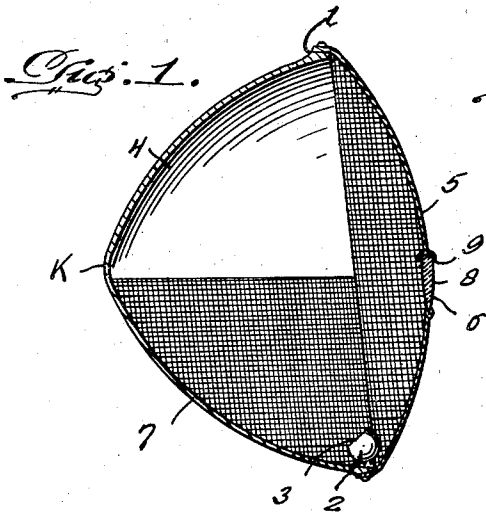
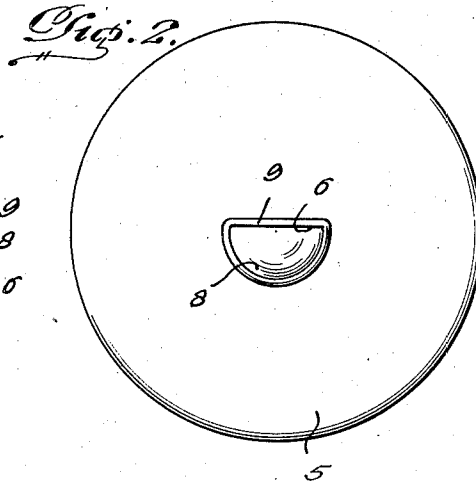
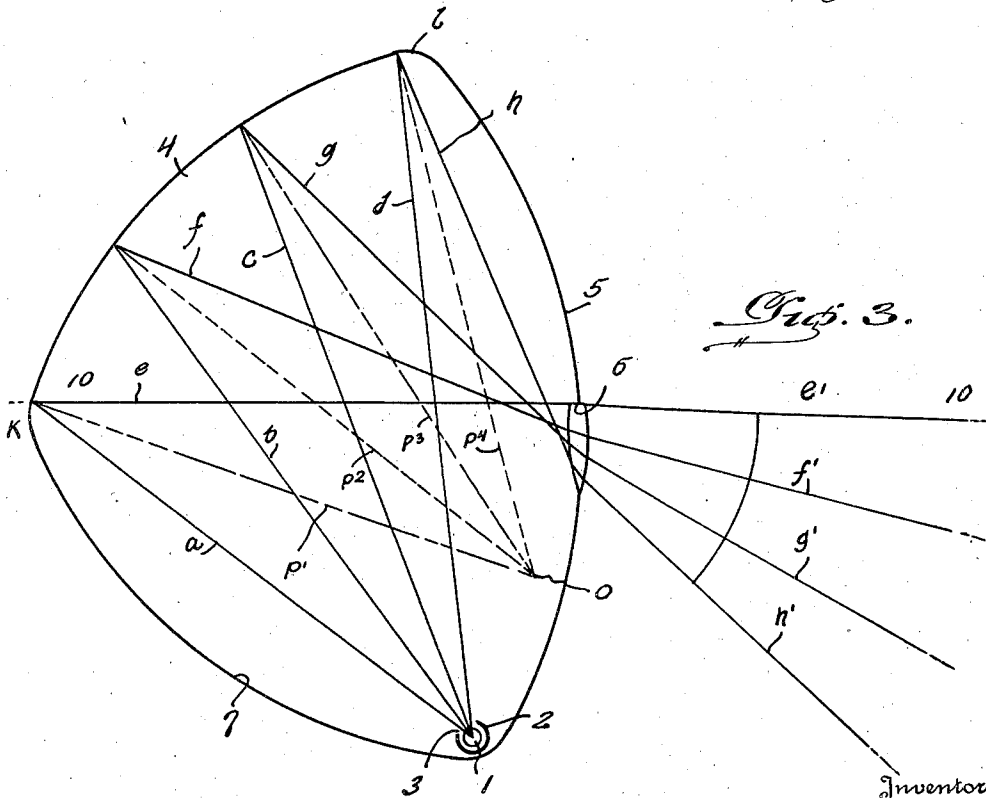


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ILLUMINATING DEVICE
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ILLUMINATING DEVICE

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2 Claims. (Cl. 240—41.1)

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This invention relates to headlights, searchlights, signal and beacon lights and other light emanating devices using sources of light, provided with a reflector, which are producing more or less concentrated light beams and it has particular reference to devices or lamps of the type specified in which the beam produced by the lamp has to be delimited in at least one direction by a sharply defined predetermined surface or in which the beam has to be limited to a sector of a predetermined angle and position.

