J. A. O'NEIL.

HEADLIGHT REFLECTOR.

APPLICATION FILED DEC. 30, 1920.

1,394,934. Patented Oct. 25, 1921.

Fig. 1.

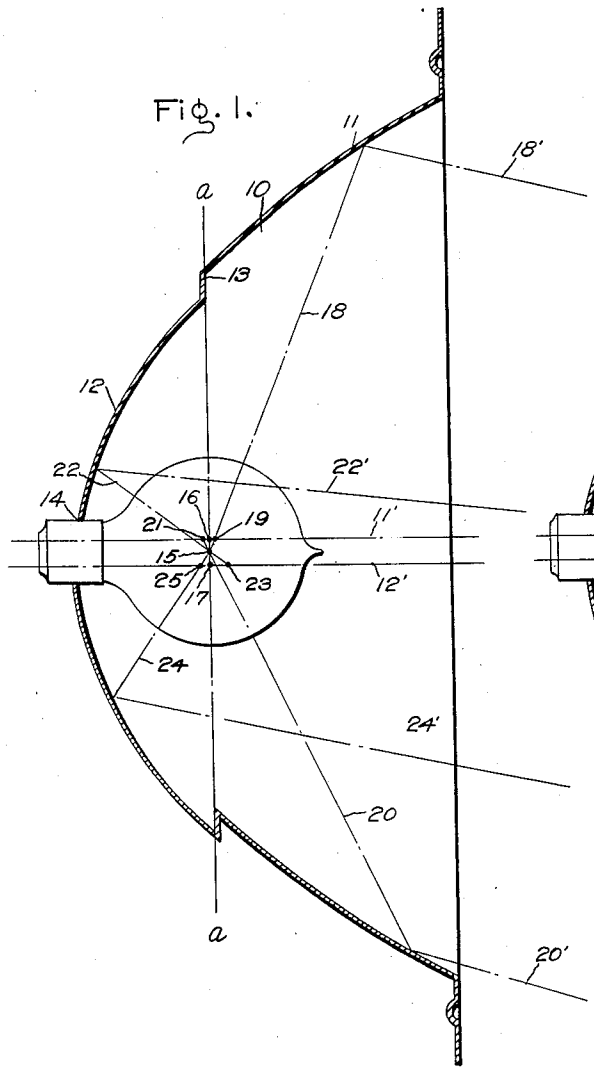
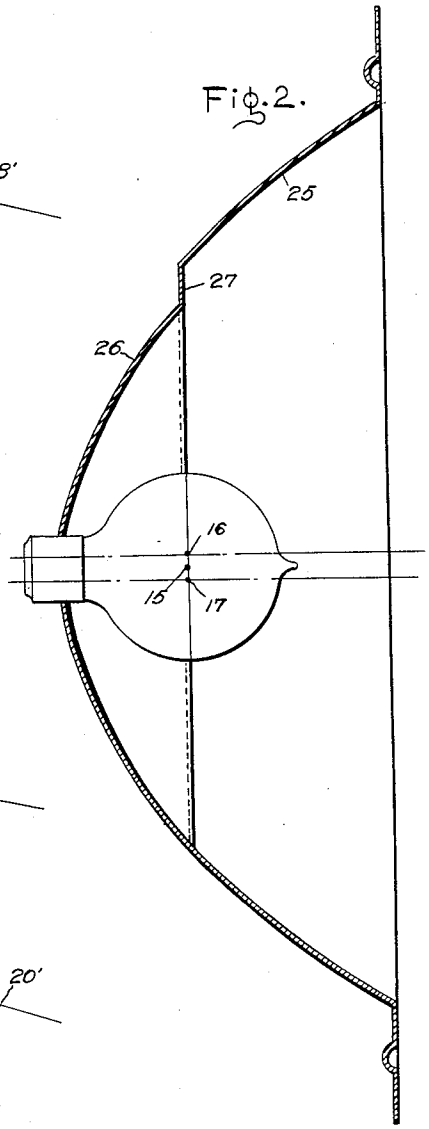


Fig. 2.



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UNITED STATES PATENT OFFICE.

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HEADLIGHT-REFLECTOR.

1,394,934. Specification of Letters Patent. Patented Oct. 25, 1921.

Application filed December 30, 1920. Serial No. 434,101.

To all whom it may concern:

Be it known that I, JAMES A. O'NEIL, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Headlight-Reflectors, of which the following is a specification.

My invention has reference to improvements in reflectors designed to give a downwardly directed illumination for a considerable distance. Lighting units having reflectors of this character are generally known as anti-glare lights, and their object is to give a strong and uniform illumination for the greatest distance possible with the rays of light sufficiently low to avoid blinding parties moving in the opposite direction. I accomplish this result by providing two parabolic or like reflecting surfaces of revolution with their axes not coincident, but parallel, and with their focal planes coincident, and by placing a source of light in the focal plane between the axes of the two surfaces.

My invention will be better understood from the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a vertical section of a reflector embodying my invention with lines indicating the reflection of certain rays of light and Fig. 2 is a vertical section of another form of reflector which my invention may assume.

