L. BELL.

HEADLIGHT.

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1,208,456. Patented Dec. 12, 1916.

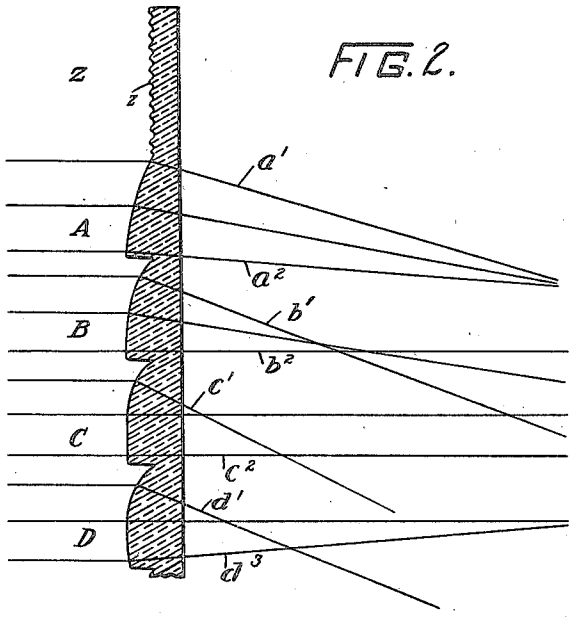



FIG. 2.

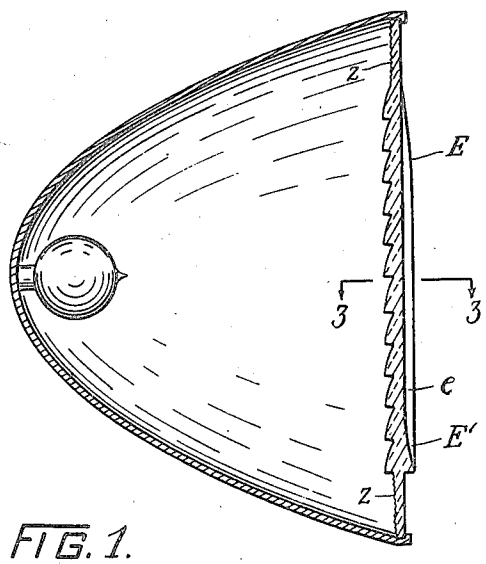



FIG. 1.

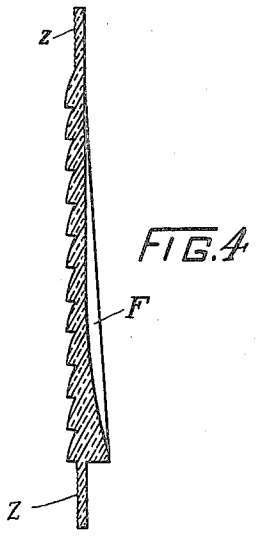



FIG. 4.

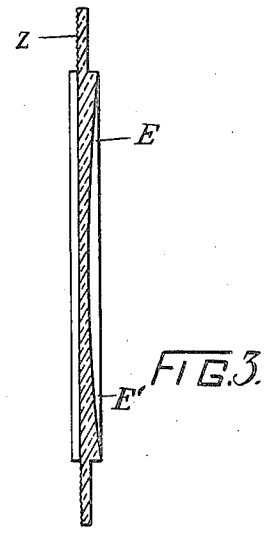



FIG. 3.

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# UNITED STATES PATENT OFFICE.

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## HEADLIGHT.

1,208,456. Specification of Letters Patent. Patented Dec. 12, 1916.

Application filed January 20, 1916. Serial No. 73,238.

*To all whom it may concern:*

Be it known that I, LOUIS BELL, a citizen of the United States, residing at West Newton, Massachusetts, have invented certain new and useful Improvements in Headlights, of which the following is a specification.

The subject matter of my present invention has to do with the optical management of the light from a source carried by a motor vehicle for the illumination for its path of travel.

As is well known, it is an increasingly common requirement for suitable headlights for motor vehicles, that they should be so arranged as not to throw a serious and confusing glare at an angle above the horizontal, while at the same time they should be arranged to spread the light thrown by them with some degree of uniformity, over the road in front.