Lights of the type mentioned are used for various purposes, for instance as headlights for automobiles or locomotives in order to avoid the glare temporarily interfering with the visual powers of other drivers or as pharos or beacon lights in which a rotating beam has to produce an exactly timed sequence of lighted and dark intervals visible from great distances. Many other arrangements employ similar devices and the present invention is mainly concerned with the principle or general arrangement by means of which such a sharply delimited light beam may be produced while the specific use to which the arrangement is put is not one of its primary objects.

The main object of the invention, therefore, resides in an arrangement producing a light beam with at least one sharply defined limiting surface which causes a break in the light intensity characteristic. On one side of said surface constant or approximately constant or slightly increasing values of the light intensity will prevail while on the other side of the said surface the intensity will have fallen to a zero value.

A further object of the invention consists in a reflector lamp which is provided with an opaque front wall with a small opening only through which, however, a light beam with the above described light intensity characteristic passes occupying a substantial angle of space on one side of the delimiting surface.

With these and other objects in view, the invention consists in the arrangement, relative location, combination and cooperation of component parts as described in detail below and illustrated in the accompanying drawing. It is, however, to be understood that the specification illustrating one example is intended in first line to show the principles involved and the general arrangement employed rather than special means used and that the invention, as will be apparent from the annexed claims, resides in the said principle or general arrangement.

The method and means employed are best ex-

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plained with reference to the accompanying drawing, in which:

Figure 1 is a side elevational sectional view of a reflector lamp according to the invention.

5 Figure 2 is a front view of the same.

Figure 3 is a diagram illustrating the method employed for producing light beams sharply limited by a plane.

Referring first to Figure 3 it is assumed that the surface within the lamp casing delimiting the projected beam sharply is above a horizontal plane 10—10 while the beam produced by the arrangement occupies a sector or angle below the horizontal plane.

15 The source of light for the beam is a conventional bulb enclosed filament 1 surrounded as closely as possible by a small reflector 2. This small reflector is only slightly larger than the bulb-enclosed filament itself and because of its proximity thereto it may be permitted to operate at a dull red heat. However, a definite temperature limit has to be kept in order that the small reflector may not become a source of light itself within the closed structure. As a rule, the prescribed temperature limit can be maintained without difficulty as the flow of heat to other parts of the structure is unrestricted.

The opening 3 of the small reflector is so chosen that the light emanating through said opening will fall on the lamp reflector 4 but will be kept from falling on any other surface of the lamp. When properly designed the small reflector 2 also increases the efficiency of the filament arrangement to a certain extent.

25 The lamp which, in the example shown, has the shape of a headlight, such as used on vehicles, forms a closed casing, which consists of an opaque front wall 5 with an opening 6 in its center, said opening being disposed in operative correlation to the aforesaid reflector 4 forming that part of the rear wall which is above the horizontal plane 10—10 and of a part 7 to the rear wall which is below the horizontal plane and has a non-reflecting or light-absorbing surface. The two parts 4 30 and 7 may comprise a continuous body and may be made of one piece or in separate sections or segments and welded or otherwise secured together. The difference between them consists merely in the different ways in which their inner surfaces are treated. While the inner surface of the reflector 4 is highly polished or carries a highly polished layer or is otherwise prepared to obtain as perfect a reflection as possible the inner surface of the part 7 as well as that of the front wall 5 are made light absorbing and non-reflect-

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ing and are prepared accordingly. As shown in Figure 1, the opaque or non-reflecting front wall 5 having the semi-circular lens segment 8 disposed therein is detachably secured to the bowl portion including the inner reflecting surface 4 and the non-reflecting inner surface 7.

