W. H. WOOD.

LAMP.

APPLICATION FILED APR. 19, 1916.

1,284,019.

Patented Nov. 5, 1918.

2 SHEETS—SHEET 1.

FIG. 1.

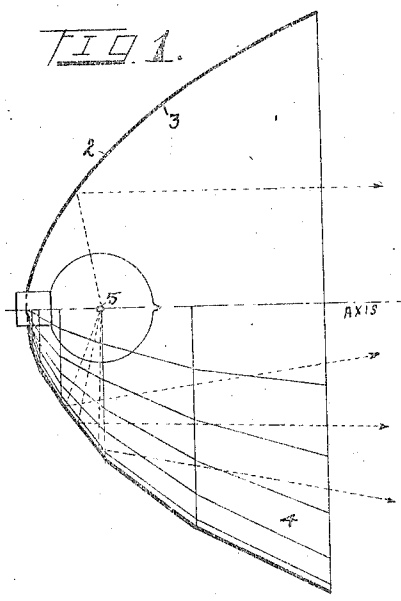


FIG. 2.

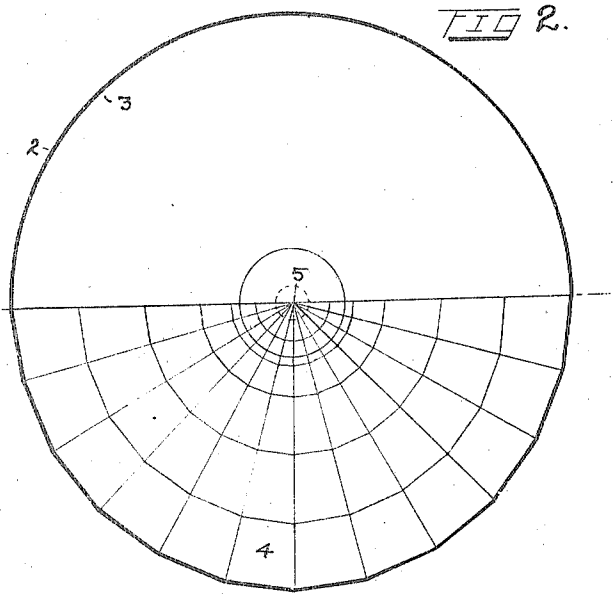


FIG. 3

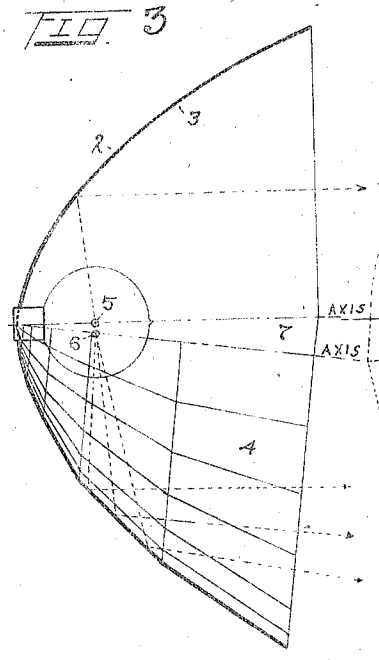
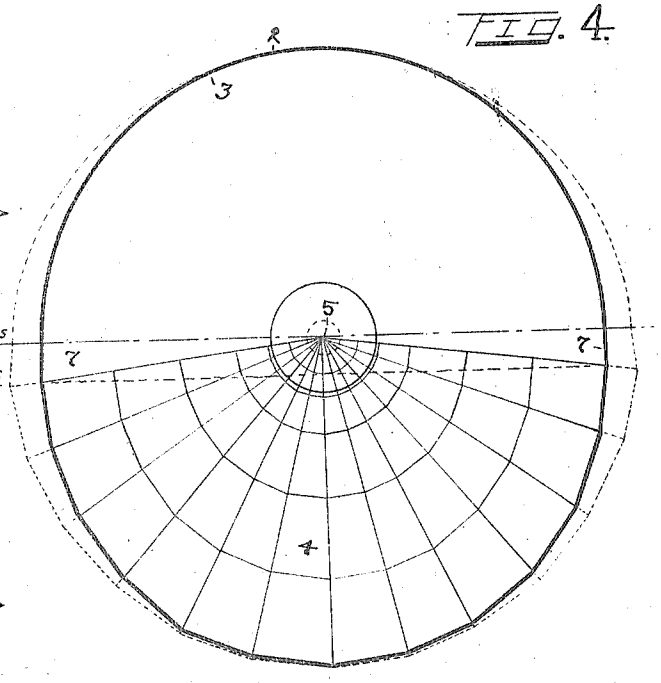


