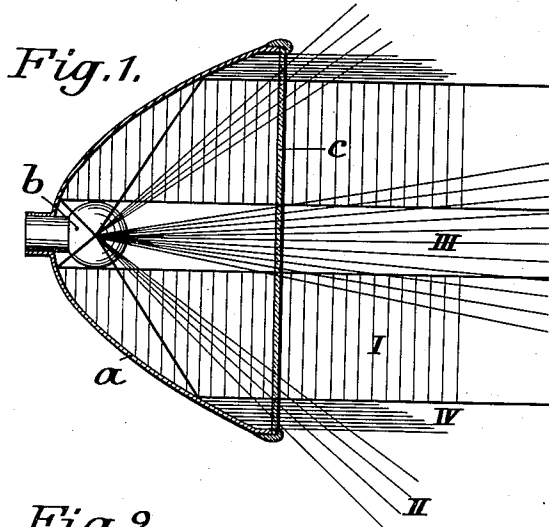
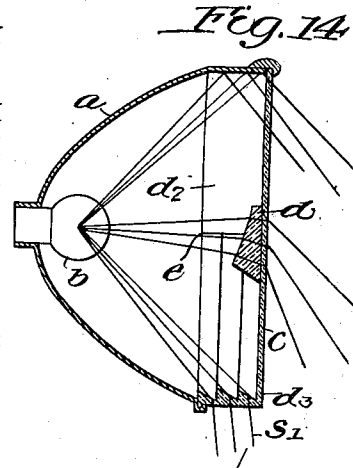
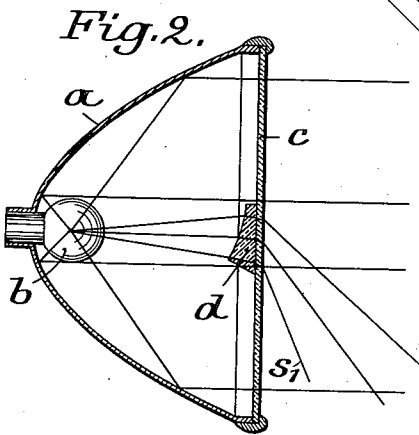
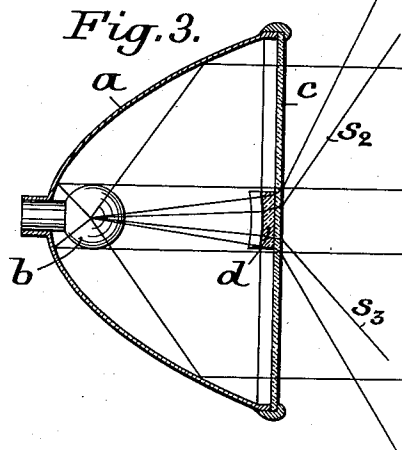
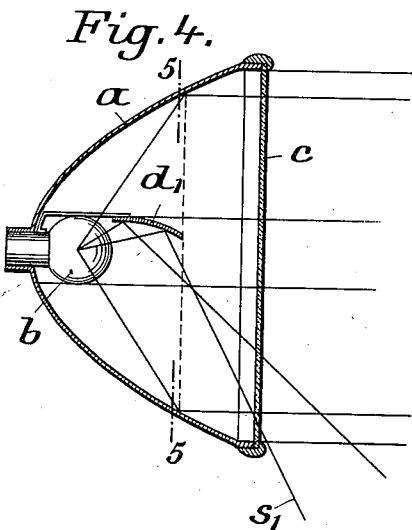
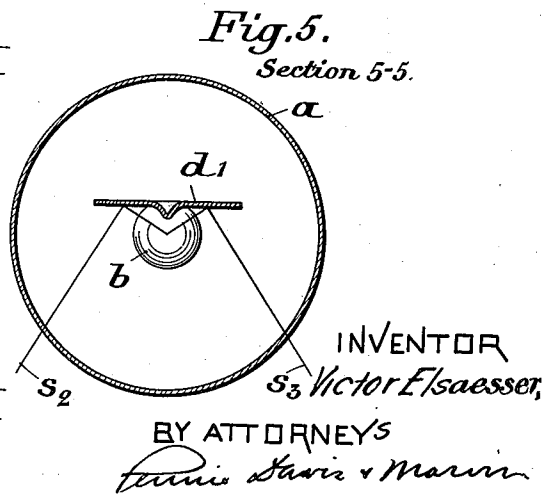


