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(54) Headlight for motor vehicles with double-filament lamp

(57) A headlight for motor vehicles with a double-filament lamp is described, having a high-beam filament (20) and a low-beam filament (30), disposed on the optical axis (X) of the reflector (R), a shield (S) being positioned above the optical axis in correspondence with the low-beam filament (30), and the filament (30) being "out of focus" to the rear of the focal point of the reflector.

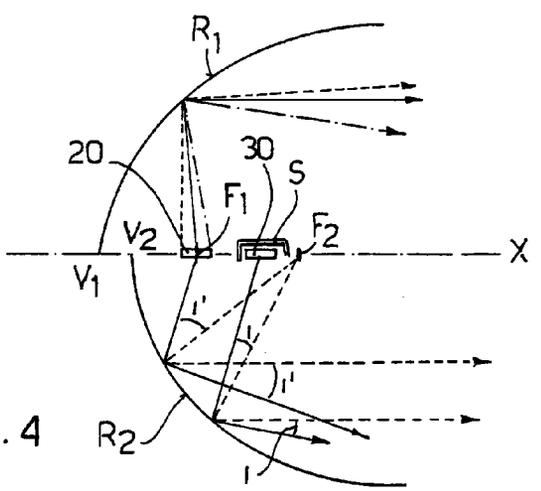

FIG. 4

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Description

The present invention relates to a headlight for motor vehicles, using a double-filament lamp to obtain the two functions of low beam and high beam.

The headlights of this type currently on the market comprise a reflector in a single parabolic body and a segmented or free-shaped surface, and a transparent front protection which may or may not be provided with a pattern of optical prisms. An outer protective envelope can be placed round the reflector, forming the body of the headlight. In all cases the double-filament lamp is positioned in the reflector so that the shield situated inside its bulb coinciding with the low beam filament is beneath the optical axis of the headlight, as shown in appended Figure 1.

These known headlights have different peculiar characteristics depending upon the type of reflector used.

In the classical parabolic reflectors, the upper half-parabola is dedicated to the low beam function, whereas the whole surface of the parabola is used for the high beam function: the focal point of the parabola is disposed on the center line of the high beam filament, and the low beam filament is "out of focus" forward of the focal point of said parabola (see Figure 2).

The light distribution on the road surface created by headlights with a classical parabola is achieved through a pattern of optical prisms on the transparent protection.

In reflectors with a segmented or free-shaped surface, the upper half-reflector is still dedicated to the low beam function, whereas the whole surface of the reflector is used for the high beam function.

In headlights with segmented surfaces the basic reflectors are generally portions of parabolas on which are laid sectors of surface with a definite and variable slant and bending radius. In this case, commonly using miltiparabolic surfaces, the focal point of the lower basic parabola is still positioned in the middle of the high-beam filament, whereas the low-beam filament is "out of focus" forward of the focal point of the upper basic parabola (see Figure 3).

The light distribution on the road surface created by headlights having reflectors with a segmented or free-shaped surface is achieved directly by the reflector itself.

This second solution (with non-classical reflectors), shown in Figure 3, improves the distribution of the low beam on the road surface with respect to the first solution (with parabolic reflectors), shown in Figure 2. However, it does not substantially improve the light distribution of the high beam on the road surface, although it does improve the depth of said beam. In fact, to obtain an improvement, a dedicated supplementary high beam must generally be placed alongside the headlight.

The object of the invention is to improve the distribution on the road surface of the low beam and the high beam of a headlight with a double-filament lamp.

Another object of the invention is to provide a solution that is easy to apply, and that does not involve substantial modifications to existing headlights.

These objects are achieved, according to the invention, by providing for the double-filament lamp to be positioned in the reflector so that the shield of the lower beam filament situated inside its bulb is above the optical axis of the reflector.

The reflector can advantageously have a segmented or free-shaped surface, the lower half reflector being dedicated to the low beam function and the whole surface of the reflector being used for the high beam function.

The focal point of the upper basic parabola is situated in the middle of the high beam filament, whereas the lower beam filament is "out of focus" to the rear of the focal point of the lower basic parabola.

Such a solution improves the distribution of the low beam of light on the road surface with respect to the prior art and also permits a substantial improvement in the distribution of the high beam on the road surface whilst also maintaining an excellent performance in depth.