FIG. 4.



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2 SHEETS—SHEET 2

FIG. 5.

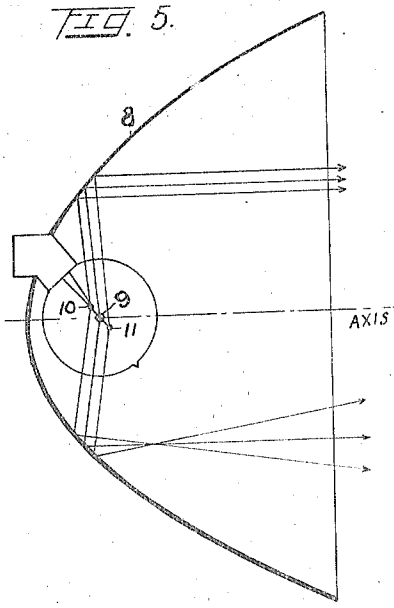


FIG. 6.

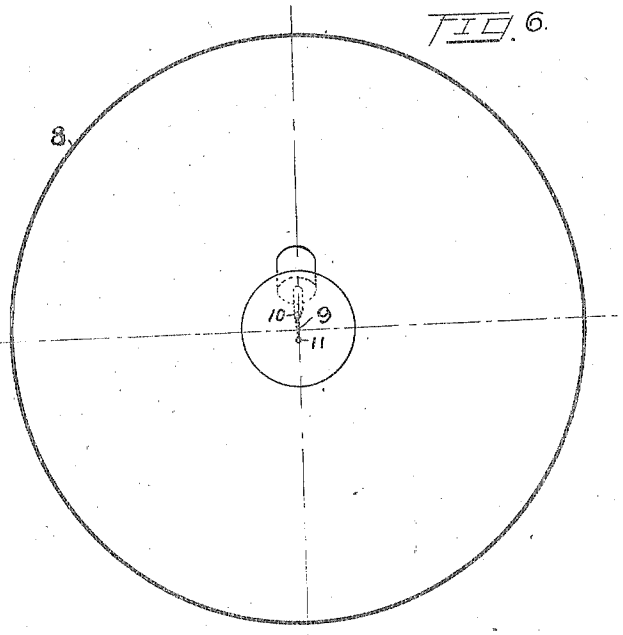


FIG. 7.

