July 31, 1928.

1,679,108

W. G. WOOD

CONDENSING REFLECTOR

Filed Nov. 3, 1925

Fig. 1.

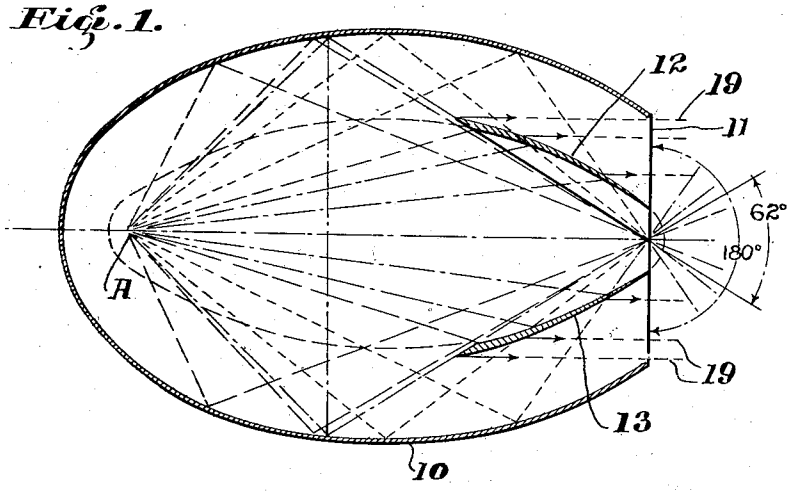


Fig. 3.

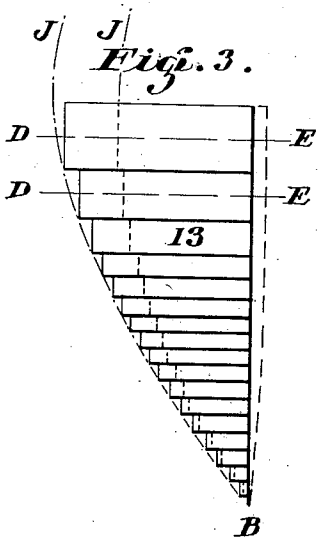


Fig. 5.

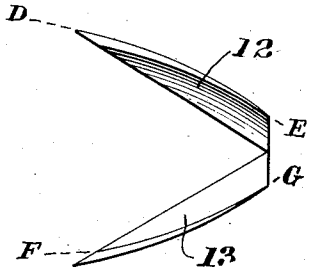


Fig. 4.

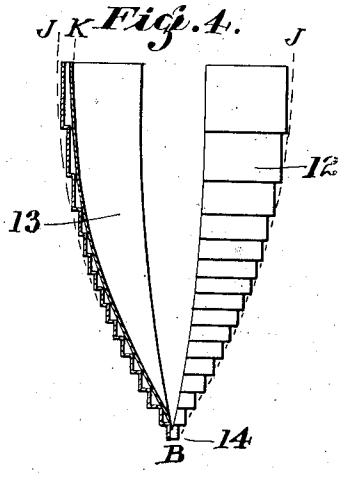


Fig. 2.

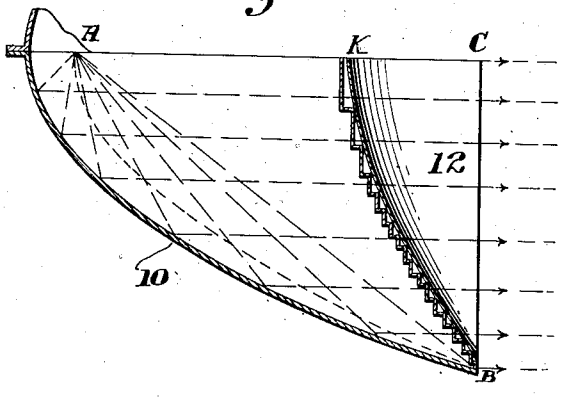
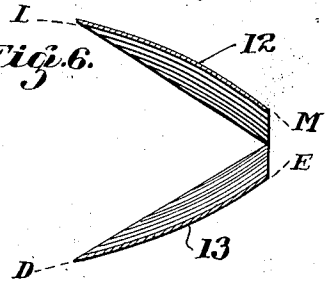


Fig. 6.



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Patented July 31, 1928. 1,679,108

UNITED STATES PATENT OFFICE.

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CONDENSING REFLECTOR.

Application filed November 3, 1925. Serial No. 66,450.

This invention relates to a condensing reflector for light projectors, and more particularly, headlights.

In my application Serial Number 682,650, filed December 26, 1923, I show a headlight having a reflector which on horizontal sections is elliptical, the proximate foci of the ellipses lying on an arc of a parabola and the remote foci occupying a straight vertical line. With such a reflector a beam is projected having rays which are parallel on vertical planes and which diverge on horizontal planes, after crossing on a vertical line within a narrow aperture in the lamp house.

The object of the present invention is to restrict the spread of the diverging rays of a reflector of the type above mentioned and to increase the penetration and power of the beam in the central field. This object I accomplish by providing a condensing reflector adapted to be installed in the front of the lamp and which is so shaped that all direct rays striking its interior surface are reflected out divergently at a relatively narrow angle, and all rays reflected from the forward portion of the main reflector are intercepted by the exterior surface of the condensing reflector and are re-reflected out substantially horizontally in parallelism.