Moreover, the proposed solution does not make it essential to use additional devices on vehicles to achieve an acceptable performance, as is required in some traditional solutions, thus allowing vehicle manufacturers a cost saving.

Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non-limiting embodiment thereof, illustrated in the appended drawings, in which:

Figure 1 is a diagrammatic view of a double-filament lamp, as mounted in the traditional manner in a reflector;

Figure 2 is a diagram illustrating operation of the double-filament lamp in Figure 1 in a classical parabolic reflector according to the prior art;

Figure 3 is a diagram showing operation of the double-filament lamp in Figure 1 in a reflector with a segmented surface according to the prior art;

Figure 4 is a diagram illustrating the operating principle of a double filament lamp according to the invention mounted in a reflector with segmented surfaces.

In Figure 1 a classical double-filament lamp, indicated by reference numeral 1, is depicted in a side view and substantially comprises a bulb 2, with the front surface 3 opacized, to shield the rays of light in this area.

Inside the bulb 2 is disposed a first filament 10, normally serving to produce the high beam, and a second

filament 20, normally serving to produce the low beam. Beneath the filament 20 is disposed a shield or dish S, that prevents the filament 20 from diffusing beneath the median plane of the lamp 1.

Figure 2 illustrates the first known solution previously described, in which the lamp 1 is disposed in a classical parabolic reflector in a single body indicated by R, the focal point F of which is positioned on the midline of the high-beam filament 20. The low-beam filament 30 on the other hand is disposed "out of focus" forward of the focal point F.

In the figure some beams of light reflected by the reflector R are shown diagrammatically. In particular, the low beam produced by the filament 30 is reflected by the upper half parabola towards the road surface, whereas the high beam generated by the filament 20 centered on the focal point F is reflected by the whole parabola and directed in depth.

Figure 3 is a diagrammatic representation of the second solution according to the previously described prior art, in which the reflector is segmented and is depicted in particular with two segments of parabolas offset with respect to each other, R1, R2, having vertexes V1, V2 and focal points F1, F2, respectively.

The lamp 1 is disposed so that the filament 20 is centered on the focal point F1 of the lower half-parabola R1, while the filament 30 is still out of focus forward of the focal point F2 of the upper half parabola R2.

The examples of some reflected beams show how the high beam is directed in depth or upwards, with poor illumination of the road surface.

The solution proposed by the invention is illustrated in Figure 4, in which, as can be seen, the lamp is mounted upside down with respect to the solutions of the prior art, that is with the shield S above the optical axis X of the reflector.

In the embodiment illustrated, the reflector is shown segmented, with two half parabolas R1, R2. The filament 20 of the high beam is centered on the focal point F1 of the upper half parabola R1, while the filament 30 producing the low beam is "out of focus" to the rear of the focal point F2 of the lower half parabola R2.

In this way, through the law of reflection according to which any ray is reflected on a point of a parabola forming an angle with the perpendicular to the tangent at this point equal to the angle formed by the incident ray, it can be seen that the rays of the low beam filament 30 are reflected toward the road surface by the lower half-reflector R2, whereas the rays of the high beam filament 20 are reflected by the whole reflector R1, R2, with an action in depth by the upper half-reflector R1 and an action on the road surface by the lower half-reflector R2.

The solution proposed by the invention, which essentially consists in shielding the low beam filament 30 on the upper side and suitably positioning the lamp 1 on the axis X of the reflector, substantially improves the distribution of the low beam on the road surface with respect to the prior art, and also substantially improves the distribution of the high beam on the road surface, at the same time maintaining an excellent performance in depth.

The invention therefore fully achieves the proposed aims.

Obviously that shown in Figure 4 is only one possible embodiment of the invention, other embodiments being possible.

Thus, for example, the reflector can be a classical rather than a segmented reflector, although in this case the performance is obviously inferior.

Claims

1. A headlight for motor vehicles, comprising a reflector (R), on the axis (X) of which is disposed a double-filament lamp (1), having a filament (20) for the high beam and a filament (30) for the low beam, in correspondence to which a shield (S) is positioned, characterized in that said shield (S) is disposed above the optical axis (X) of the reflector.

2. A headlight according to claim 1, characterized in that said filament (30) is "out of focus" to the rear of the focal point of the reflector.

3. A headlight according to claim 1 or 2, characterized in that said reflector is segmented or free-shaped, the lower half-reflector (R2) being dedicated to the low beam function and the whole surface of the reflector (R1, R2) being used for the high beam function.