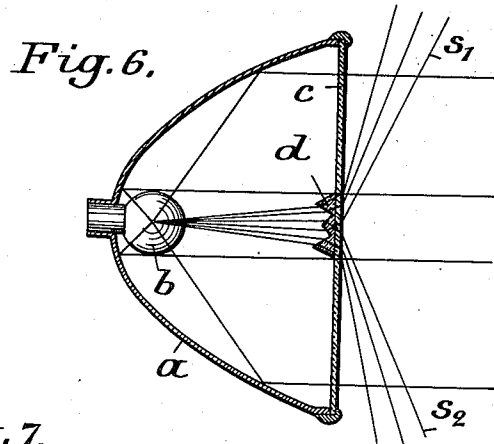
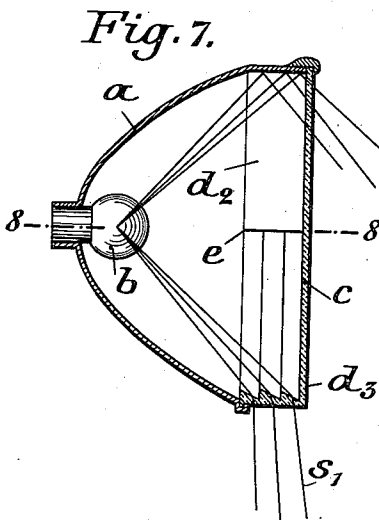
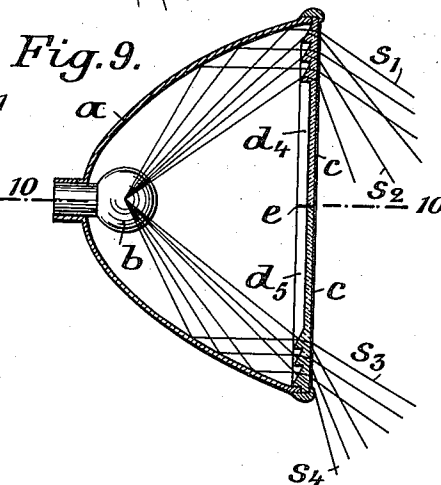
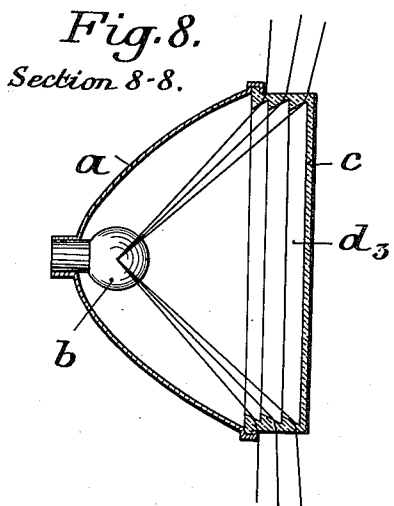
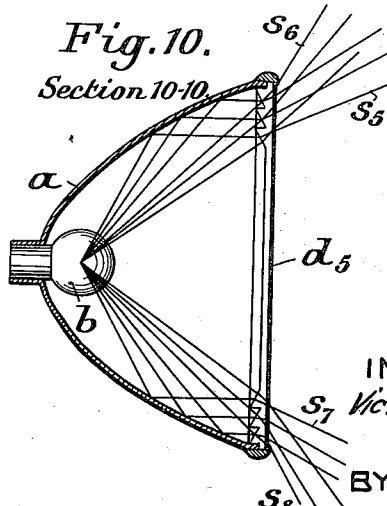
1,168,064.

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 3 SHEETS—SHEET 1.



1,168,064.

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 3 SHEETS—SHEET 2.