The purpose of my present invention is to furnish for headlights provided with reflectors adapted to furnish a parallel or nearly parallel beam, a refracting screen, capable of turning the major part of the rays delivered from the reflector, below the horizontal, so as not to produce a glare above it, and distribute them both laterally and downwardly so as to provide any desired degree of uniformity in the illumination delivered to the roadway.

I am aware that both for headlights and for the deflection of light from other sources, prismatic glass has been used to deflect the incident rays in some specified direction. As applied to headlights for motor vehicles, the provision of a simple prismatic glass front in connection with the usual reflector, is in practice, the substantial equivalent of turning down the axis of the reflector through a certain small angle. If the prisms are made partly of one angle and partly of another, the tendency is to throw bars of light corresponding to these separate prismatic elements, on the roadway, and hence it is difficult to produce or preserve uniformity of illumination.

In my improved form of headlight lens, I provide a group of horizontally disposed prismatic elements of which the faces of incidence are not bounded by plane surfaces, but in part at least, by curves so disposed that each of such prismatic elements deflects the rays falling upon it through a vertical angular range, predetermined by the form of the curved part of the prism. In addition to this, I provide preferably, additional prismatic elements of vertical axis disposed on the exterior surface of the headlight lens, so as to disperse laterally, or both laterally and downwardly, the rays which emerge from the prismatic elements just described.

In order to illustrate my invention, I have shown in the accompanying drawings, embodiments which well illustrate the parts thereof, and are in themselves practical forms well adapted to the ends above enumerated.

Throughout specifications and drawings, like reference characters are employed to indicate the corresponding parts in the drawing.

Figure 1, is a central vertical section through a lamp equipped with a screen in accordance with my invention. Fig. 2, is an enlarged detail of a section of a portion of such a screen. Fig. 3, is a transverse central section of the screen shown in Fig. 1. Fig. 4, is a central vertical section.

In the forms shown in the accompanying drawings, I have provided a screen which preferably has a peripheral or marginal diffusing surface "Z" surrounding the prismatic portion, formed by concentric grooves "*z*" of very short radius to scatter a certain amount of light in the immediate vicinity of the headlight, for the purpose of seeing conveniently immediately in front of the vehicle. The area "Z" which I have termed generally a diffusing surface, may be formed in various manners and variously located. For example, it may be given its diverging effect by the rounded grooves or ribs shown, or it may be generally roughened to scatter the transmitted rays. The rounded grooving has the advantage of higher transmitting power, and of being more readily kept clean. As to form and location, the surrounding peripheral zone is found satisfactory in practice, but the diffusing area may be differently placed and variously shaped. The prismatic elements extending horizontally across the inner face of the lens front, may all show the same vertical section, or the inner faces of the prisms may be varied in accordance with the requirements of the desired distribution.

In Fig. 2, three forms of the prismatic

elements are shown. The prismatic element A shows a curve, sharpest at its upper part. The rays $a'$ striking in the upper portion are the most deflected, and the deflection decreases steadily downward until at the lower portion, the rays $a^2$ proceed through practically horizontally. The prism B in Fig. 2, shows a prismatic element of slightly different section, deflecting the rays $b'$ in its upper portion, more than in the rays of prism A, and changing more precipitously to a horizontal distribution at $b^2$. The prism C shows a still greater deflection of the upper rays $c'$ and the sudden passage to the nearly horizontal path of the rays $c^2$ through the prism. The fourth prism D shows a varying distribution from a sharp downward deflection from horizontal, as at $d'$ in the upper part of the prism, to, at the extreme lower part as at $d^3$, a slight upward prismatic deflection, raising the lower rays slightly above the normal direction which may be desirable when the rays issuing from the reflector are slightly divergent instead of being nearly or quite parallel. It is obvious that a wide variety of curved sections may be given to these prisms without departing from the spirit of my invention, the intention of each of them, being to pick up the nearly parallel rays received from the reflector and to spread them on the roadway, not in single bars of light corresponding to an element of prismatic deflection, but over a reasonable area within the required limits, so that the overlapping of these areas produces increased uniformity of illumination of the roadway.