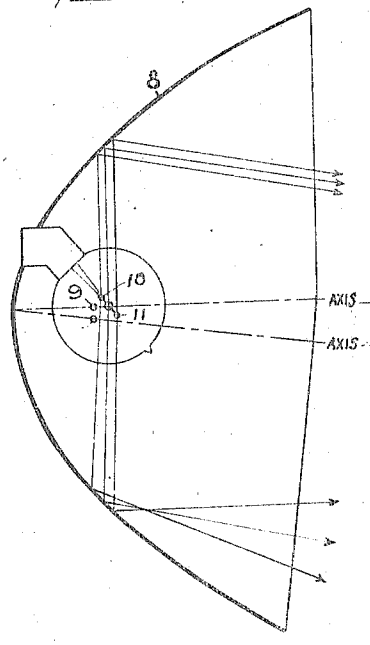
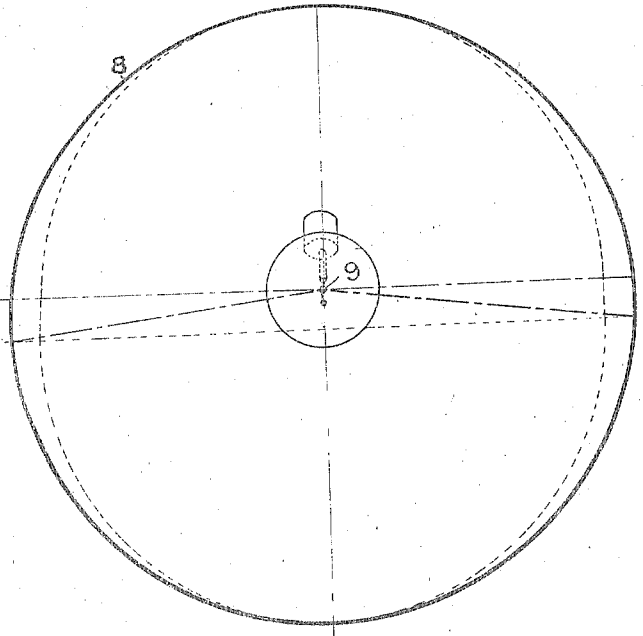


FIG. 8.



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UNITED STATES PATENT OFFICE.

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LAMP.

1,284,019. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed April 19, 1916. Serial No. 92,135.

To all whom it may concern:

Be it known that I, WILLIAM H. WOOD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Lamps, of which the following is a specification.

My invention involves a lamp in which a reflector of special construction and a source of light are related in a particular way to project a beam of substantially parallel rays of light axially of and to a considerable distance ahead of the lamp while diffusing other rays of light with day-light effect beneath the axis of the lamp and over a widened field relatively near the lamp, in this manner providing an excellent headlight for an automobile, motor boat, or other vehicle wherein a driving light is used relatively near the surface over which the vehicle travels.

The accompanying drawings show several different forms of my invention, Figures 1 and 2 representing a vertical section and a front view respectively, of a reflector and electric lamp, the reflector comprising a semi-circular body portion of parabolic form with a plain smooth reflecting surface and a similar body portion subdivided into a series of flat light-diffusing surfaces. Figs. 3 and 4 correspond to Figs. 1 and 2, but show the two semi-circular divisions in inclined relations with two foci on diverging axes, and the dotted lines in Fig. 4 show that the reflector may be made elliptical in cross section if desired.

Figs. 5 and 6 show a vertical section and front view, respectively, of a parabolic reflector and an electric lamp having an extended filament inclined to and intersecting the horizontal axis at the focal point of the reflector.

Figs. 7 and 8 correspond to Figs. 5 and 6, but the reflector is of elliptical cross section and has its upper and lower opposed parabolic surfaces in inclined relations and its inclined light filament intersects the horizontal axis in advance of the two focal points of the opposed parabolic surfaces.

Describing the invention in detail, the reflector shown in Figs. 1 and 2, comprises a circular sheet-metal body 2 formed with a perfectly smooth parabolic reflecting portion 3 above its horizontal axis, while the lower portion or half of body 2 corresponds approximately to the parabolic formation of the upper half except that it is sub-divided radially into a multiple of co-extensive flat reflecting planes 4, either of graduated length or the same length.

As shown, the flat planes 4 nearest the focal point 5 of the reflector are the smallest and each successive plane 4 in each radial row of flat planes is made larger gradually as its place of location on the parabolic curve becomes more distant relatively to the focal point. Each flat plane 4 is also made to terminate at its ends and meet the succeeding plane on the same parabolic curve, altogether with a view of definitely fixing the angle of incidence and reflection of rays of light emanating from a suitable light source placed at the focal point 5, a spreading and uniform diffusion of light being desired from the lower portion of the reflector body 2. On the other hand, the upper parabolic reflector projects the light on substantially straight lines in the form of a beam of light, because the source of light on focal point 5 is centered exactly on the true focus for the upper parabolic reflector surface 3. The beam of light thus obtained is of utility for distant lighting effects, and the diffused light for illuminating nearby objects, but a certain percentage of the diffused light projected above the axis of the lamp by the upwardly-inclined rays of light from the flat planes 4, is objectionable in a vehicle headlight.

