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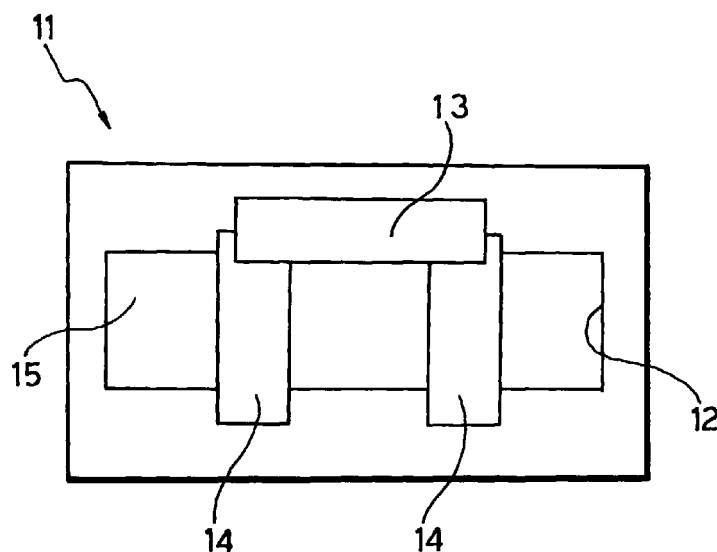
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(54) **Double headlamp adaptive lighting device for motor-vehicles, having a variable diaphragm**

(57) An adaptive lighting device for motor-vehicles comprises a first headlamp (3) to generate a predetermined basic light beam, and a second headlamp (4) having a variable diaphragm so as to be able to select a

plurality of different additional light beams which are added to the basic light beam to generate different total light beams.

FIG. 3



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Description

[0001] The present invention relates to a lighting device for motor-vehicles, of the type comprising a first and a second headlamp arranged side-by-side, each comprising a light source constituted by an incandescence lamp and a reflector associated with said lamp.

[0002] In particular, the invention relates to a lighting device of adaptive type, i.e. adapted to generate a light beam at the output whose pattern can be varied depending upon the travel condition of the motor-vehicle (steering angle, speed, etc.) and the ambient and light conditions, as well as the type of road on which the vehicle travels.

[0003] The object of the present invention is that of providing an adaptive lighting device which on one hand is able to provide an optimized pattern in any condition of use and on the other hand has a structure which is relatively simple, of very reduced dimensions and of relatively low cost.

[0004] In view of achieving this object, the invention provides an adaptive lighting device for motor-vehicles, comprising a first and a second headlamps arranged side-by-side, each including a light source constituted by an incandescence lamp and a reflector associated with said lamp, characterised in that said first headlamp is provided to originate a light beam at the output of the device having a predetermined basic pattern, and in that said second headlamp comprises diaphragm means arranged in front of the light source and the reflector of said second headlamp to intercept the emitted light beam and able to define at least one window for passage of the beam having variable positions and dimensions, so that said second headlamp is able to originate a plurality of additional light beams, which can be selected by adjustment of said diaphragm means, so as to generate a different total pattern for each condition of use.

[0005] In the device according to the present invention, the first headlamp has the task to originate a basic light beam, having a predetermined pattern, whereas the second headlamp, which is provided with an adjustable diaphragm, has the task to generate additional light beams, which are added to the basic light beam of the first headlamp in order to obtain the required total beam.

[0006] According to a further advantageous feature of the invention, motor means are preferably provided for adjustment of the diaphragm means and electronic control means are also provided for controlling said motor means, said control means receiving signals from sensor means for sensing the travel and the ambient conditions and controlling the motor means depending upon said signals.

[0007] The above mentioned sensor means may comprise a sensor of the steering angle of the motor-vehicle, a speed sensor, a light sensor, a GPS receiver, or also a videocamera located on board the vehicle having the function of monitoring both the ambient condi-

tions and the type of road on which the motor-vehicle travels. In this manner, the device according to the invention is able to automatically adapt the characteristics of the beam going out of the device to the conditions of use.

[0008] 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 front diagrammatic view of a lighting device according to the invention, which clearly shows the double headlamp arrangement, figure 2 is a diagrammatic cross-sectional view of the second headlamp of the device according to the invention, which is for generating the additional light beams which are added to the basic beam generated by the first headlamp, figure 3 diagrammatically shows a front view of the diaphragm means, figure 4 is a block diagram which shows the principle for controlling the headlamp of figure 2, and figure 5 is a diagram which shows the various light patterns which can be obtained by the device according to the invention.

