vertical, horizontal or vertical and horizontal deviation. Said light source is in the shape of a cylinder which is placed laterally in the vicinity of the reflector focus.

It is an advantage of this solution that in case of sufficiently small dimensions of the basic and the concentration elements, a good uniformity of brightness distribution along the light emitting lamp surface and this also in case of observing its signalization from the side spaces of visibility is obtained. Luminous intensity in the direction around the reference axis is significantly increased to the detriment of the side areas of the light beam, where there is a lower probability and registration rate of the lamp light signal, what makes possible to fulfil the demanding photometrical requirements set e.g. for

the front direction indicating lamps, mounted in the vicinity of the light-emitting surfaces of the main headlamps, for the rear fog lamps, where, according to the present invention, it is possible to increase luminous intensity in horizontal and vertical sections by means of a linear ray deviation away from the normal line to the horizontal and vertical surfaces of the concentrating reflexive elements or for the rear brake and position lamps.

The invention is further illustrated with reference to the accompanying drawings, in which Figure 1 shows a lamp in front view. Figure 2 shows a lamp in vertical section made along the plane A-A as shown in Figure 1 and Figure 3 shows a light beam of the lamp in projection into the perspective road projection.

A lamp for motor vehicles according to Figure 1 is comprised of a reflector 1, a refractor 2 and a source 3, e.g. of cylindrical shape mounted laterally with regard to the axis x of the lamp in the vicinity of the focus F of the reflector 1. The reflector 1 having its basic surface 10 spherical, paraboloidal, ellipsoidal or hyperboloidal is provided with convex or concave basic reflexive elements 5 so that the corners 6 of the basic reflexive elements 5 are placed on the basic surface 10 of the reflector 1.

The working surface 16 of the basic reflexive elements 5 is of Bézier's type or this surface 16 has the shape of a circle or an ellipse in horizontal and vertical sections. In all or in a part of corners 6 of the basic reflexive elements 5 the reflector 1 is provided with concentration elements 4 so that they do not rest on the basic surface 10 of the reflector 1. The vertical dimension θ_{vk} of the concentration elements 4 is smaller or equal to the vertical dimension θ_{vp} of the basic reflexive elements 5.

$$\theta_{vk} \leq \theta_{vp} \quad (1)$$

and the horizontal dimension θ_{hk} of concentrating reflexive elements 4 is smaller or equal to the horizontal dimension θ_{hp} of the basic reflexive elements 5.

$$\theta_{hk} \leq \theta_{hp} \quad (2)$$

If we neglect dimension of the elementary image of the light source 3 by reflector 1, the light beam is concentrated by reflection on the reflector 1 with the basic reflexive elements 5 after passage through the refractor 2 is geometrically similar to their shape in front view, that is, it is in shape of a rectangle or a square in projection on the normal plane of projection according to Figure 3, in case of surfaces of the Bézier's type it can be also of another shape. In the corners 6 of the basic reflexive elements 5 the ray deviation off the normal lines to the basic surface 10 is maximal and the light source 3 is imaged from this place by the refractor 2 into the corner

areas of the light beam, where it is generally not necessary to have such a high luminous intensity as it is the case in the area around the reference axis 14 of the lamp. Therefore, the concentration elements 4 are formed here outside the basic surface 10 of the reflector 1 with a smaller ray deviation off the normal line to the basic surface 10, which is in case of the same profile lower because of lower 9HV.K dimensions of the concentration elements 4 in comparison to the dimensions 9HV.P of the basic reflexive elements 5. The reflexive surface of the concentration elements 11 is cylindrical, toroidal or in the shape of parabolic cylinders with vertical axis position, whereby, the the area 7 around the horizontal line H-H is strengthened by a linear ray deviation off the normal line to the basic surface 10 and or a horizontal position of the axis, whereby, the area 8 around the vertical line V-V is strengthened, or this surface is a three dimensional one with a creating curve in the shape of conics and can be in a special case eventually rotationally symmetric, whereby vertical and horizontal deviations of the ray off the normal line to the basic surface 10 into the area 9 around the lamp reference axis is obtained. Thereby, luminance distribution is maintained on the light emitting surface into the space around the lamp reference axis 14 is increased, whereby good uniformity of luminous intensity distribution is maintained on the light radiating surface of the lamp. That makes possible to increase speed and probability of registration of the optical lamp signalization and, thereby, also an increase of road traffic safety and obtaining of the needed optic comfort during observing of such a lamp.

A lamp for motor vehicles according to the present invention is applicable in illumination systems of motor vehicles operated on ground communications.

Claims

1. A lamp for motor vehicles comprised of a reflector, a refractor and a source of light, characterized in that said reflector (1) having the basic surface <10> spherical, ellipsoidal, paraboloidal or hyperboloidal is provided with convex or concave basic reflexive elements (5) having their working surface (16) of Bézier's type or it is a circle or a sphere in horizontal and vertical sections, and in corners (6) of the basic reflexive elements (5) it is provided with concentration reflexive elements (4) that have their vertical dimension (θ_{vk}) smaller or equal to the vertical dimension (θ_{vp}) of basic reflexive elements (5) and their horizontal dimension (θ_{hk}) is smaller or equal to the horizontal dimension (θ_{hp}) of the basic reflexive elements (5).
2. A lamp according to claim 1, characterized in that said reflexive surface (11) of concentrating reflexive elements (4) has the creating curves in the shape

of conics.

