Aug. 16, 1932. R. N. FALGE ET AL 1,871,505

VEHICLE HEAD LAMP

Filed June 16, 1927

Fig. 1.

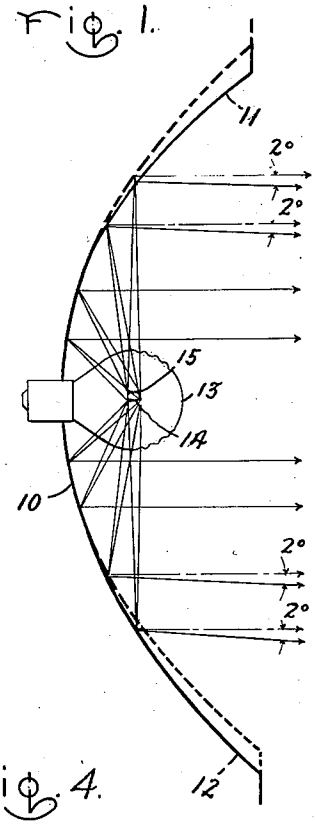


Fig. 2.

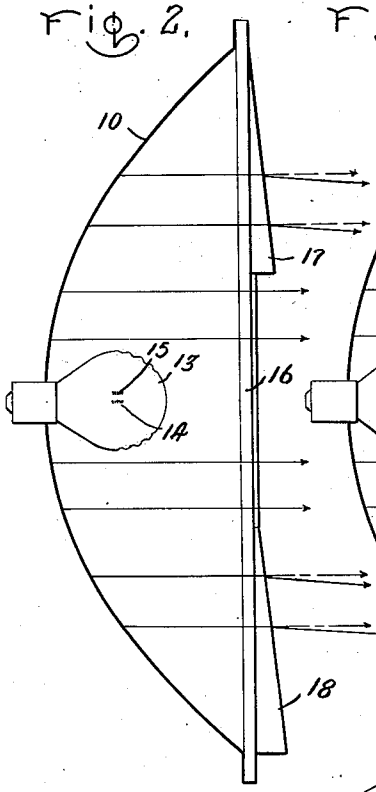


Fig. 3.

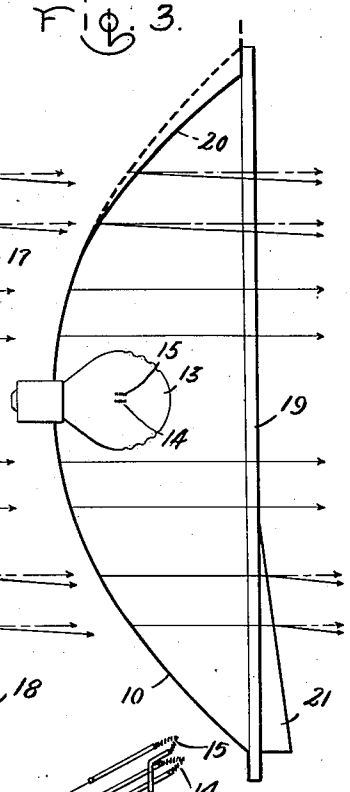


Fig. 4.

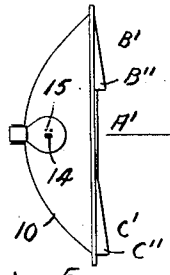


Fig. 5.

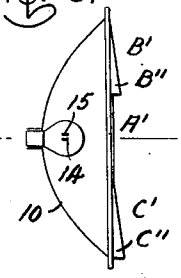
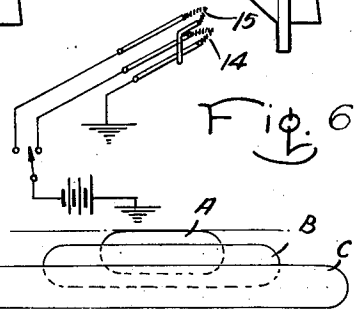
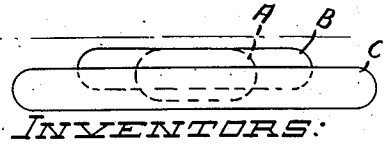


Fig. 6





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UNITED STATES PATENT OFFICE

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VEHICLE HEADLAMP

Application filed June 16, 1927. Serial No. 199,366.