[0009] Figure 1 is a front diagrammatic view of a lighting device 1 for motor-vehicles, comprising a supporting structure 2 on which two headlamps 3, 4 are mounted which are arranged side-by-side.

[0010] The first headlamp 3 is of a conventional type, with a light source constituted by an incandescence lamp 5, such as of the H7 type and a reflector 6 located at the rear of lamp 5, with reference to the output direction of the light beam from the device, having known characteristics.

[0011] Also according to the prior art, the headlamp 3 is completed by a transparent element 7 located at the front and spaced apart from the lamp 5.

[0012] The second headlamp 4 also has a light source 8 (see also figure 2) constituted by an incandescence lamp such as of the H7 type and a reflector element 9 located at the rear of lamp 8. In the drawings, the details of construction relating to lamp 8, reflector 9 and the way by which the lamp 8 is mounted on reflector 9 are not shown, since they can be made in any known way and since their deletion from the drawings renders the latter simpler and easier to understand. For the same reason, in figure 2, the supporting structure of the device has not been illustrated.

[0013] With reference to figures 2, 3, in front of the light source 8 and reflector 9 a diaphragm 11 is located adapted to intercept the light beam emitted by reflector 9.

[0014] With reference to figure 3, the diaphragm 11 is adapted to define one or more windows 12 for passage of the light beam. The shape and position of the window is determined by the operative condition of a

plurality of curtain-like shutters 13, 14, 15 with which the diaphragm 11 is provided. Shutter 13 is movable between a completely closed condition in which is completely occupies an upper rectangular area of the diaphragm, and a completely opened condition, in which this area is completely free. Similarly, the two shutters 14 are movable between a totally closed operative condition, in which they totally cover to two rectangular vertical areas which are parallel to and spaced apart from each other, and a completely opened condition, in which these areas are free. Finally, the shutters 15 is movable between a completely closed condition, in which it totally covers the horizontally oriented rectangular area indicated in figure 3, and a completely closed condition, in which this area is completely free. By playing on a different degree of activation of the various curtain-like shutters 13, 14, 15 is thus possible to obtain different shapes and positions of the free window or windows of the diaphragm. The above mentioned shutters can be made according to any known technology and therefor are not illustrated in detail in the present description. For the same reason, also the structure of the motor means associated with said shutters are not described in detail.

[0015] As already described in the foregoing, the first headlamp 3 is for generating a basic light beam, having a predetermined pattern, whereas the second headlamp 4 is able to selectively generate a plurality of different additional beams, which are added to the basic beam generated by the headlamp 3 to originate a total beam having variable characteristics, depending upon the conditions of use. The selection of additional light beams is obtained by adjusting the various curtain-like shutters of the diaphragm 11.

[0016] Figure 5 of the annexed drawings shows the pattern which can be obtained by the device according to the invention in a plane orthogonal to the optical axis of each of the head lamps 3, 4 and located at a 25 meters distance from the device. In this figure, axes H and V respectively designate the horizontal direction and the vertical direction, whereas the various lines indicate the profiles of the area illuminated by the device in the different conditions of use. The basic beam generated by the head lamp 3 is that which originates the pattern indicated by line B, which is of the so called "low beam" or "cross beam" type, having characteristics defined by the laws or more specifically by car manufactures. When driving in town, the basic pattern B is added with two distinct areas C, as shown in figure 5, by a suitable adjustment of the headlamp 4. When driving out of town, the two areas D are activated, whereas for driving on a high-way the pattern E is generated. If desired, an over-head lighting pattern F can be further originated, for use for example when reading over-head road signals. Area G is instead activated when an upper beam is desired. Areas L and R are activated for lighting when driving in a curve to the left or the right, respectively, whereas the sum of these two areas L and R is activated when an anti-fog lighting is required.

[0017] Figure 4 is a block diagram which diagrammatically shows diaphragm 11 and the motor means 16 which are for driving the diaphragm. These motor means 16 are controlled by an electronic control unit 17 on the basis of signals 18 which are sent thereto by sensors of various type, such as a sensor of the steering angle of the motor-vehicle, a speed sensor, a GPS receiver, and sensors of the ambient and light conditions. Additionally, or alternatively, a videocamera can be used which is located on-board the motor-vehicle and adapted to detect both the ambient conditions and the conditions of the road on which the motor-vehicle travels.

[0018] 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, without departing from the scope of the present invention.