Some of the various forms which my invention may assume are exemplified in the following description and illustrated in the accompanying drawing, in which:

Fig. 1 shows a plan view in section of my headlight reflector Serial Number 682,650, equipped with the condensing reflector of the present invention;

Fig. 2 shows a vertical central sectional view of the same;

Fig. 3 shows a side elevation of the condensing reflector;

Fig. 4 shows a front elevation of the condensing reflector partly in section;

Fig. 5 shows a plan view of the condensing reflector;

Fig. 6 shows a sectional plan view of a modified form of condensing reflector.

Referring in detail to the accompanying drawing, I show a main reflector 10 which is shaped as described in my prior application; that is, on horizontal sections it is formed of parallel, diminishing ellipses, the ellipses being such that their proximate foci fall upon a parabolic arc A—B passing through the point A which is occupied by the light source. The remote foci of these diminishing ellipses fall on a straight vertical line B—C. The reflector is cut away at its forward end to form an aperture 11, and at this aperture I place the condensing reflector of the present invention. This condensing reflector has a right-hand wing 12 and a left-hand wing 13, meeting at their lowermost forward tips 14. Each wing has an exterior curvature which on parallel horizontal planes is formed of diminishing parabolic arcs D—E, and the interior curvature on parallel horizontal planes is formed of diminishing ellipses F—G.

The condensing reflector is located at the aperture of the main reflector and the vertical line of foci of the main reflector is coincident at B—C with the vertical line of foci of the condensing reflector. The light source A is the proximate focus of the family of ellipsoids from which the series of diminishing parallel elliptical arcs F—G, which comprise the interior reflecting surface of the condensing reflector, are taken. Of necessity, it will be seen that the remote foci of the elliptical arcs of both the condensing reflector and the main reflector must lie on the same coincident vertical line. It will follow then that the interior surface of the condensing reflector will function, in direct reflection, similarly to the main reflector, producing converging rays, which cross at C—B.

The exterior surface of the condensing reflector, as stated, is composed of a series of diminishing parabolic arcs, D—E. The foci of these parabolic arcs all lie on the above-mentioned coincident vertical straight line C—B, and by referring to Fig. 1 it will be seen that instead of the light from the source A emanating at the focus of each parabolic arc, it is directed on converging lines on each parallel horizontal plane toward said foci, the result naturally being that the exterior surface intercepts these rays and the reflected rays 19 are passed out in parallelism. Furthermore, the major axes of all elliptical arcs, and the axes of all parabolic arcs of the condensing reflector, are parallel and lie on the same median vertical plane, this plane also being the median vertical plane of the main reflector, the axes of both reflectors being parallel.

The vertices of the diminishing parabolic arcs and the remote vertices of the elliptical arcs both lie on parabolic arcs.

It will be noted that the exterior surface of the condensing reflector is stepped so that the horizontally extending parabolic arcs have straight vertical side walls. The corners of these stepped portions lie along vertical parabolic arcs J—B when intersected by a vertical pencil of planes with axis C—B. This stepped construction is of importance to prevent the rays reflected by the exterior surfaces from being deflected downwardly, as they would be if the surfaces were made smooth and continuous.

The interior surfaces F—G, as shown in Figs. 1 to 5 inclusive, are elliptical on parallel horizontal planes, and a vertical pencil of planes with axis coincident with the vertical line C—B will form parabolic arcs K—B on these interior surfaces. As shown in Fig. 6, the interior surfaces may be parabolic as indicated at L—M instead of elliptical, and still function approximately as above described. Where parabolic interior surfaces are used, the light rays from the source A striking the interior surfaces at a diverging angle, will cross approximately on a substantially vertical line slightly to the rear of the line C—B, so that in general the effect is the same as when the interior surfaces are made elliptical.

Fig. 1 serves to show how the rays from the main reflector are concentrated and re-reflected. The shape of the beam projected by the main reflector is not materially altered; whereas the rays are condensed, thereby giving greater power and penetration to the beam. Instead of spreading at an angle of 180° as in my prior application, the spread is approximately 65°.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A secondary reflector for re-reflecting light rays, whose exterior surface is parabolic on all parallel horizontal planes, which surface intersected by a pencil of planes with axis coincident with the locus of the foci of said parallel horizontal parabolas form steps having corresponding points lying on a vertical parabolic arc.

2. A secondary reflector for re-reflecting light rays formed of a series of diminishing parallel horizontal parabolic arcs, each arcuate section having vertical side walls, the sections being stepped so that the edges of the steps lie along a vertical parabolic arc.

3. In combination with a reflector for reflecting light rays horizontally and convergently, a condensing reflector composed of bands that are conic sections on all horizontal planes and parallel straight lines on all vertical planes.

4. A secondary reflecting surface consisting of a number of bands, horizontal sections of which are conic sections having their proximate foci disposed along a vertical straight line, vertical sections of which are straight parallel lines, corresponding points of which lie on vertical parabolic arcs.

5. In combination with a reflector for reflecting light rays horizontally and convergently, a condensing reflector composed of bands that are conic sections in horizontal planes and the loci of parallel straight lines in all vertical sections, the major axes of said conic sections lying in a common median plane, the similar foci of said conic sections lying on a common vertical line, the conic sections diminishing in size from top to bottom substantially as described.

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