The numeral 10 indicates a reflector which is formed of two reflecting surfaces of revolution 11 and 12, each adapted to direct beams parallel to its axis from a source of light placed at their respective foci. In Fig. 1, I have shown these surfaces as sections from the same paraboloid.

The reflecting surfaces are cut substantially through their focal planes, that is, on a line perpendicular to their axes passing through their foci, as indicated by the line *a*—*a* in Fig. 1. Therefore, the surface 11 extends in front of the focal plane and the surface 12 extends in the rear of the focal plane. The surfaces 11 and 12 are relatively displaced with their respective axes 11′ and 12′ parallel, and are connected with each other in any suitable manner, when so displaced and with their focal planes substantially coincident. For the sake of simplicity of construction, I preferably unite the reflecting surfaces 11 and 12 by a surface 13, which also serves to close the opening between the surfaces caused by their relative displacement, and which is preferably non-reflecting.

An opening 14 is provided in the back reflecting surface 12 in which is suitably supported a source of light 15 shown as an incandescent lamp. The light source 15 is substantially in the focal plane, indicated by the line *a*—*a*, and between the axes 11′ and 12′ of the two reflecting surfaces. From Fig. 1, it will be seen that the focus of the front reflecting surface 11, indicated at 16, is above the light source 15 and that the focus of the back reflecting surface 12, indicated at 17, is below the light source 15. Obviously the foci 16, 17 and the light source 15 are in the same vertical plane.

Having described the construction of a reflector embodying my invention, I will now describe the direction taken by reflected rays of light emanating from the source 15. A point source of light is, of course, not available, since every available light source is more or less extended in space; however, in practice, it is found that by using a concentrated filament substantially all rays are reflected as if they proceeded from a common point and the departure from this course of the rays from the extended source is not sufficient to detract from my invention. Therefore, for purposes of illustration, I will regard the light source 15 as a point source of light.

Referring to those rays of light proceeding from the source 15 which strike the front reflecting surface 11, it will be seen that any ray directed upwardly, say the ray 18, passes through its axis 11′ and apparently comes from a point 19 on its axis, which point is in front of its focus 16, and in accordance with well known laws governing reflection from parabolic surfaces, is reflected convergently toward the axis, *i. e.*, when the axis is horizontal, as indicated by the reflected ray 18′. Any ray directed downwardly, toward the reflecting surface 11, say the ray 20, apparently comes from a point 21, on its axis 11′, which point is behind the focus 16, and con-

sequently such rays are reflected divergently from the axis, *i. e.*, downwardly, as indicated by the reflected ray 20′.

Referring to those rays of light proceeding from the source 15 which strike the back reflecting surface 12, it will be seen that any ray directed upwardly, say the ray 22, apparently comes from a point 23 on its axis 12′, which point is in front of its focus 17, and such rays are therefore directed downwardly, as indicated by the reflected ray 22′. Any ray directed toward the reflecting surface 12 downwardly, say the ray 24, passes through its axis 12′ and apparently comes from a point 25, on its axis, which point is behind its focus 17, and of course such rays are directed downwardly, as indicated by the reflected ray 24′.

The surface 13 is preferably non-reflecting; however this is not necessary, since this surface is in the focal plane, and no rays of light strike it other than those caused by the possible forward extension of the light source, which are not objectionable.

In Fig. 2 I have shown a reflector in which the front reflecting surface 25 and the back reflecting surface 26 are sections from different parabolas. These two parabolic surfaces may be selected so that they will substantially coincide at a point in their focal plane, when displaced with their axes parallel, as shown in the drawing. The two reflecting surfaces 25, 26 are united by a surface 27, and the particular advantage of a structure of this type is that it may be stamped out or molded in one operation from one piece of material. The location of the light source and the direction of the reflected rays is similar to that described with reference to Fig. 1.

While I have described my invention as embodied in concrete form in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

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

1. A reflector comprising a parabolic reflecting surface cut into two parts on a line perpendicular to its axis through its focus, and the cut parts relatively displaced with their axes parallel, in combination with a source of light located substantially in the focal plane and between the axes of said parts.

2. A reflector comprising two reflecting surfaces of revolution, each adapted to direct beams parallel to its axis from a source of light placed at the focus, the axes of said reflecting surfaces being relatively displaced and parallel, said reflecting surfaces having their focal planes coincident, no portion of one of said surfaces being back of the focal plane, and no portion of the other being ahead of the focal plane, in combination with a source of light located substantially in the focal plane and between said axes.

3. A reflector comprising two reflecting surfaces of revolution, each adapted to direct beams parallel to its axis from a source of light placed at the focus, a non-reflecting means rigidly uniting said surfaces with their axes relatively displaced and parallel and their focal planes coincident, in combination with a source of light located substantially in the focal plane and between said axes.

4. A reflector comprising two reflecting surfaces of revolution, each adapted to direct beams parallel to its axis from a source of light placed at the focus, a non-reflecting surface substantially in the focal plane rigidly uniting said reflecting surfaces with their axes relatively displaced and parallel, and with no portion of one of said reflecting surfaces back of the focal plane and with no portion of the other ahead of the focal plane, in combination with a source of light located substantially in the focal plane and between said axes.

In witness whereof, I have hereunto set my hand this 28th day of December, 1920.

JAMES A. O'NEIL.