3. A lamp according to claims 1 and 2 characterized in that said reflexive surface (11) of said concentration elements (5) is of cylindrical or toroidal shape or in the shape of a parabolic cylinder with the vertical or the horizontal cylinder axis position.
4. A lamp according to claims 1, 2 or 3, characterized in that said refractor (2) is provided with optical elements (15) of low deviation or decorative optics on its functional surface (12).
5. A lamp according to claim 1, 2, 3 and 4, characterized in that on the functional surface (12) the refractor (2) is provided with optical elements (15) having either vertical or horizontal or both vertical and horizontal deviations.
6. A lamp according to claims 1, 2, 3, 4 and 5, characterized in that said light source (3) is of cylindrical shape with the cylinder axis situated laterally with regard to the lamp axis (14) in the vicinity of the focus (F) of the reflector (1).

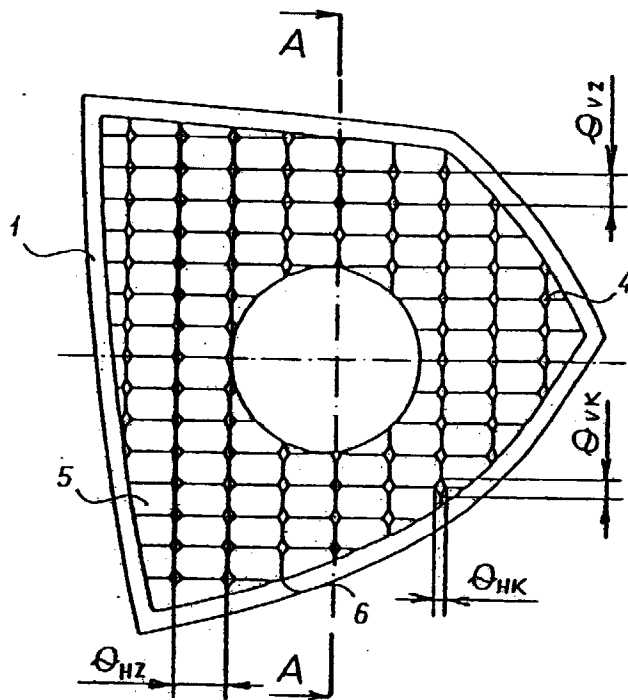


FIG. 1

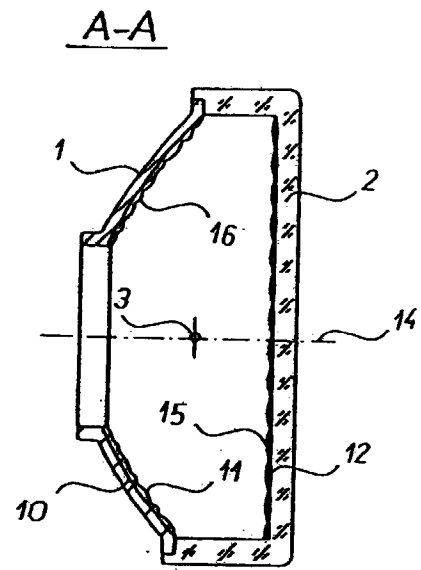


FIG. 2

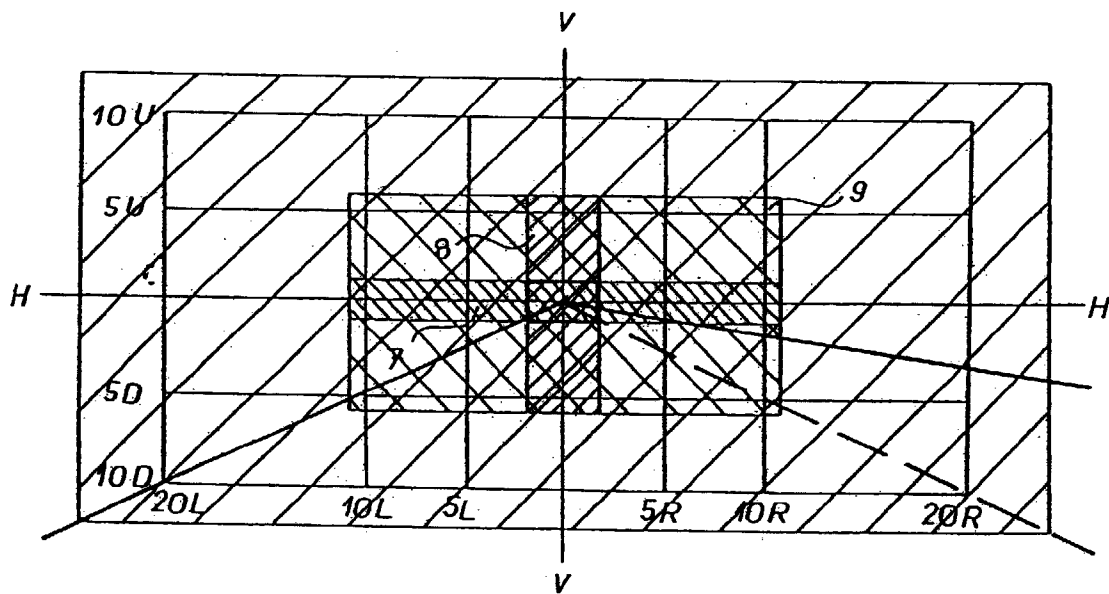


FIG. 3