To overcome the objection noted, I construct the reflector body substantially as shown in Figs. 3 and 4, with the lower half inclined downwardly and at an angle to the upper half. In effect this places the axis for the lower half at an angle to the horizontal axis for the upper parabolic portion and lowers the focus 6 for this lower portion relatively to the focal point 5 and the light source thereat, thereby not disturbing the light beam from the upper half but changing the angle of incidence and reflection of the light rays for the flat surfaces 4 so that practically all the light reflected from the lower half will be projected beneath the horizontal plane of the upper axis on which the light source is centered. It is desirable also to converge the rays of light to some extent from the sides of the reflector, and for this purpose each body portion may be made semi-elliptical instead of semi-circular, see the dotted lines in Fig. 4. Here it is seen that the greatest diameter of each body por-

tion lies in the horizontal plane of its axis, thus involving a parabola in that plane having its focus necessarily in advance of the focus 5 for the parabola in the vertical plane of the axis. Where the light source in a parabolic reflector is located behind the focal point the rays of light will be projected on converging lines, and in the present arrangement the light source is located at the focal point 5 of the parabola in the vertical plane of the axis behind the focal point of the larger parabola in the horizontal plane of the axis and in fact behind all intermediate focal points of the parabolas involved in the elliptical formation.

By placing the two body portions in angular relations a triangular space is produced at each side of the axis which is filled in by flat sections 7, and in making the upper and lower body portions semi-elliptical in cross section and arranging them in angular relations and filling in the triangular spaces the complete body appears to be approximately round viewed from the front. The reflector described is designed to utilize an electric lamp in which the light emanates from a restricted area approximating a point, but a somewhat similar beam and diffusion of light may be obtained by a reflector and lamp constructed and arranged as disclosed in Figs. 5 to 8. Thus, in Figs. 5 and 6, I show a parabolic reflector 8 of the ordinary kind in which the focus is located approximately at point 9. By employing an electric lamp having an extended line of light and arranging the lamp to place this extended line of light at an angle and in intersecting relations with the focus 9 the terminals 10 and 11 of the line of light may be placed at equal distances in advance of and behind the focus 9 and also at equal distances above and below the axis. The result in the vertical plane of the axis is this: that the rays from the linear source of light are projected from the upper portion of the reflector on lines approximately parallel with the axis, while the rays from the same source are projected from the lower portion of the reflector at varying angles to the axis, that is, the light is diffused. A source of light emanating from the axis ahead of the focus converges the rays and terminal 11 is placed in advance in this way in Fig. 5, but it must be noted also that it is below the axis as well and in offset relation to focus 9 thereby rectifying the convergence and causing the rays from this extended point to parallel the angle of deflection of the ray of light from focal point 9. The opposite terminal 10 of the source of light is behind focal point 9 and ordinarily the rays of light would diverge under this condition, but this terminal point 10 is also offset, only it is placed above the axis and relatively nearer the upper parabolic surface, thereby effecting the same result as the front offset 11, that is, the ray of light therefrom is projected at the same or substantially the same angle of deflection as the ray from the focal point 9. An entirely different result occurs in the lower portion of the reflector, that is, the diverging and converging rays of light due to the retired and advanced points of light 10 and 11 are not corrected but are enhanced because the rear point 10 is above the axis and farther removed from the lower parabolic surface, and the front point 11 is nearer to said lower parabolic surface and beneath the axis. Briefly, a diffused light is obtained from the lower half of the reflector, and to utilize this distribution of light to the best advantage, the same steps may be taken as in the other form of my invention, that is, the lower portion of the reflector may be arranged at an angle to the upper and an elliptical shape given to the reflector in cross section, see Figs. 7 and 8. In addition, the electric lamp might be moved forward to place the line of light ahead of the focal point 9 so that practically all the light will be directed below the horizontal axis of the lamp.

