

E. E. PECK.
AUTOMOBILE HEADLIGHT,
APPLICATION FILED APR. 20, 1921

1,410,077.

Patented Mar. 21, 1922.

Fig. 1.

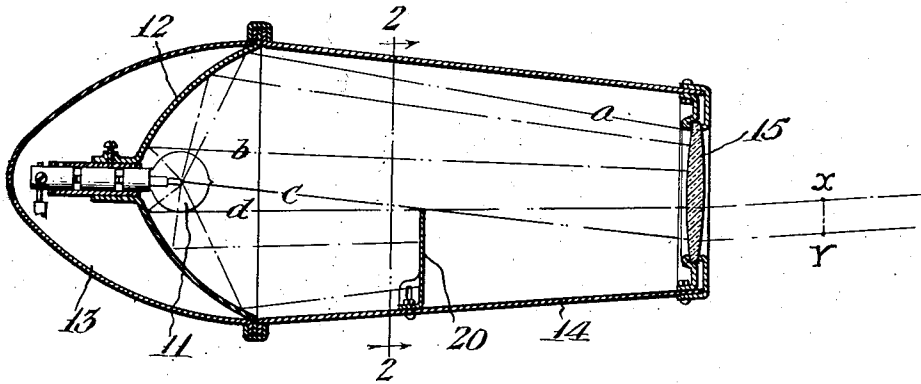
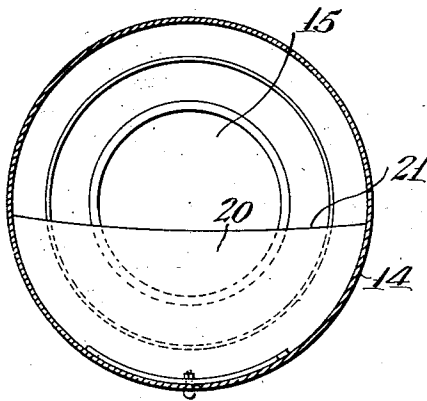


Fig. 2.



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EDWARD E. PECK, OF LOS ANGELES, CALIFORNIA.

AUTOMOBILE HEADLIGHT.

1,410,077.

Specification of Letters Patent. Patented Mar. 21, 1922.

Application filed April 20, 1921. Serial No. 462,973.

To all whom it may concern:

Be it known that I, EDWARD E. PECK, a citizen of the United States, residing at Los Angeles, county of Los Angeles, and State of California, have invented a new and useful Improvement in Automobile Headlights, of which the following is a specification.

For the purpose of allowing the operation of vehicles at night, it is common practice to supply headlights which illuminate the road in front of the automobile. Such headlights are now commonly operated by electric power and it is possible by the use of suitable reflectors or other concentrating devices to provide a very intense illumination. Various attempts have been made to control this illumination so that it will be thrown exclusively on the surface of the street as in the ordinary forms of headlight the illumination above a horizontal plane which passes through the center of the headlight is quite considerable. This illumination above the horizontal plane is practically valueless to the driver of the vehicle and it is a source of great danger as it tends to blind the drivers of vehicles approaching in the opposite direction.

Legislation has been passed in many States in the attempt to eliminate the glaring headlight nuisance and various devices are now in use which are designed to overcome this difficulty.

It is an object of my invention to provide a headlight in which the illumination above a horizontal plane is substantially eliminated.

Further objects and advantages will be made evident hereinafter.

Referring to the drawing which is for illustrative purposes only,

Fig. 1 is a cross section through a headlight embodying my invention.

Fig. 2 is a section on an enlarged scale on a plane represented by the line 2—2 of Fig. 1.

In the form of the invention shown, 11 is a luminous source, such for example as an incandescent light with a very small filament. 12 is a reflector which may be an ellipsoid or a paraboloid, 13 is a lamp casing, 14 is a barrel and 15 is a lens mounted

in the barrel. Between the luminous source 11 and the lens 15 is a light interceptor 20. This interceptor may have a curved edge as shown at 21 in Fig. 2. The lens 15 is smaller in diameter than the reflector 12. The luminous source 11 is so placed and the reflector 12 is so formed that the light striking on the surface of the reflector is thrown in a converging beam on the inner surface of the lens 15, the direction of typical rays being indicated by the lines *a— α* and *b— β* . This may be accomplished by making the section of reflector an ellipse with the luminous source at its focus or a parabola with the luminous source in front of the focus.

In the ordinary types of automobile headlights a parabolic reflector is used to produce an approximately parallel beam. With the high candle power incandescent lamps now available, this beam is very intense. The standard type of automobile headlight has a reflector whose surface is symmetrical about the light axis of the headlight and the beam projected is also symmetrical about that axis. As a result as much light is thrown above this axis as below and various inventors have provided interceptors or diffusers to cut down the glare above this axis. In practice I prefer to so shape the reflector 12 and the lens 15 that the beam of light from the lens 15 is focused at a point some distance in front of the headlight, the light thereafter spreading to light up the roadway. The degree of such spreading may be varied by different forms of lens 15.

