J. H. OLD.

LENS.

APPLICATION FILED DEC 31, 1920.

1,430,580. Patented Oct. 3, 1922.

Fig. 1.

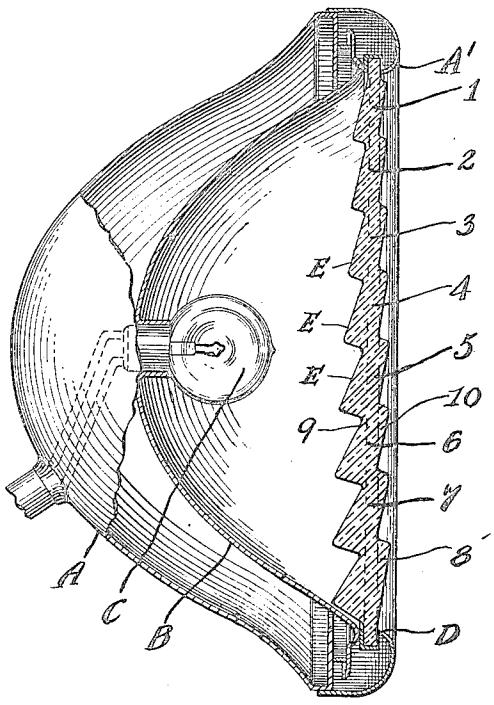


Fig. 3.

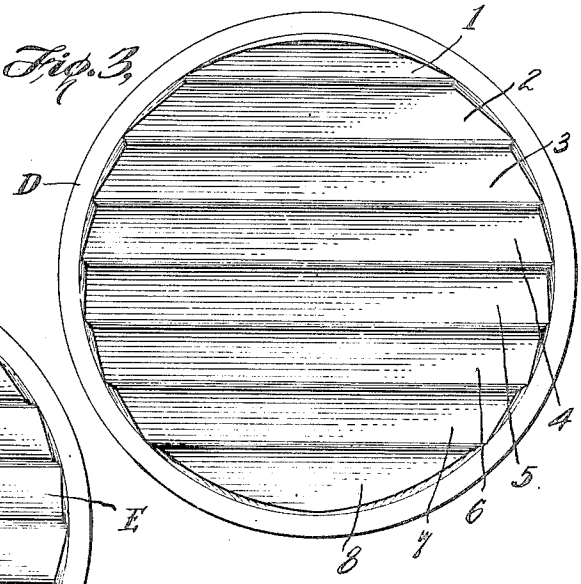
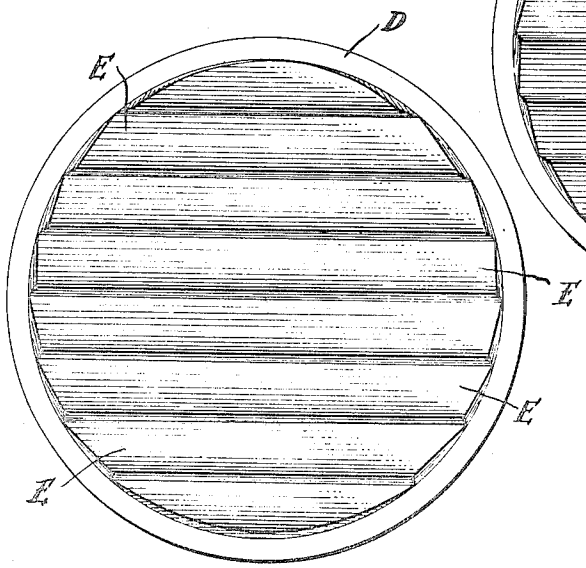


Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES HARLAN OLD, OF BOSTON, MASSACHUSETTS.

LENS.

Application filed December 31, 1920. Serial No. 434,204.

To all whom it may concern:

Be it known that I, JAMES HARLAN OLD, a citizen of the United States, and resident of the city of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Lenses, of which the following is a specification.

My invention relates to lenses.

The object of my invention is to provide a lens that can be easily molded from glass or other suitable transparent material and that can be used to direct light rays in substantially parallel lines.

My object is to provide a lens in the present case that is particularly adapted for use for automobile head lights and that can be used in connection with a parabolic reflector in such a manner as to direct light rays generated in a lamp placed at the focal point of the reflector, in parallel lines to illuminate the roadway.

A further object is to provide a lens that will not diffuse the light and therefore permit practically all the light to be directed to the exact place required on the road so that no glare will be produced to annoy persons coming toward the light.

Referring to the drawings forming a part of this specification,

Fig. 1 is a side view of an automobile head light shown partly in section and disclosing a parabolic reflector and a lamp and a lens shown in cross section which embodies my invention;

Fig. 2 is an elevational view of the side of the lens adjacent the lamp and

Fig. 3 is a front elevation of the lens.

A indicates the casing of the lantern which is spun or pressed into shape and is usually made of sheet metal, and A′ is the usual ring used in lanterns of this character to hold the lens and is secured to the casing in the usual manner. B indicates a parabolic reflector of the usual construction held in the casing A, and C is an electric lamp. D indicates my improved lens which in the present case is illustrated as having eight different sections respectively numbered 1 to 8 in Fig. 1. I have found by experiments that this number of sections is well suited to give good practical results in a lantern of average size, namely about twelve inches in diameter.

