C. W. AND C. H. CROCKETT.

SEARCHLIGHT REFLECTOR.

APPLICATION FILED FEB. 27, 1915. RENEWED JAN. 11, 1921.

1,385,429.

Patented July 26, 1921.

Fig. 7.

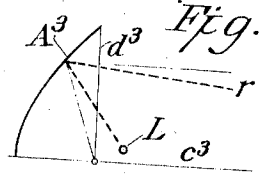


Fig. 1.

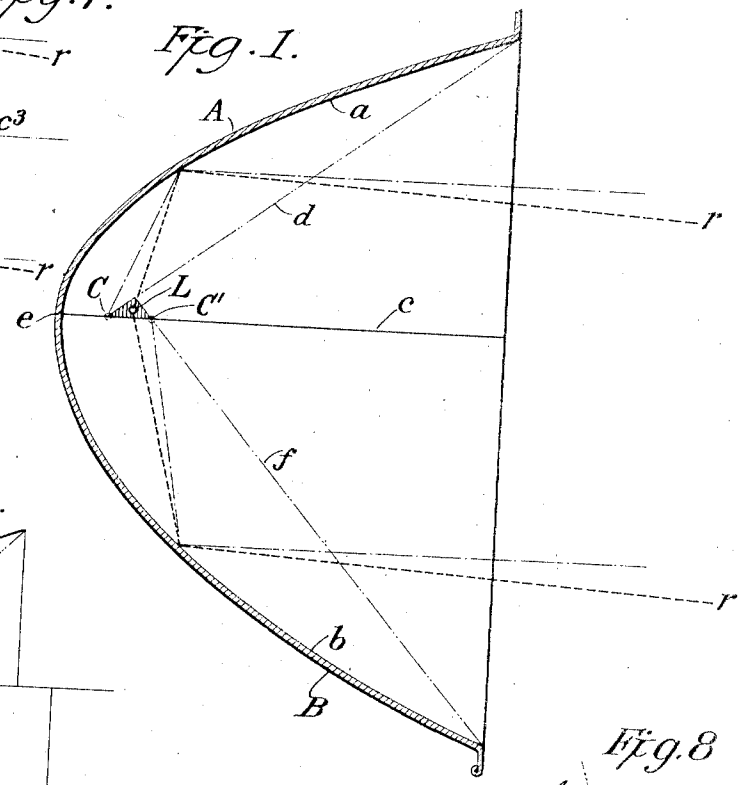


Fig. 6

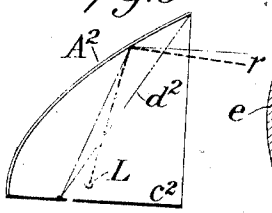


Fig. 5.

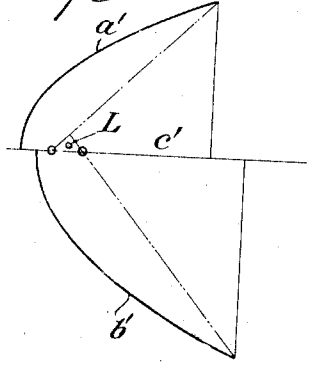


Fig. 8

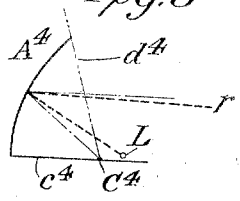


Fig. 2.

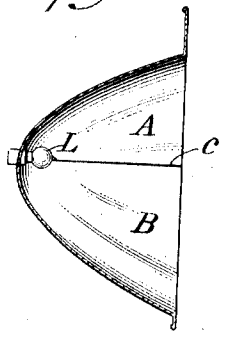


Fig. 3

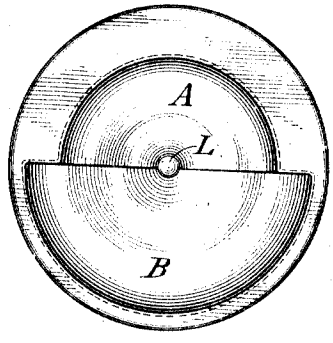
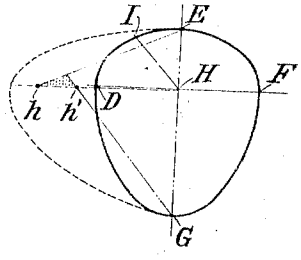


Fig. 4



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SEARCHLIGHT-REFLECTOR.

1,385,429. Specification of Letters Patent. Patented July 26, 1921.

Application filed February 27, 1915, Serial No. 10,956. Renewed January 11, 1921. Serial No. 436,615.