As stated above and as shown the source of light is arranged opposite the lamp reflector 4 and the light beam which is emitted from the opening 3 of the small reflector 2 is so limited that it will just cover the lamp reflector 4, as is indicated by the light rays *a*, *b*, *c*, *d*, of which the first and the last mentioned ray represent the two rays which are farthest apart. These rays fall on the two ends *k*, *l* of the reflecting surface 4, the end *k* being coincident with the horizontal plane 10—10 whose inner portion is within the body shell and coincident with the top of the front wall opening 6. Assuming that the lamp reflector surface 4 is formed in cross section by the segment of a circle having its center at *o* then the lines *p*1, *p*2, *p*3, *p*4 will be lines which are perpendicular to the reflecting surface within the plane of the cross section and which converged at the point *o* and thus determine the angle of reflection within this plane. The reflected rays will, therefore, be represented by the lines *e*, *f*, *g*, *h*, whose inclination towards *p*1, *p*2, *p*3, *p*4, represents the angle of reflection which is equal to the angle of incidence represented by the above mentioned lines and the lines *a*, *b*, *c*, *d*. If the lower limit of the reflecting surface at *k* is arranged within the same plane which passes the highest point of the opening 6 or the upper edge of the lens 8 filling said opening and which forms the limiting surface in the horizontal plane 10—10 then it is impossible that any light ray, be it even a ray due to stray reflection, may issue in a direction which is upwardly inclined with respect to the said plane 10—10. A perfectly and sharply defined limiting surface is thus obtained. The above described effect is attained by having the radius point *o* located between the source of light *l* and the front wall opening 6 and adjacent a part of the intermediate wall.

When considering the entire lamp and not only its cross section it will be clear that conditions will be the same everywhere, when the reflecting surface is a spherical segment which is limited by the plane 10—10 as shown. As a consequence of this arrangement the exit opening 6 must be semi-circular, as shown in Figure 2, with the straight edge 9 forming the upper limit of the opening. Through this edge the plane 10—10 is passing.

The angle between the rays *e'* and *h'* which are the two rays farthest apart issuing from the exit opening 6 and which is, therefore, the angle occupied by the pencil of rays may be varied according to the effect which is desired and which is, of course, dependent on the use to which the arrangement is to be put.

It has been found expedient in constructions

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such as described, which are suitable for headlights or the like to make the projections of the distances between the light source *l*, reflector radius point *o* and the beam opening 6 on the plane 10—10 much shorter than the indicated distances of the two first named points from said plane. The source of light is thus arranged in proximity to the front wall, its distance from the reflecting surface is greatest, the position which the reflecting surface assumes and the angle of the reflected beam is such that a good concentration is obtained near the lens and the efficiency of the lamp is therefore high.

It is, however, clear that specific other purposes will call for variations in the arrangement described which will still be within the scope of the invention.

I claim:

1. In a beam projecting lamp of the type specified and adapted to produce a light beam directed and confined to one side of and limited by the plane of a predetermined bordering surface, a closed lamp casing having a front wall, the inner surface of which is light absorbent and non-reflective and provided with an opening for the emission of the beam, a source of light within the casing, located at a lower corner thereof and adjacent the lower edge of the front wall, a small reflector surrounding said source of light in close proximity thereto and directing the light rays therefrom through a restricted opening in said reflector, a curvilinear reflecting surface within said casing, located on an upper rear portion of the casing and formed from a radius point within the casing located adjacent the lower front wall portion and between the source of light and the beam opening of the front wall, the upper edge of the reflector terminating at an upper forward corner of the casing and contiguous to the upper edge of the front wall and its lower edge terminating substantially coincident with a transverse plane which is coincident itself with the top boundary of the beam opening of the front wall, the lower remaining portion of the casing between said reflecting portion and the source of light having its inner face made light absorbent and non-reflective, whereby a beam is projected from the beam opening of the front wall and confined effectively below and lengthwise of the aforesaid plane which is coincident with the top boundary of the beam opening.

2. A beam projecting lamp as set forth in claim 1, wherein the beam opening in the front wall of the casing is covered by a lens of a form adapted to diverge the projected beam in substantial elongation with its top boundary surface flattened and approximately in the aforesaid transverse plane which is coincident with the top boundary of the beam opening of the front wall of the casing and the remaining circumferential boundary of the beam being definitely controlled and restricted below said top boundary of the beam.

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