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(54) Headlamp for motor vehicles

KFZ-Scheinwerfer

Projecteur pour véhicule automobile

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DE-A- 3 430 272

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Description

The invention relates to a headlamp for motor vehicles having a dipped light beam of increased illumination intensity above the edge of the cut-off areas in the space where vertical traffic signs occur most frequently.

CH-A-366806 discloses a headlamp for motor vehicles comprising a reflector, a refractor and a light source placed in the reflector. The refractor is provided with a zone of spread elements located below the upper edge of the reflector.

Headlamp models disclosed up to now have a relatively low illumination intensity above the edge of the cut-off areas for illuminating vertical traffic signs, particularly in the area 2 to 4 degrees above the horizontal line and 8 degrees to the left and to the right of the vertical line. A consequence of this is a relatively low brightness level of vertical traffic signs if they are illuminated by such headlamps. Consequently, both the probability that the driver will perceive the vertical traffic signals, and the speed of his perception are lower.

This disadvantage is removed in the headlamp according to the invention as set out in Claim 1. In a preferred embodiment, the refractory elements are vertical strip flutes and at least in part of the zone of the refracting elements, their profile is of wedge shape horizontally and the refracting angle basis is at the side of the central line of the road surface. Thereby, a part of the light beam of the dipped light beam which was originally directed below the cut-off area edge is moved upwardly so that it does not overlap the trajectory of the eye of the driver passing by in the opposite direction. The vertical lenses then enlarge the light beam laterally so that the whole geometric area of the possible traffic signs occurrence is covered, whereby, the horizontal wedges direct the beam partially to the central line of the road surface, where the traffic signals are diverted by a greater angle away from the headlamp central line. Thereby, a minimal headlamp illumination intensity in the direction to the traffic signals of 0.1 to 0.2 Cd is created. This illumination intensity then ensures the necessary brightness level of their surface and thereby also the necessary speed and probability of signal perception in case of vertical traffic signals.

An example of the headlamp according to the invention will be described below, with reference to the accompanying drawings, in which:

Figure 1 is a headlamp reflector in the light beam direction view "P";
Figure 2 shows a headlamp in the vertical section A-A;
Figure 3 shows the horizontal section B-B through the zone of diffusion elements; and
Figure 4 is a vertical section C-C through the zone of refractor spread elements.

Figure 1 shows a refractor 2 in the light beam direction view "P", a reflector 1 and a light source 3. Below the upper edge 11 of the reflector 1, the refractor 2 is provided on one side or on both sides of the vertical y with a zone 21 of diffusion or spread elements 22 at a distance W from the vertical y which is given by

$$W = (0.3 \text{ to } 1.2) \cdot p \quad (1)$$

where p is polar vector of the reflecting surface profile of the reflector 1 that extends from the focus F perpendicularly to the axis x of the reflector 1, whereby, for the parabolic or the elliptic profile of the reflecting surface of the reflector 1, p is a parameter of the parabola or the ellipse.

This distance value W determines the size and slope of the elementary representation of the light source 3, whereby the required vertical dimension of the zonal light beam is obtained.

The reflective surface of reflector 1 can be general or in the form of a paraboloid or ellipsoid of rotation with the axis of revolution x, where p is a parameter of the creating curve. This reflector 1 in the form of a paraboloid or ellipsoid axially symmetrically integrates the light flow from the light source 3 into a slightly covergent light beam.

The surface of the zone 21 of the spread elements 22 determines the illumination intensity of the zonal light beam and is determined by the width S and the height H:

$$S = (0.1 \text{ to } 0.6) \cdot p \quad (2)$$

$$H = (0.05 \text{ to } 0.3) \cdot p \quad (3)$$

Figure 2 shows reflector 1, light source 3 and refractor 2 with a zone 21 of the spread elements 22 under the upper edge 11 of the reflector 1. The spread elements extend vertically in the form of a wedge shape with the basis of the wedge at an upper side and the apex of the wedge below, and having a refracting angle $\underline{\Theta}_{2V}$ where:

$$\Theta_{2V} = 5° \text{ to } 18° \quad (4)$$

Above the zone 21 of the spread elements 22, the refractor 2 is provided with a zone 23 of the spread elements 24 that extend vertically in the form of a wedge shape with the basis of the wedge at the bottom side and the apex of the wedge above, and having a refracting angle $\underline{\Theta}_{3V}$ where:

$$\Theta_{3V} = (0.05 \text{ to } 1.0) \cdot \Theta_{2V} \quad (7)$$

The light spread step at the transition of zones 21 and 23 of the spread elements 22, 24 is decreased by the difference in basis height of the refraction angles $\underline{\Theta}_{2V}$, $\underline{\Theta}_{3V}$ and also the light beam that passes through the zones 23 of the spread elements 24 is directed down to the road surface. Thereby, the level of dazzling illumination in the space of the eye trajectory of the driver passing by in the opposite direction is decreased.