To all whom it may concern:

Be it known that we, CHARLES W. CROCKETT and CHARLES H. CROCKETT, citizens of the United States, residing in Troy, Rensselaer county, State of New York, have jointly invented new and useful Improvements in Searchlight-Reflectors, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 shows a diagrammatic representation of our improved reflector; Fig. 2 is a vertical section thereof and Fig. 3 is a front elevation; Fig. 4 shows a section of a modified form of our invention, and Figs. 5, 6, 7, and 8 show diagrammatic representations of further modifications thereof.

Our invention relates to searchlight reflectors, and provides a reflector particularly adapted for use in motor vehicles, boats and the like, by which the rays of light are projected forwardly in a direction either parallel to the horizontal plane through the horizontal axis of the reflector, or downwardly, so as to be thrown directly into the path of the vehicle or vessel as it advances. To this end we construct our searchlight reflector preferably in the form of a paraboloidal surface or paraboloidal surfaces, with the light so arranged with regard to the focus or foci that all of the rays of light must be reflected in a direction either parallel with or downward from the horizontal plane through the horizontal axis of the reflector. Our invention also consists of the construction and coöperation of the parts which we shall hereinafter describe and claim.

Referring to the drawings, and particularly to the form shown in Figs. 1, 2 and 3, *a* indicates a parabolic arc, which, if rotated 180° about a horizontal axis *c*, will describe a surface A of a paraboloid of revolution, which constitutes the shape of the upper portion of this form of the reflector. If a point of light is placed above the axis *c*, in the vertical plane through the axis, and forward of the line *d*, drawn from the focus C to a point on the parabola *a* which corresponds to the upper outer edge of the reflector, none of the rays of light falling on the surface A will be reflected in an upward direction.

To form the lower portion of the reflector, a parabolic arc *b*, having the same vertex *e* and axis *c* as the parabolic arc *a*, is rotated 180°, thereby describing a surface B of a paraboloid of revolution. In order that none of the rays of light reflected from the surface B shall ascend, the parabolic surface B has a greater parameter than the surface A. Hence if a point of light is placed above the axis *c*, and in the vertical plane through the axis, and to the rear of the line *f* intersecting the focus C′ and extending to a point in the parabolic surface B which corresponds to the lower outer edge of the reflector, none of the rays of light falling on the surface B will be reflected in an upward direction.

It will thus be seen that when the light is placed forward of the line *d* and in the vertical plane of the axis and above the axis, its rays will be reflected by the upper parabolic surface A, either parallel to the horizontal plane through the horizontal axis, or downwardly from the horizontal plane through the horizontal axis, while, if it is also placed to the rear of the line *f* and above the axis, and in the same vertical plane as the axis, its rays will be reflected by the lower parabolic surface B also either parallel to or downwardly from the horizontal plane through the horizontal axis. It will also be seen that the horizontal axis *c*, with the lines *d* and *f*, forms a triangle, as is shown in Fig. 1, the base of which is the axis, and within any part of which the light may be suitably placed, with the result that its rays will be reflected in a direction parallel to the horizontal plane through the horizontal axis, or downwardly therefrom. The extent of the differences of the parabolic surfaces A and B is shown in Fig. 3, but if desired these surfaces may be modified so as to merge into each other, as is shown in Fig. 4.

We have observed that in searchlights of the character commonly used, which are usually of a parabolic shape, the light is normally placed at the focus. If the light were no larger than a point, its rays would obviously be reflected in a direction parallel to the axis, but inasmuch as the light is always larger than a point, certain of its rays are always reflected in directions divergent from the horizontal axis.

We have found in carrying out our invention that there is a space—whether the reflector is comprised of one or two paraboloidal surfaces—within which the light may be placed, and that when the light is

placed wholly within such space none of the rays of light will be reflected in an upward direction. In Fig. 1 such a space is projected in the area bounded by the lines c, d and f, and the light L being wholly within such space none of its rays will be reflected by the surfaces A and B in an upward direction. Hence, in employing our invention, it is to be understood that it is desirable to arrange all portions of the light or flame as nearly as may be within the space just described and preferably with the center of the light in the vertical plane through the axis, so that all the rays of light, as far as is possible, may be directed forwardly to the desired point and concentrated within the desired radius, and the annoyance usually occasioned to pedestrians and to the drivers of other vehicles, by reason of a broad diffusion of light, will thus be avoided.

In Figs. 4, 5, 6, 7 and 8 we have shown modified forms of our invention.

In Fig. 4 the reflector is formed from portions of the surfaces of two opposed and unequal elliptic paraboloids having a common axis and a common vertex. The upper edge of the reflector is in the form of a semi-ellipse DEF and the lower edge of the reflector is in the form of another and unequal semi-ellipse DGF, the two semi-ellipses having a common center H and a common axis DF. The plane EH will cut the reflector in a parabolic arc, and the plane HI will cut the reflector in a parabolic arc having a greater parameter than that of the arc cut by the plane EH, and the parameter will increase until the plane reaches HG where the parameter has its greatest value. The foci of the parabolic arcs will lie between h and h', which are the extreme foci. The light should be in the space which is projected in the shaded area between the foci h, h'.