Claims

1. Adaptive lighting device for motor-vehicles, comprising a first and a second headlamp (3, 4) arranged side-by-side, including a light source (5, 8) constituted by an incandescence lamp, and a reflector (6, 9) associated with said lamp (5, 8), characterised in that said first headlamp (3) is provided to originate a light beam at the output of the device having a basic predetermined pattern, and in that second headlamp (4) comprises diaphragm means located in front of the light source (8) and the reflector (9) of said second headlamp (4) in order to intercept the emitted light beam and adapted to define at least one window (12) for passage of the beam, having variable positions and dimensions, so that said second headlamp (4) is adapted to originate a plurality of additional light beams which can be selected by adjustment of said diaphragm (11) so as to generate a different total pattern for each condition of use.
2. Device according to claim 1, characterised in that said diaphragm (11) has a window (12) controlled by a plurality of curtain-like shutters (13, 14, 15), each movable between a completely closed condition, in which it obstructs a portion of said window (12) and a completely opened condition.
3. Device according to claim 1, characterised in that the adjustment of the diaphragm (11) is controlled by motor means (16) controlled by an electronic control unit (17) on the basis of signals (18) received from sensor means comprising one or more sensors chosen among: a sensor of the steering angle of the motor-vehicle, a speed sensor, an ambient light sensor, a GPS receiver, a videocamera.