The outside face of my headlight lens is preferably prismatic or lenticular so as to deflect the emerging rays laterally or vertically, or both. This may take the form of a weak concave cylindrical lens with vertical axis, or the substantially equivalent prisms, or of two narrow lateral prisms. In Fig. "3," I have shown a form which I have found well adapted to the purpose, consisting of a cylindrically concave element "E" (see Fig. 3) extending throughout the upper part of the headlight lens and merging at "E" (see Fig. 1) into a concave spherical element "E'" at the bottom, which tends to deflect downward, some of the rays from the lower part of the reflector, to an extent to which it might not be convenient to attain by the interior prisms alone.

As a still further modification, as indicated in Fig. 4, the form of the front concavity is modified as in the longitudinal section of a parabolic cone "F." This produces increasing deflection of the emerging rays both laterally and downward, in the lower portion of the screen. Obviously this concavity may be varied to other forms as for example, that of other conic sections or even to more complicated curves so disposed as to deflect the emerging rays in the required direction, so that the parallel or nearly parallel rays received from the reflector, can be distributed according to the predetermined requirements without the interference from shadows, which is often found in attempting thus to redirect the rays from the reflector.

Obviously, the horizontal distributing prisms may be placed on the outside of the screen, and the concavity inside, at the risk of somewhat more difficult cleaning. In such case, the faces of incidence herein referred to, become faces of emergence without in any manner changing the function of my construction, since when the refracting screw is reversed, incident rays become emergent, and vice versa.

The above suggested modifications are indicative of the considerable variety of variant forms, all of which may be resorted to within the spirit of my invention if consistent with a proper construction of the terms of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In a headlight screen the combination of transverse prisms having curved surfaces of incidence with an exterior refracting surface so disposed as to deflect the emergent light laterally downwardly and outwardly.

2. In a headlight screen, the combination of a plurality of transverse prismatic elements on one face of the screen, and a refracting surface so disposed as to deflect the emergent light laterally outwardly and downwardly upon the other side of the screen, and a peripheral zone of diffusing surface.

3. In a headlight screen, the combination of a plurality of horizontal prisms upon one side thereof, with a refracting surface upon the other side thereof, so disposed as to deflect laterally outwardly and downwardly, the light rays which pass through it.

4. In a headlight screen, the combination of a plurality of horizontal prisms upon one side thereof, with a refracting surface upon the other side thereof, so disposed as to deflect laterally outwardly and downwardly, the emergent light, and an auxiliary area of diffusing surface.

5. In a headlight, a substantially parabolic reflector, and a screen carried at substantially right angles to the roadway, having upon its interior a plurality of transverse prismatic elements, each having its face of incidence a curved surface of horizontal axis and having an exterior curved refracting surface of vertical axis so disposed as to deflect emergent light laterally, downwardly, and outwardly.

6. In a headlight, a source of light, a reflector for returning said light in an approximately horizontal beam, a refracting

screen provided with a plurality of transverse prisms, said prisms having curved faces of incidence of horizontal axis and varying curvature for projecting an arbitrary distribution of light over the roadway.

7. In a headlight, a source of light, a reflector for turning said light in an approximately horizontal beam, a refracting screen provided with a plurality of transverse prisms, said prisms having curved faces of incidence of horizontal axis and varying curvatures for projecting an arbitrary distribution of light over the roadway, and an auxiliary area of diffusing surface.

8. In a headlight screen the combination of a plurality of horizontal prisms upon one side thereof with a concave refracting surface upon the other side thereof so disposed as to deflect the emergent light unsymmetrically with reference to a horizontal plane passing through the center of said headlight screen.

9. In a headlight screen the combination of a plurality of horizontal prisms upon one side thereof, each having its face of incidence so formed as to produce both downward and upward deflection of the entering ray, with an outwardly dispersive refracting surface upon the other side thereof.

10. In a headlight screen the combination of an element of variant curvature of its face of incidence on one side thereof, with a concave surface of variant curvature in its refracting face upon the other side thereof.

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

LOUIS BELL.

Witnesses:
MARY WOTHERSPOON,
VICTORIA LOWDEN.