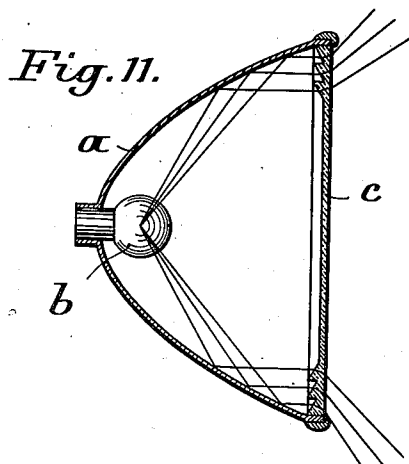
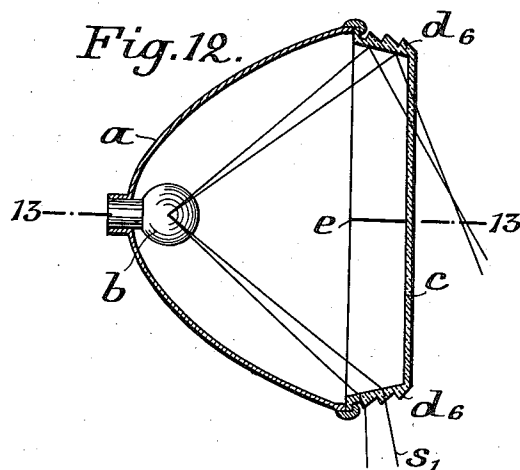
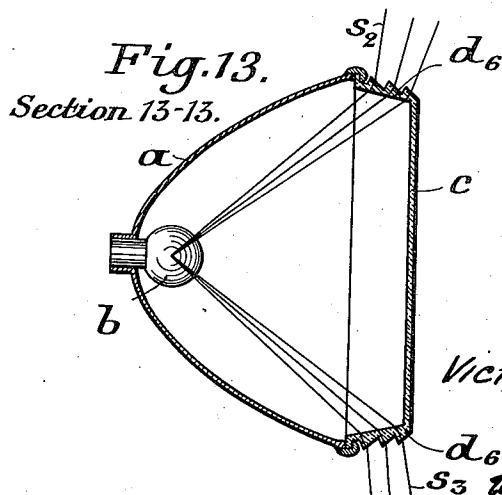
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1,168,064.

V. ELSAESSER.
SEARCH LIGHT.
APPLICATION FILED NOV. 10, 1915.

Patented Jan. 11, 1916.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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SEARCH-LIGHT.

1,168,064.

Specification of Letters Patent.

Patented Jan. 11, 1916.

Application filed November 10, 1915. Serial No. 60,778.

To all whom it may concern:

Be it known that I, VICTOR ELSAESSER, a subject of the German Emperor, residing at and whose post office address is Langerfeld, near Barmen, 32 Hebbekerstrasse, Germany, have invented certain new and useful improvements in Search-Lights; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in search-lights and more especially to search-lights or headlights used on motor cars, and its particular object is to improve the lighting capacity of such search-lights.

In the ordinary search-lights in use on motor cars the reflector arranged behind the source of light merely acts upon part of the light emitted from said source, the rays forming this part being converted into a beam of parallel rays. The rest of the light passes out directly without having been influenced by the reflector. The reflected parallel rays, which shall be called hereinafter "zone of light I", being projected far out upon the road form the most valuable part of the whole light emitted. On the other hand those direct rays which leave the search-light near its periphery (these rays being hereinafter called "zone II") are useful only inasmuch as they are directed sidewise and downward. The rays escaping in an upward direction are not only valueless as far as the lighting capacity is concerned, but in misty weather they are also inconvenient to a high degree, the driver's eyes being dazzled by them. Further all those direct rays are without any value as far as the lighting power is concerned, which are projected forward at an angle of such smallness that they leave the beam of parallel reflected rays only at a longer distance, say 15 to 30 feet, in front of the search-light (zone III). These rays on leaving the parallel beam, owing to dispersion, become so faint as to be practically without any value. The light reflected near the edge of the reflector (zone IV) is not very effective either, the rays owing to the lower intensity of the light striking this part of the reflecting surface being rather faint. Zone I being directed merely forward does not suffice for an all-round distribution of light. In motor cars

the best possible distribution of light in a sidewise and downward direction is of the greatest importance in order to light the curves, the road-borders and similar objects. The few direct rays of zone II do not by any means meet the requirements. Therefore it has been proposed to partly or totally deflect the parallel beam of rays of zone I to the side or to the ground by arranging in the glass cover of the search-light a number of prisms adapted to deflect the rays. This method however is not satisfactory, the whole of the parallel reflected rays being absolutely required for lighting the road as far in front of the car as possible. In contradistinction to this method the present invention, while leaving unrefracted or undeflected the cylindrical beam of parallel rays, which pass through a coaxial annular portion of the transparent cover and which form zone I, turns to account the practically worthless light of zones II, III and IV for emitting sufficient quantities of light to the sides and to the ground.

The search-lights according to this invention are provided with means for deflecting sidewise and downward all those rays which are not projected in the direction of the search-light axis in form of a cylindrical beam of parallel reflected rays of high illuminating power. To this end dispersing lenses, prisms or mirrors are disposed on the search-light in such a way that the zones II, III, IV are deflected sidewise or downward either singly or all together. The said deflecting devices may be arranged near the axis or near the periphery of the search-light.