4. A headlight according to claim 3, characterized in that said filament (20) is centered on the focal point (F1) of the upper half reflector (R1), whereas said low beam filament (30) is "out of focus" to the rear of the focal point (F2) of the lower half reflector (R2).

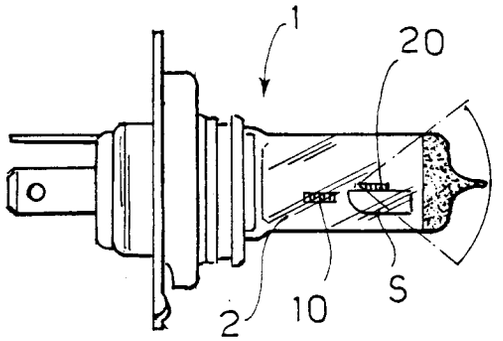

FIG. 1

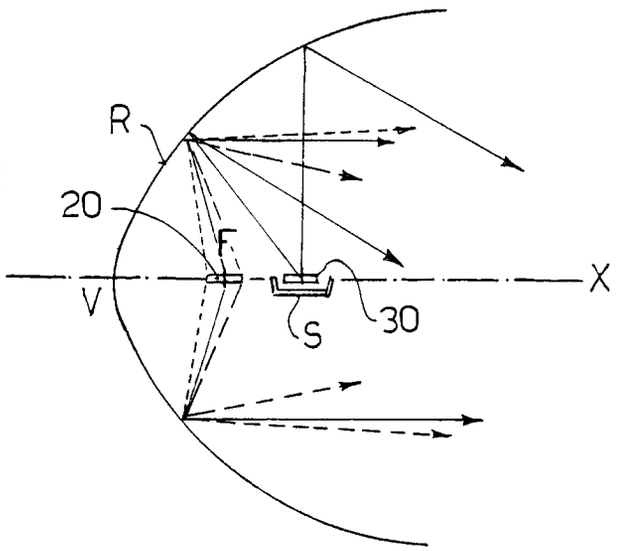

FIG. 2

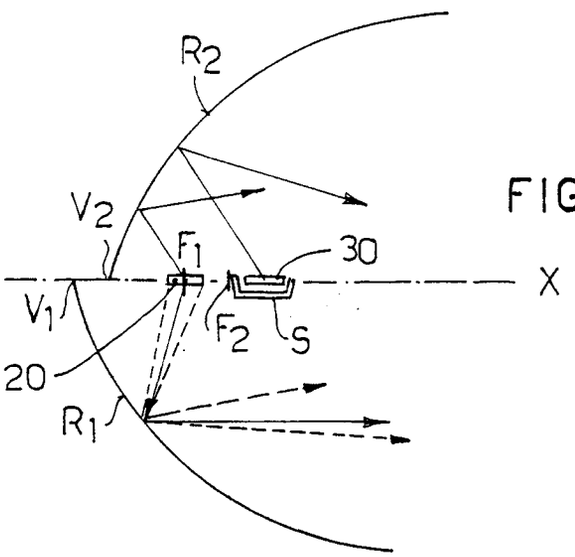

FIG. 3

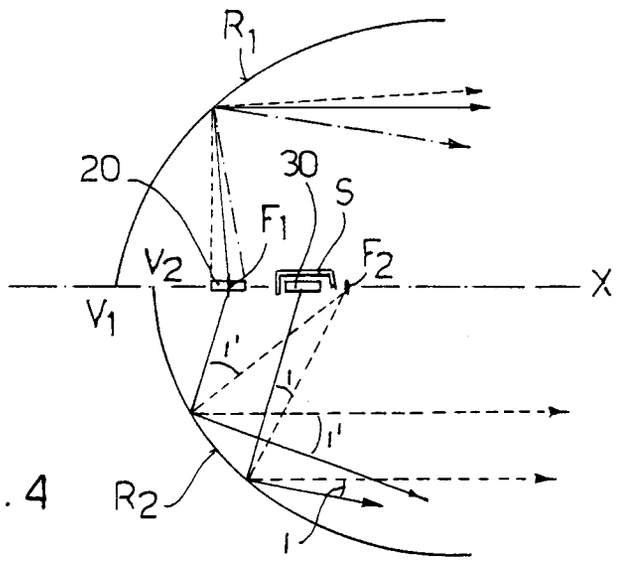

FIG. 4