Our invention relates to vehicle headlamps and more particularly to means for obtaining a desirable distribution of light therefrom. Our invention relates particularly to headlamps each comprising a reflector and a single light source or two light sources one above the other. More specifically our invention is particularly adapted for use in connection with an incandescent lamp comprising a plurality of filaments disposed differently with respect to the focus of a substantially parabolic reflector, or with respect to the surfaces of a reflector of other contour or configuration, and each adapted to be lit independently to obtain a distinct distribution of light.

A headlamp comprising an ordinary parabolic reflector and a concentrated light source located at the focus of the reflector projects a beam, the cross-section of which in a plane perpendicular to the axis, is approximately circular. If the axis of the reflector is horizontal and the light source is located above the focus, the cross-section of the beam will be elongated downward but the level of the top of the section will be practically the same as in the first case. If the light source is below the focus, the bottom of the section is in approximately the same position as the bottom of the circular section above referred to but the top of the section will be above the position of the circular section. Similarly, with different positions of the light source with respect to the reflector surfaces, the form and upper level of the beams will be variously affected in reflectors of various contours and with lenses of various redirecting properties.

Utilizing these principles, it becomes possible by the use of an incandescent lamp having two filaments suitably disposed with respect to the reflector surfaces to provide from each headlamp two beams of different direction, so that with the one filament the light is projected a considerable distance down the road, and with the other filament the beam is depressed to a lower angle so as to illuminate the road for a shorter distance ahead of the car. The latter beam may, for example, then be substituted for that from the other filament in passing another vehicle, or in city driving, or in any case where it is not so necessary to have distance projection and where the matter of glare is material or where it is desired to have more illumination close to the vehicle.

That portion of the beam which is projected from the central transverse zone of the reflector will be referred to as the intermediate element of the beam. This part of the beam is the most sensitive to vertical variations in the position of the light source. That portion of the beam which is projected from the upper transverse zone of the reflector will be referred to as the upper element, and that portion of the beam from the lower transverse zone will be referred to as the lower element. All of these elements taken collectively will be referred to as the composite beam. These upper and lower elements are comparatively insensitive to vertical variations in the position of the light source. As stated above, in the case of the parabolic reflector the top of the beam when the light source is located above the focus is at substantially the same position as the top of the beam when the light source is located at the focus. This position is fixed by the upper and lower elements and it is the object of our invention to insure that these elements are properly directed so that the top of the composite beam with the light source above focus is approximately as low or lower than the top of the composite beam which is formed when the filament is located at the focus. We attain this object by appropriate design of reflector contour or lens, or by a combination of the two.

In practice, there is some variation in the positioning of the socket with refernce to the reflector surfaces as well as some variation in the position of the filaments in an incandescent lamp of a given design. The effect of these variations is to alter the form of the beam from conventional headlight equipments and to introduce a variation in the angle of depression or tilt between the two beams. If, however, the composite beam is formed by bending downward the upper and lower elements, as above described, the

effects of vertical variations in the position of the light sources are lessened and it becomes possible over the range of these variations encountered in practice to maintain desirable form of the beams and angle of tilt or depression between beams from the two filaments. This is accomplished by bending the upper and lower elements of the beam downward through a sufficient angle so that the upper level of these elements of the beam will be approximately as low or lower than the upper level of the intermediate element of the beam. Thus the effect of the greater angle of tilt between the intermediate elements of the beams from the two filaments is more nearly realized.

A further advantage gained in applying the principles above stated is that the main driving beam, that is the one projected farther down the road, is obtained from the filament at the focus of a parabolic reflector or in the most favorable position with reference to the surfaces of a modified reflector, in either case forming a beam with the high intensity near the top.

Fig. 1 is a diagrammatic elevation of a reflector of our invention equipped with a two-filament electric incandescent lamp—the full lines show one form taken after the contour of the reflector has been modified according to our invention and the dotted lines represent the usual parabolic reflector contour; Fig. 2 illustrates diagrammatically a modified headlamp of our invention in which the lens has been altered; Fig. 3 illustrates diagrammatically a modified headlamp of our invention in which both the lens and the reflector have been altered. Fig. 4 is a diagrammatic view showing the section of the beam from an ordinary parabolic reflector when the lower filament is lighted, said reflector being used in conjunction with an appropriately designed lens having deflecting prisms such as shown in Fig. 2; Fig. 5 is a similar view showing the section of the beam when the upper filament is lighted; and Fig. 6 is a diagrammatic view showing conventional means for alternately lighting the light sources or filaments.