In the drawings accompanying this specification and forming part thereof Figure 1 is the longitudinal vertical section of an ordinary search-light showing the different zones of light emitted by the source of light in coöperation with the reflector. Figs. 2 and 3 are vertical and horizontal sections, respectively, of a search-light showing the use of a prism secured at the center of the transparent cover for deflecting the centermost unreflected rays emitted by the light; Fig. 4 is a vertical section of a search-light showing the use of a reflecting mirror in place of the prism used in Figs. 2 and 3; Fig. 5 is a transverse vertical section taken on the line 5—5 of Fig. 4; Fig. 6 is a horizontal section of a search-light showing a

modified form of the prism used in Figs. 2 and 3; Fig. 7 is a vertical section of a search-light illustrating the peripherally-disposed means hereinafter described for deflecting the rays of zone II; Fig. 8 is a horizontal section taken on the line 8—8 of Fig. 7; Fig. 9 is a vertical section of a search-light illustrating a different form of peripherally-disposed means for deflecting the rays of zone II and IV. Fig. 10 is a horizontal section taken on the line 10—10 of Fig. 9; Fig. 11 is a vertical section of a search-light showing another modification of the peripherally-disposed deflecting means of Figs. 9 and 10; Fig. 12 is a vertical section of a search-light illustrating a further modification of the peripherally-disposed deflecting means; Fig. 13 is a horizontal section taken on the line 13—13 of Fig. 12; and Fig. 14 is a vertical section of a search-light showing the combination of the deflecting devices of Fig. 7 and the deflecting prism of Fig. 2.

Throughout the drawings, *a* is the reflecting mirror, *b* the source of light, *c* the glass cover.

In the modification shown in a vertical section and in plan in Figs. 2 and 3 and in Fig. 14 a dispersing lens *d* is fixed on the cover *c*, this lens presenting to the rays a spherical concave curvature. The lens is arranged on the glass cover in such a manner that the greater part of the concavity is located below the axis of the search-light. In consequence thereof the direct rays of the source of light falling on the lens are partly refracted downward (s_1). Some rays however are deflected sidewise, as shown in Fig. 3 (s_2, s_3).

In the modification shown in Figs. 4 and 5 in longitudinal and cross section respectively, a small mirror *d'* is placed in front and slightly above the source of light *b*. The mirror may be fixed to the lamp holder, as shown. Part of the rays (s_1) are reflected downward by the mirror. As shown in the figures, the mirror is so shaped and located that practically none of the parallel reflected rays belonging to zone I are deflected, the mirror presenting to these rays a sharp edge and its surface being directed parallel to the beam of rays and outside the cone having its basis confined by the boundary line of zone I on the reflector. The rays emitted by the source of light and reflected by the reflector to form zone I do not, therefore, strike the mirror. This latter may present a small inflexion, as shown in the drawing, which is however, confined within zone III. The sectional view represented in Fig. 5 clearly shows that the mirror is well adapted to spread the light out sidewise (rays s_2, s_3), this capacity being still increased if a slightly convex mirror is employed.

The central zone of rays may also be

spread sidewise by means of a system of prisms *d* placed on the central part of the glass cover *c*, as shown in Fig. 6 (rays s_1, s_2).

The search-light represented in Figs. 7 and 8 in vertical and horizontal section respectively has a device for deflecting the rays of zone II arranged near its periphery. To the upper part of the free edge of the reflector a semicylindrical arcuate piece of metal *d²* is fixed whose inner surface is covered with metal such as silver. This cylindrical mirror reflects the upwardly projected direct light to the outside and also downward (ray s_1). In order however to provide also for a stronger sidewise-deflection of the oblique side-rays, another semicylindrical piece *d³* carrying prisms is fixed to the lower part of the peripheral edge of the reflector; *e* is the joint formed between *d²* and *d³*. As shown in Figs. 7 and 8, the prisms of *d³* strongly deflect the oblique side-rays of zone II to the sides, this being of great advantage in driving through narrow curves. With this arrangement the oblique bottom-rays, it is true, are slightly refracted in a downward direction, which is not a very desirable effect; anyhow this drawback has to be put up with.