Figure 3 shows the horizontal section B-B through zone 21 of the spread elements 22 of radius R of width T that is:

$$T = (0.2 \text{ to } 1.2) \cdot R \qquad (5)$$

This profile of the spread elements 22 in the form of vertical strip flutes enlarges the side-zonal light beam that covers the area of probable occurrence of traffic signs. A part of the traffic signals at the side of the central road surface line is angularly more declined from the axle x of the reflector 1. Therefore, at least in a part of the zone 21, the spread elements 22 extend horizontally in the form of a wedge shape with the basis of the wedge at the side of the road surface central line and the apex of the wedge at the side away from the road surface central line, and having refracting angle $\underline{\Theta}_{2H}$ where:

$$\Theta_{2H} = 0.2° \text{ to } 16° \qquad (6)$$

at the side of the road surface central line.

This arrangement improves the visibility of vertical traffic signals even when riding through a bend. The driver's optical vision is also improved.

Claims

1. A headlamp for motor vehicles comprising a reflector (1) integrating the light, a refractor (2) directing the light beam and a light source (3) placed in the reflector, wherein the refractor (2) is provided with a zone (21) of spread elements (22) located below the upper edge (11) of the reflector (1), characterised in that the or each of spread elements is located on one side or on both sides of the vertical (y) at a distance (W); wherein the distance (W) is given by:

$$W = (0.3 \text{ to } 1.2) \cdot p \qquad (1)$$

where p is the polar vector of the reflecting surface profile of the reflector (1) that extends from the focus (F) perpendicularly to the axis (x) of the reflector (1);
wherein the width (S) and the height (H) of the zone (21) of the spread elements (22) are given by:

$$S = (0.1 \text{ to } 0.6) \cdot p \qquad (2)$$

and

$$H = (0.05 \text{ to } 0.3) \cdot p \qquad (3)$$

and wherein the spread elements (22) in the zone (21) extend vertically in the form of a wedge shape with the apex of the wedge below, and having a refracting angle $\underline{\Theta}_{2V}$ given by:

$$\Theta_{2V} = 5° \text{ to } 18° \qquad (4)$$

2. A headlamp for motor vehicles according to Claim 1, characterized in that the spread elements 22 are vertical strip flutes of radius (R) and width (T) whose relationship is given by

$$T = (0.2 \text{ to } 1.2) \cdot R \qquad (5)$$

3. A headlamp for motor vehicles according to Claim 1 or Claim 2, characterized in that the spread elements (22), at least in a part of the zone (21), extend horizontally in the form of a wedge shape with the apex of the wedge at the side away from the road surface central line and having a refracting angle Θ_{2H} given by

$$\Theta_{2H} = 0.2° \text{ to } 16° \qquad (6)$$

4. A headlamp for motor vehicles according to anyone of Claims 1 to 3, characterized in that above the zone (21) of the spread elements (22) the refractor (2) is provided with a zone (23) of spread elements (22) that extend vertically in the form of a wedge shape with the apex of the wedge above, and having a refracting angle Θ_{3V} given by

$$\Theta_{3V} = (0.05 \text{ to } 1.0) \cdot \Theta_{2V} \qquad (7)$$

5. A headlamp for motor vehicles according to anyone of Claims 1 to 4, characterized in that the reflecting surface of the reflector (1) is in the form of a paraboloid or ellipsoid of rotation with the axis of revolution (x) and parameter (p).

Patentansprüche

1. Scheinwerfer für Kraftfahrzeuge mit einem das Licht bündelnden Reflektor (1), einem den Lichtstrahl ausrichtenden Refraktor (2) und einer in dem Reflektor angeordneten Lichtquelle (3), wobei der Refraktor (2) mit einer Zone (21) von Aufweitelementen (22), die unterhalb der oberen Kante (11) des Reflektors (1) angeordnet sind, ausgestattet ist, **dadurch gekennzeichnet**, daß das oder jedes der Aufweitelemente an einer Seite oder an beiden Seiten der Vertikalen (y) in einem Abstand (W) angeordnet ist, wobei der Abstand (W) gegeben ist durch:

$$W = (0{,}2 \text{ bis } 1{,}2) \cdot p \,, \qquad (1)$$

wobei p der Polarvektor des reflektierenden Oberflächenprofiles des Reflektors (1) ist, der sich zwischen dem Brennpunkt (F) rechtwinklig zu der Achse (x) des Reflektors (1) erstreckt, wobei die Breite (S) und die Höhe (H) der Zone (21) von Aufweitelementen (22) gegeben ist durch:

$$S = (0{,}1 \text{ bis } 0{,}6) \cdot p \qquad (2)$$

und

$$H = (0{,}05 \text{ bis } 0{,}3) \cdot p \qquad (3)$$

und wobei sich die Aufweitelemente (22) in der Zone (21) vertikal mit einer keilartigen Gestalt mit dem Scheitel des Keils unten mit einem brechenden Winkel Θ_{2V} erstrecken, der gegeben ist durch:

$$\Theta_{2V} = 5° \text{ bis } 18° \,. \qquad (4)$$

2. Scheinwerfer für Kraftfahrzeuge nach Anspruch 1, dadurch gekennzeichnet, daß die Aufweitelemente (22) vertikale streifenartige Riffelungen mit Radius (R) und Breite (T) sind, deren Relation gegeben ist durch:

$$T = (0{,}2 \text{ bis } 1{,}2) \cdot R \,. \qquad (5)$$

3. Scheinwerfer für Kraftfahrzeuge nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß sich die Aufweitelemente (22) wenigstens in einem Teil der Zone (21) horizontal mit einer keilartigen Gestalt mit dem Scheitel des Keils an der von der Mittellinie der Straßenoberfläche wegweisenden Seite erstrecken und einen brechenden Winkel Θ_{2H} haben, der gegeben ist durch:

$$\Theta_{2H} = 0{,}2° \text{ bis } 16° \,. \qquad (6)$$

4. Scheinwerfer für Kraftfahrzeuge nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß oberhalb der Zone (21) der Aufweitelemente (22) der Refraktor (2) mit einer Zone (23) von Aufweitelementen (22) ausgestattet ist, die sich mit einer keilartigen Gestalt vertikal mit dem Scheitel des Keils oben erstrecken und einen brechenden Winkel Θ_{3V} haben, der gegeben ist durch:

$$\Theta_{3V} = (0{,}05 \text{ bis } 1{,}0) \cdot \Theta_{2V} \,. \qquad (7)$$

5. Scheinwerfer für Kraftfahrzeuge nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die reflektierende Oberfläche des Reflektors (1) in Gestalt eines Rotationsparaboloids oder einer Rotationsellipse mit der Rotationsachse (x) und dem Parameter (p) ist.

Revendications

1. Projecteur pour véhicules automobiles comprenant un réflecteur (1) intégrant la lumière, un réfracteur (2) dirigeant le faisceau lumineux, et une source lumineuse (3) placée dans le réflecteur, dans lequel le réfracteur (2) est pourvu d'une zone (21) constituée d'éléments allongés (22) placés en dessous du bord supérieur (11) du réflecteur (1), caractérisé en ce que l'élément allongé ou chacun des éléments allongés (22) est placé d'un côté ou des deux côtés de la verticale (y) à une distance (W) ; laquelle distance (W) est donnée par la relation :

$$W = (0{,}3 \text{ à } 1{,}2) \cdot p \qquad (1)$$

où p est le vecteur polaire de la courbure de la surface réfléchissante du réflecteur (1) qui s'étend depuis le foyer (F) perpendiculairement à l'axe (x) du réflecteur (1) ;
dans lequel la largeur (S) et la hauteur (H) de la zone (21) constituée par les éléments allongés (22) sont données par les relations :

$$S = (0{,}1 \text{ à } 0{,}6) \cdot p \qquad (2)$$

et

$$H = (0{,}05 \text{ à } 0{,}3) \cdot p \qquad (3)$$

et dans lequel les éléments (22) de la zone (21) s'étendent verticalement suivant la forme d'un coin dont le sommet se trouve en bas, et qui a un angle de réfraction θ_{2V} donné par :

$$\theta_{2V} = 5° \text{ à } 18° \qquad (4)$$

2. Projecteur pour véhicules automobiles selon la revendication 1, caractérisé en ce que les éléments allongés (22) sont des bandes cannelées verticales dont le rayon (R) et la largeur (T) sont liées par la relation :

$$T = (0{,}2 \text{ à } 1{,}2) \cdot R \qquad (5)$$

3. Projecteur pour véhicules automobiles selon la revendication 1 ou la revendication 2, caractérisé en ce que les éléments allonges (22), au moins dans une partie de la zone (21), s'étendent horizontalement suivant la forme d'un coin dont le sommet se trouve du côté qui s'écarte de la ligne centrale de la surface de la route, et qui a un angle de réfraction θ_{2H} donné par :

$$\theta_{2H} = 0{,}2° \text{ à } 16° \qquad (6)$$

4. Projecteur pour véhicules automobiles selon l'une quelconque des revendications 1 à 3, caractérisé en ce que, au-dessus de la zone (21) des éléments allongés (22), le réfracteur (2) est pourvu d'une zone (23) constituée d'éléments allongés (22) qui s'étendent verticalement suivant la forme d'un coin dont le sommet se trouve en haut, et qui a un angle de réfraction θ_{3V} donné par la relation :

$$\theta_{3V} = (0{,}05 \text{ à } 1{,}0) \cdot \theta_{2V} \qquad (7)$$

5. Projecteur pour véhicules automobiles selon l'une quelconque des revendications 1 à 4, caractérisé en ce que la surface réfléchissante du réflecteur (1) a la forme d'un paraboloïde ou d'un ellipsoïde de révolution, d'axe de révolution (x) et de paramètre (p).