The interceptor 20 cuts off the upper portion of the projected beam beyond this forward focal point. The lens 15 of course also has a second focal point and is so located that this focal point is between the lamp 11 and the lens 15. I have found, by placing the interceptor 20 at this point, that the lower edge of the shadow produced by the interceptor may be made very sharp. The reason for this can be understood if we consider that in any commercial headlight, in which an incandescent lamp and a sheet metal reflector are used, the light rays do not follow any exact system. The lamp does not constitute a point source and the

reflector, due to the requirements of cheap manufacture is not of the exact theoretical shape. There follows a dispersion or jumbling of the rays. Also we have not only the reflected rays shown at *a*, *b* and *d*, which in the construction shown converge, but we also have the direct rays *c* which are divergent. Now, if we place an interceptor in the lens 15 or directly in front or behind the lens, the shadow of this interceptor will have a very indistinct edge. There will, in fact, be as many shadows as there are systems of rays and the projected shadow for the reflected rays may be widely displaced from the shadow for the direct rays. Now absolute sharpness at the composite shadow's edge requires that all the projected shadows shall coincide at each and every distance in front of the headlight. This condition cannot be obtained with commercial lamps and reflectors due to the lack of a point source, errors of focus, and imperfections of manufacture, and it certainly cannot be obtained where both divergent direct light and convergent reflected light is concerned as in the construction shown. This absolute sharpness can be approximated closely, however, if the interceptor 20 is placed in the focal plane of the lens 15. If so placed, any rays which cross each other at the edge of the interceptor 20 will be parallel to each other after they leave the lens 15. In other words, the edge of the direct light shadow will be at *y* and the edge of the reflected light shadow will be at *x* and these two shadows will register within the distance *x-y* of each other at any distance in front of the headlight, if, for example, the lens 15 is three inches in diameter the distance *x-y* will be about 1½ inches, with the proportions shown, which means that at any distance such, for example, as fifty feet in front of the headlight the eye will pass from a position receiving all the light into a position of full shadow by a vertical movement of 1½ inches.

The result is a sharpness of shadow's edge which allows the headlight to be tipped so that the rays *x* and *y* are directed slightly downwardly as they leave the headlight with the assurance that practically no light will be thrown above the horizontal plane.

I am also able by placing the interceptor 20 in the focal plane of the lens 15 to cut the interceptor considerably below the optical axis of the headlight and still preserve the sharpness of shadow desired. This allows me to use a greater proportion of the total light with a consequent gain in efficiency.

The interceptor 20 is shown as located in the focal plane and entirely below the axis of the lens inside the lamp casing. In practice the interceptor thus prevents practically or substantially the lower half of the circle of light projected from the reflector from

reaching the upper half of the lens, and by locating the interceptor at substantially the inner focus of the lens the line of division between light and shadow is sharply defined and no glare above this line is produced.

The above advantages are not based on mere theory as I have fully and conclusively demonstrated by actual experiment that the edge of the projected shadow is very sharp with the interceptor 20 in or near the focal plane of the lens and that this sharpness is destroyed if it is moved for any considerable distance out of this plane.

I claim as my invention:

1. In a lamp of the character disclosed, the combination including a source of light, a lens having its rearward focal plane within the lamp, a reflector having one focus within the lamp and the other exterior of the lamp in front of the lens and directing the reflected light toward the lens in non-intersecting planes and a light interceptor substantially at the rear focal plane of the lens and below the axis of the lamp and intercepting substantially the lower half of the light beam.

2. In a lamp of the character disclosed, the combination including a source of light, a reflector directing a cone of light forwardly, a lens positioned to truncate said light cone and having its rearward focal plane forwardly of the light source, and a light interceptor substantially at said rearward focal plane and constructed to intercept the beam transversely below the axis of the lens preventing a portion of the light reaching the lens.

3. In a lamp of the character disclosed, the combination including a lamp housing, a source of light in the rear portion of the housing, a reflector behind the light source directing the cone of light forwardly, a lens axially aligned with the light source and positioned at the forward end of the housing to truncate the light cone, said lens having its rearward focal plane forwardly of the light source, and a light interceptor substantially at said rear focal plane and below the axis of the lamp, said interceptor extending to the wall of the housing to form an impenetrable baffle.

4. In a lamp of the character disclosed, the combination including a lens having a rear focal plane, a source of light rearwardly of said focal plane, a reflector behind said light source reflecting light rays directly to the lens in non-intersecting planes, and a light interceptor substantially at said focal plane and below the axis of the lens and covering substantially the lower half of the reflector.

5. In a lamp of the character disclosed the combination including a bi-convex lens, a light source rearwardly of the rear focal plane of the lens, and a reflector behind the

light source, all axially alined, and a light
interceptor substantially at the rear focal
plane and below the axis of the lens, the re-
flector functioning to reflect light rays di-
5 rectly to the lens in non-intersecting planes,
the lens functioning to converge both the
direct and reflected light rays beyond the

lens and the interceptor functioning to pre-
vent the rays from the lower half of the re-
flector from reaching the lens.

10 In testimony whereof, I have hereunto set
my hand at Los Angeles, California, this
14th day of April, 1921.

EDWARD E. PECK.