When the light source is located at the focus of an ordinary parabolic reflector 10, the rays are reflected into a narrow beam which, in falling on a screen at right angles to the beam, produces an approximately round spot of light. If the light source is placed above the focus, the beam of light is elongated downward but the level of the top of the beam remains substantially unaltered. This upper unaltered or stationary portion of the beam is formed principally from the upper and lower elements, that is, the upper and lower zones of the reflector. One way of effectively accomplishing this is by changing the contour of the reflector 10 as by bending the upper and lower sections 11—12 slightly downwardly, as shown in full lines in Fig. 1, and thus a tilt through any desired angle is given the rays striking these sections. Fig. 1 shows the reflector equipped with an electric incandescent lamp 13 having two filaments 14—15. The lamp is placed in the reflector so that its filament 14 is at the focus, and the filament 15 slightly above the focus. The general practice is to focus and aim the headlamp so that when the filament 14 is lighted, the top of the beam is substantially parallel to the level surface on which the vehicle stands.

As shown in Fig. 2, this tilting effect may also be accomplished by using an ordinary parabolic reflector in conjunction with a specially designed lens 16 which has formed on the upper and lower portions thereof the downwardly bending prisms 17 and 18. Still another way in which this tilting effect may be secured is by modifying both the reflector 10 and the lens 19 as by bending downwardly the upper section 20 of the reflector and having only one bending prism 21 over the lower portion of the lens 19, such as shown in Fig. 3.

The form of beam from one form of headlamp made in accordance with our invention is shown diagrammatically in Figs. 4 and 5. For ordinary driving purposes on smooth level roads, the lower filament 14 is in operation and the field of illumination is that shown in Fig. 4. The lower elements B and C come from the upper and lower sections B′ and C′ and are bent to the positions shown, by the prisms B″ and C″. The upper element A comes from the central section of the reflector A′. In order to effectively distribute the light over the road surface, we provide on the lens a series of spreading prisms (not shown) or a corresponding form or configuration of the reflector. Inasmuch as the elements B and C are directed to the roadway near the vehicle, the refractive power of their spreading prisms is preferably made greater than those of the element A. In passing other cars or in traffic where a short range is required, the driver by merely switching from the lower filament 14 to the upper filament 15 causes the upper element A to shift or drop and the field of illumination is of the form shown in Fig. 5.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. The combination of a substantially paraboloidal reflector, a source of light adjacent the focus of the reflector and a source of light spaced a slight distance above the first named source, means for separately energizing said sources, said reflector comprising, top, bottom and central zones, the rays of light from said top and bottom zones being but slightly affected by shifting from one source to the other while the rays of light

from said central zone are shifted sharply downwardly upon energizing the upper source, said top and bottom zones being formed to direct the rays falling upon them beneath the top of the beam produced when the lower source is energized whereby, upon changing to the upper source, an effective lowering of the beam is secured.

2. In a headlighting system for automobiles the combination of a substantially parabolic reflector extending forwardly of the focal plane on all sides, a light source adjacent the focus of the reflector and another light source slightly above the first named source, means for alternately lighting the sources, said reflector comprising transversely extending top, bottom and central zones, said top and bottom zones lying adjacent to and forward of the focal plane whereby the rays projected therefrom are but slightly changed in direction upon shifting from one light source to the other while the rays projected from the central zone are deflected sharply downwardly upon shifting to the upper source, said top and bottom zones being so formed as to give a downward inclination to the rays projected therefrom to bring the light below the light from the central zone when the lower source is lighted so that the light from the central zone forms the top of the beam, and, upon shifting to the upper source, the top of the beam is dropped.

3. A substantially parabolic reflector extending on all sides forwardly of the focal plane and divided into top, bottom and central zones extending from edge to edge of the reflector, the top and bottom zones terminating on substantially horizontal lines drawn on the reflector and intersecting the vertical axial section through the reflector at points slightly to the rear of the focal plane at the top and bottom of the reflector respectively, said top and bottom zones being formed to project the reflected rays beneath the rays from the central zone.

In witness whereof, we have hereunto respectively set our hands the 11th day of June, 1927, and the 13th day of June, 1927.

ROBERT N. FALGE.
WILLARD C. BROWN.