4. Device according to claim 1, adapted to generate a plurality of different total beams as shown in annexed figure 5.

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FIG. 1

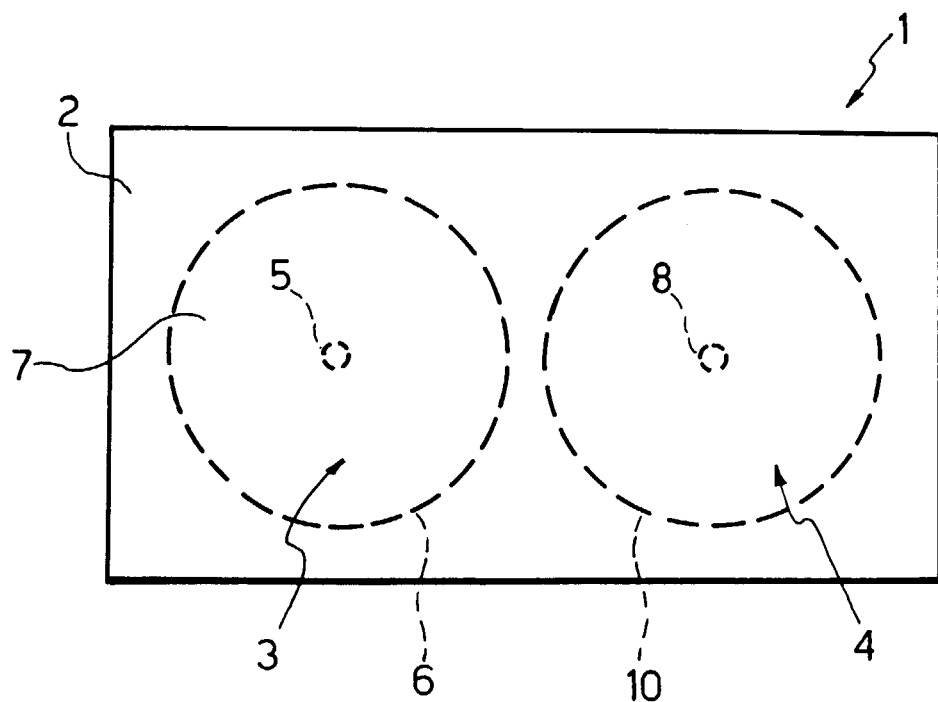


FIG. 2

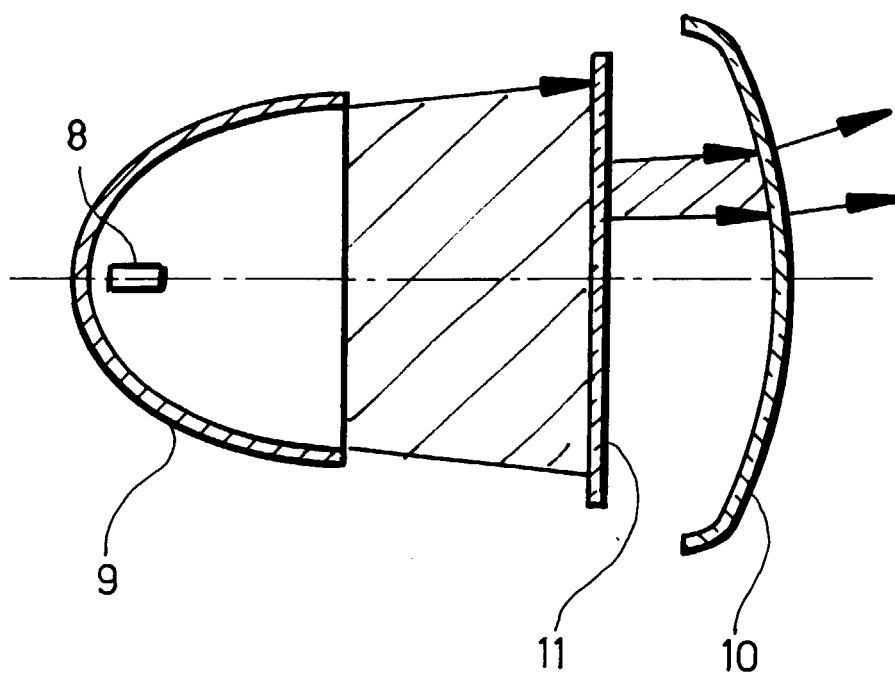


FIG. 3

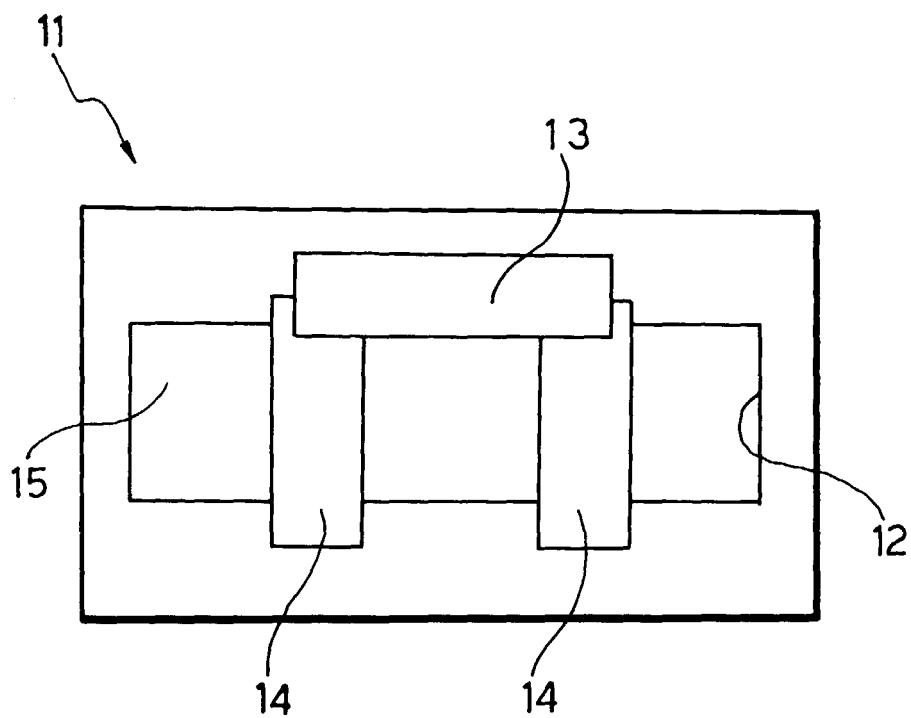


FIG. 4

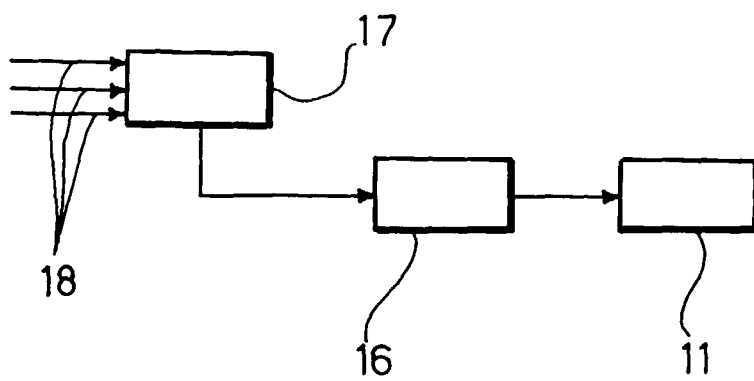


FIG. 5