Figs. 9 and 10 are vertical and horizontal sections, respectively, of a search-light having deflecting prisms arranged near the periphery of the glass cover *c*, which is divided in two parts, it being important that the faces of the prisms in the upper and lower halves of the cover be directed in the same general direction. The semicircular prismatic piece *d⁴* deflects the upper direct rays of the source of light as well as the parallel rays of zone IV downward (rays s_1, s_2). On the other hand, the semicircular prismatic piece *d⁵* deflects the direct rays emitted sidewise and downward by the source of light as well as the parallel rays of zone IV to the side and to the ground (Fig. 9, rays s_3 ; Fig. 10, rays $s_3, s_4, s_5, s_6, s_7, s_8$).

Fig. 11 is a vertical section of a search light similar to the one shown in Figs. 9 and 10. However in this modification the glass cover is made in one piece and the prismatic parts form a closed ring. With this modification the rays of zone IV are deflected on the sides as well as below in the correct way. There is however a drawback connected with this modification in so far as the rays in the upper part of zone IV are not deflected downward, but upward. For this reason it may be preferable in some cases to remove the prisms from the upper part of the glass cover and to coat this part of the cover with metal in order to prevent the rays from escaping upward.

Figs. 12 and 13 are vertical and horizontal sections respectively of a search-light provided with a dish-shaped glass cover set on its periphery with oblique prisms *d⁶*. The

glass cover is made in one piece and the upper part of the inner surface of the prismatic part down to the middle line *e* is covered with some light absorbing or reflecting material. In the lower part the rays are deflected outward (s_1, s_2, s_3).

A plurality of deflecting devices may of course be combined in one search-light. Thus the devices shown in Figs. 2 to 6 may be combined with the devices shown in Figs. 7 to 13. This is exemplified in Fig. 14, which shows the central prism *d* of Fig. 2 combined with the peripherally-disposed deflecting devices of Fig. 7.

Having thus described the nature of my invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a headlight, the combination of a source of light, a reflector adapted to reflect part of the rays emitted thereby in a direction substantially parallel with the axis of the reflector to form a zone of the parallel rays of greatest luminous intensity, a transparent cover having a coaxial annular portion through which said parallel rays are permitted to pass unrefracted, means peripherally disposed with respect to the cover for deflecting downwardly and to the side at least a portion of the rays which are not included in the above-mentioned zone, and means interposed in the path of the centermost unreflected rays issuing directly from the light to deflect the same downwardly.

2. In a headlight, the combination of a source of light, a reflector adapted to reflect part of the rays emitted thereby in a direction substantially parallel with the axis of the reflector to form a zone of the parallel rays of greatest luminous intensity, a transparent cover, and a prism secured at the center of said cover to deflect downwardly and laterally only, the centermost unreflected rays issuing directly from the light.

3. In a headlight, the combination of a source of light, a reflector adapted to reflect part of the rays emitted thereby in a direction substantially parallel with the axis of the reflector to form a zone of the parallel rays of greatest luminous intensity, a trans-

parent cover through which said parallel rays are permitted to pass unrefracted, said cover being dish-shaped with a horizontally-directed rim portion, and means including a plurality of circularly-disposed prisms associated with said rim portion to deflect downwardly and laterally only, at least a portion of those rays not included in the above-mentioned zone.

4. In a headlight, the combination with a source of light, a reflector adapted to reflect part of the rays emitted thereby in a direction substantially parallel with the axis of the reflector to form a zone of the parallel rays of greatest luminous intensity, a transparent cover through which such parallel rays are permitted to pass unrefracted, a plurality of circularly-disposed prisms inserted between the lower half of said reflector and said cover, and an arcuate reflecting member inserted between the upper part of said reflector and said cover, said prisms and reflecting member being adapted to deflect downwardly and laterally only, at least a portion of the rays not included in the above-mentioned zone.

5. In a headlight, the combination with a source of light, a reflector adapted to reflect part of the rays emitted thereby in a direction substantially parallel with the axis of the reflector to form a zone of the parallel rays of greatest luminous intensity, a transparent cover through which such parallel rays are permitted to pass unrefracted, said cover being dish-shaped with a horizontally-directed rim portion, a plurality of circularly-disposed prisms associated with the outer surface of said rim portion, and a reflecting coating on the inner surface of the upper half of said rim portion, said prisms and reflecting coating being adapted to deflect downwardly and laterally only, at least a portion of the rays not included in the above-mentioned zone.

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

VICTOR ELSAESSER. [L. S.]

Witnesses:

HELEN NUFER,
ALBERT NUFER.