What I claim is:

1. In a lamp, a reflector of parabolic form having a plain smooth reflecting surface above its horizontal axis and a multiple of flat light-diffusing surfaces beneath said axis.

2. In a lamp, a reflector having on one side of its axis a paraboloid surface and on the other side of its axis a multiple of flat co-extensive reflecting surfaces approximating a parabolic curve.

3. In a lamp, a reflector having a plain smooth parabolic reflecting portion and a surface opposed thereto sub-divided into a multiple of co-extensive flat reflecting planes whose normals intersect the parabolic axis.

4. In a lamp, a reflector of parabolic form having above its horizontal axis a plain smooth reflecting surface and below said axis a multiple of flat light diffusing surfaces whose normals intersect said axis.

5. In a lamp, a reflector having at one side of its axis a light focusing surface and at the other side a light diffusing and projecting surface.

6. In a lamp, a reflector having a parabolic reflecting portion on one side of its center and drawn about a given axis and a multiple of flat reflecting surfaces of graduated size upon the other side of its center extending radially therefrom on parabolic lines, drawn about an axis slightly diverging from said first axis.

7. In a lamp, a reflector having a smooth parabolic reflecting surface and a reflecting surface situated opposite thereto subdivided radially into a multiple of flat planes extending on straight lines which meet on par-

abolic curved lines corresponding approximately to the parabolic curves of said smooth reflecting surface.

8. In a lamp, a reflector having the form of a pair of opposed semi-elliptic paraboloids one of which is sub-divided over a portion of its reflecting surface into a multiple of flat planes.

9. In a lamp, a reflector in the form of a pair of opposed semi-elliptic paraboloids having a plain smooth reflecting surface above its horizontal axis and a multiple of flat light diffusing surfaces beneath said axis.

10. In a lamp, a reflector in the form of a pair of opposed semi-elliptic paraboloids arranged with their greatest diameters in the horizontal plane through its axis and the lower segment being subdivided into flat light-diffusing surfaces.

11. In a lamp, a reflector of parabolic form having a plain smooth reflecting surface above its horizontal axis and a portion inclined relatively to said axis having a multiple of flat light-diffusing surfaces beneath said axis.

12. In a lamp, a reflector wherein all sections parallel to the axis contain semi-parabolic segments having progressively varying focal points so related that every section transverse to the axis constitutes a portion of an ellipse, and a linear light source obliquely disposed to said axis in the plane of the smallest parabola.

13. In a lamp, a pair of reflector portions of elliptical and parabolic formation disposed with their axes in angular relation and one of said portions having a multiple of flat reflecting surfaces.

14. In a lamp, a reflector having a paraboloid portion, in combination with a linear light source extending through the axis of such portion to substantially uniform distances on opposite sides thereof and inclined relatively to that axis.

15. In a head light, a parabolic reflector in combination with an electric light filament intersecting the parabolic axis and inclined relatively thereto at an oblique angle.

16. In a headlight, a reflector having a parabolic portion arranged with its axis horizontal in combination with a linear light source intersecting the parabolic axis and inclined relatively thereto, said light source being wholly contained in a vertical plane and being inclined downwardly from rear to front.

17. In a lamp, a reflector having upper and lower reflecting surfaces of parabolic form set with their axes in angular relations, in combination with a line of light extending through one axis and inclined relatively thereto.

18. In a head light, a reflector having upper and lower reflecting surfaces of semi-paraboloid form set with their axes diverging forwardly in combination with a linear light source intersecting the axis of the upper paraboloid and inclined relatively thereto, the direction of such inclination being downwardly from rear to front.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. WOOD.

Witnesses:
GEO. E. KUCKER,
F. C. HARROLD.