The lens is constructed to provide sections having their surfaces inclined to the vertical axis of the lens on both sides thereof as shown in the drawings, and at different angles relative to each other, but if desired, a lens could be made in which all the sections would be alike and still give good results, however, I prefer to form the sections as shown for use with head lights The sections extend horizontally and are arranged in superimposed relation.

It will be observed that there are no vertical surfaces formed in this lens, all surfaces being formed at an angle to the vertical axial line. The angle at which the faces of the lens is inclined on the inner side I call standard angles as these angles which decrease proportionally in pitch from the bottom one upwardly can be used in connection with any parabolic curved reflector with the light in or out of focus and still refract the light rays to the same given place when used with the correcting angles formed on the outer surface as hereinafter set forth.

The lens is constructed on the basis of taking any given vertical distance or diameter and subdividing it into eight equal spaces which constitute eight horizontal angles or sections on the inside and eight on the outside surface. The angles of the faces on the outside or exposed side of the lens vary in degree of pitch, the lower one 8 being a specific degree of pitch together with the four adjoining ones 7—6—5 and 4 while the remaining three 3—2 and 1 are alike but of a different pitch. These outside angles I call the correcting angles as by changing proportionately the degree of pitch of these angles I can control the light rays that are refracted from the standard angles E—E—E, etc., formed on the inside surface of the lens thereby raising or lowering the light rays so that they will illuminate the roadway at a predetermined distance ahead of the automobile according to the height of the lens above the roadway relative to the horizontal line taken from the focus or axis of the light.

The outside angles 1 to 8 inclusive are all of comparatively small degree so that the lens as a whole functions as parallel plates of glass, permitting a ray incident thereon to emerge substantially parallel to itself.

The lens constructed as herein described can, in fact, be considered as comprised of a plurality of pairs of triangular prisms with their angles as described and disposed in inverted relation to each other, one set

of triangular prisms having their bases in an imaginary vertical plane 9 passing through the lens and the other set having their bases in an imaginary plane 10 parallel to plane 9, the planes 9 and 10 intercepting or bounding between themselves a substantial and uniform thickness of the lens body.

A parabolic surface if perfectly formed would reflect the rays from a light source placed at its focus in parallel lines but I have found that the surface of the reflectors used with head-lights are not perfect mechanically and that they contain minute depressions and projections, which cause the light rays to be deviated from being reflected in perfect parallel lines also when the rays from a light source is not placed at its focus.

The operation of my lens will now be clear. It is seen from the foregoing description that my lens comprises a plurality of pairs of triangular prisms arranged in inverted relation to each other in substantially the same manner as is employed in the synthesis of light.

The angles of the prisms are such that the optical functioning of each pair is substantially the same as that of parallel plates of glass. As a result, the lens comprised of these pairs of triangular prisms, act to refract rays parallel to the axis of the parabolic mirror so as to cause the emergent rays to be parallel but slightly bent down toward the roadway to strike a place in the roadway a desired number of feet in front of the automobile, depending upon the degree of angularity of the corrected angles as described above.

In addition, I have found that chromatic effects, due to the non-homogeneity of the lamp, are substantially eliminated by my lens, the triangular prisms serving apparently to symphasize the various wavelets of the non-homogeneous line into a homogeneous beam.

It will be observed that if this lens was divided vertically on an axial line spaced half way between the two dotted lines, there would be presented prisms, the basis of which are relatively oppositely disposed.

It will also be observed that the inclined surface of the outer and inner projections are inclined in the same direction, relative to the vertical axis of the body portion and by reason of this formation the rays of light received from the reflector are perfectly controlled and projected in parallel lines as herein before set forth.

I have avoided technical description as far as possible and rely upon the drawings which are drawn to scale to reveal the construction and believe that a person skilled in this art will have no difficulty in making and using this lens in the light of these specifications.

Having thus described my invention, I claim as new:

1. A lens comprising a plate having transversely extending offset portions on each side thereof, the surfaces of which are inclined in the same direction relative to the vertical axis of the plate, the top of the outer portions extending above the lower adjacent end of the inner portions respectively, said offset portions being separated from each other by a substantially equal thickness of the material of the plate.

2. A lens comprising a plate having transversely extending offset portions on each side thereof, the surfaces of which are inclined in the same direction relative to the vertical axis of the plate, the offset portions on one side of the plate gradually increasing in thickness from the top of the lens downward and the offset portion on the opposite side gradually decreasing in thickness from the top of the lens downward and said offset portions being separated from each other by a substantially equal thickness of the material of the plate.

3. A lens comprising a transparent plate having the faces thereof shaped to provide a plurality of horizontal pairs of triangular prisms in inverted relation to each other, the angle of said prisms varying in degree but being all substantially small.

Signed at New York city, in the county of New York and State of New York this 28th day of December, A. D. 1920.

JAMES HARLAN OLD.

Witness:
FRANK M. ASHLEY.