In Fig. 5 the reflecting surfaces are generated by parabolic arcs a', and b', which have different vertices but the same axis c'. In Fig. 6 the reflector is in the form of a single parabolic surface A^2, described by revolving a parabolic arc about its axis c^2 through an angle not exceeding 90° in each direction, and the light L, as is also shown in Fig. 1, lies in the vertical plane of the axis c^2 and above the axis and forward of a line d^2 drawn from the focus to the forward edge of the arc of the reflector. In Fig. 7 the reflector is in the form of a single parabolic surface A^3, described by revolving a parabolic arc about its axis c^3 through an angle not exceeding 90° in each direction, and the arc of the reflector extends to a plane perpendicular to the axis c^3 at the focus. The light L is forward of the perpendicular d^3 at the focus, and above the axis. In Fig. 8 the reflector is also in the form of a single parabolic surface A^4, described by revolving a parabolic arc about its axis c^4 through an angle not exceeding 90° in each direction, in which the arc of the reflector does not extend to a plane perpendicular to the axis c^4 at the focus C^4. The light L is forward of a line d^4 drawn from the focus to the forward edge of the arc of the reflector and above the axis.

The letter L designates the source of light in the various figures of the drawings, and the letter r designates the reflected rays therefrom.

It is obvious that the space within which the light may be placed in carrying out our invention varies in shape when different surfaces are used. For instance, when the reflector is of the form shown in either Fig. 1, 5 or 6, the cross-section of the space made by a plane perpendicular to the axis is somewhat oval in shape; when the reflector is of the shape shown in either Fig. 7 or 8, the cross-section of the space seems to be of unlimited extent in an upward direction.

The terms and expressions which we have employed are used as terms of description and not of limitation, and we have no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described, or portions thereof, but recognize that reflectors of various shapes, generated from a variety of curves and embodying the substance of our invention, are possible within the scope of the invention claimed.

What we claim is:

1. A searchlight reflector comprising a curved surface lying substantially on one side of a horizontal plane through the horizontal axis of a vertical axial section of the surface, the vertical axial section of the said surface being an arc of a conic section, and a source of light lying substantially above the horizontal plane through the horizontal axis of a vertical axial section of the surface and forward of a plane intersecting the forward upper edge of the reflector and the focus of a vertical axial section of the surface, whereby reflection of light in a direction above the horizontal is substantially prevented.

2. A searchlight reflector comprising a curved surface lying substantially on one side of a horizontal plane through the horizontal axis of a vertical axial section of the surface, the vertical axial section of the said surface being an arc of a conic section, and a source of light lying substantially above the horizontal plane through the horizontal axis of a vertical axial section of the surface and to the rear of a plane intersecting the lower forward edge of the reflector and the focus of a vertical axial section of the surface, whereby reflection of light in a direction above the horizontal is substantially prevented.

3. In a searchlight reflector comprising curved surfaces, a space within the reflector the base of which passes through the axis of one of the surfaces and which is forward of a plane intersecting the forward upper edge of the reflector and the focus of an axial vertical section of the upper surface and to the rear of a plane intersecting the forward lower edge of the reflector and the focus of an axial vertical section of the lower surface, and a source of light lying substantially in said space and in the vertical plane of the axes, whereby the reflection of light in one direction is substantially prevented.

4. A searchlight reflector in the form of one continuous surface without any abrupt break in curvature, in which each half section made by an axial plane is a parabolic arc, the focus of the axial vertical upper half section and the focus of the axial vertical lower half section being out of coincidence, one of the halves of the reflector having axial sections in one portion thereof differing in shape from other axial sections in other portions of such half of the reflector.

5. A searchlight reflector in the form of one continuous surface without any abrupt break in curvature, in which each half section made by an axial plane is a parabolic arc, the focus of the axial vertical upper half section and the focus of the axial vertical lower half section being out of coincidence, and a source of light lying substantially between the said foci and above the axes of the said vertical half sections, whereby the reflection of light in one direction is substantially prevented.

6. A searchlight reflector in which the focus of an axial vertical upper half section is out of coincidence with the focus of an axial vertical lower half section, and a source of light so placed that an axial section thereof is substantially above the axes of the half sections of the reflector and forward of a line intersecting the forward upper end of the upper half section of the reflector and the focus of the axial vertical upper half section, and to the rear of a line intersecting the forward lower end of the lower half section of the reflector and the focus of the axial vertical lower half section, whereby the reflection of light in one direction is substantially prevented.

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