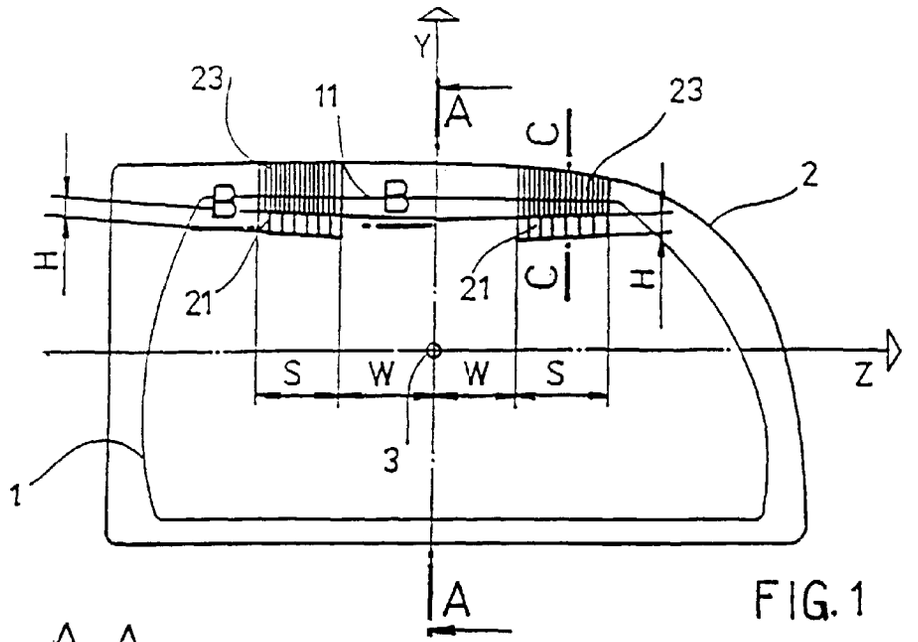


FIG. 1

A-A

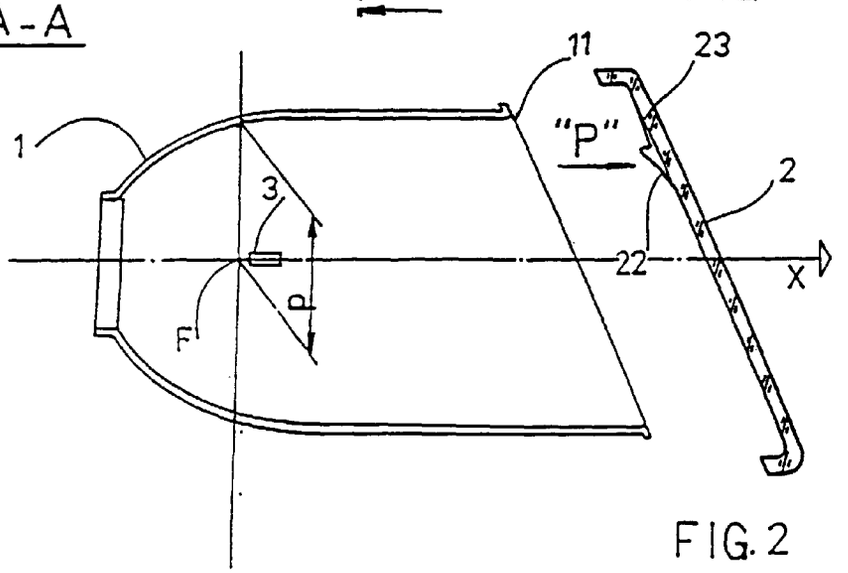


FIG. 2

B-B

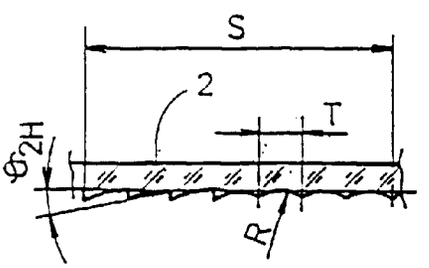


FIG. 3

C-C

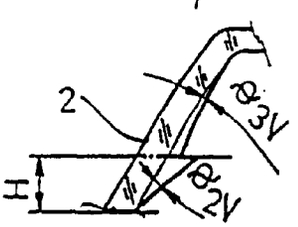


FIG 4