Jan. 26, 1937. S. L. LEBBY 2,068,805

COVER GLASS

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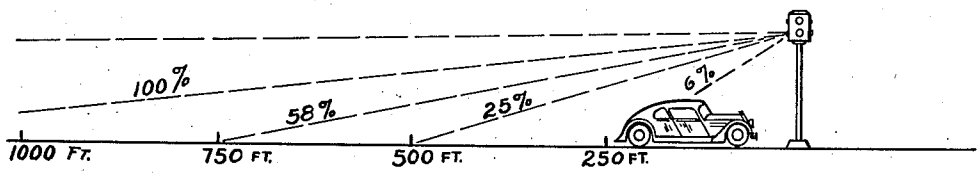


Fig. 1

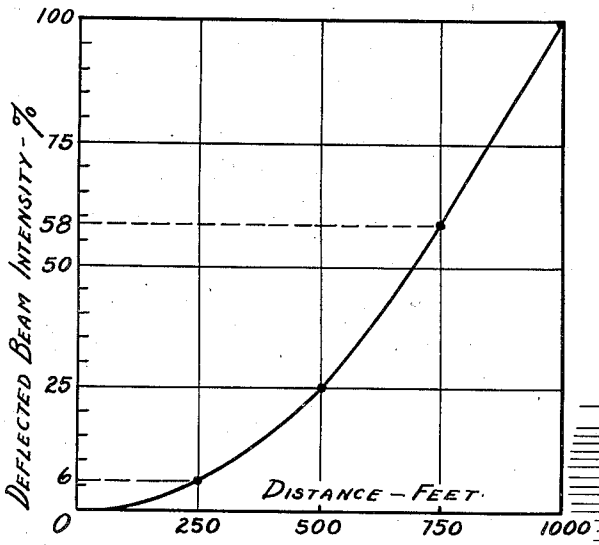
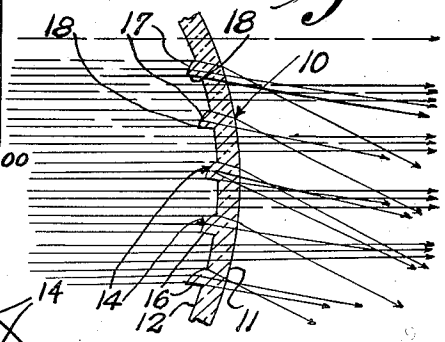


Fig. 2

Fig. 10.



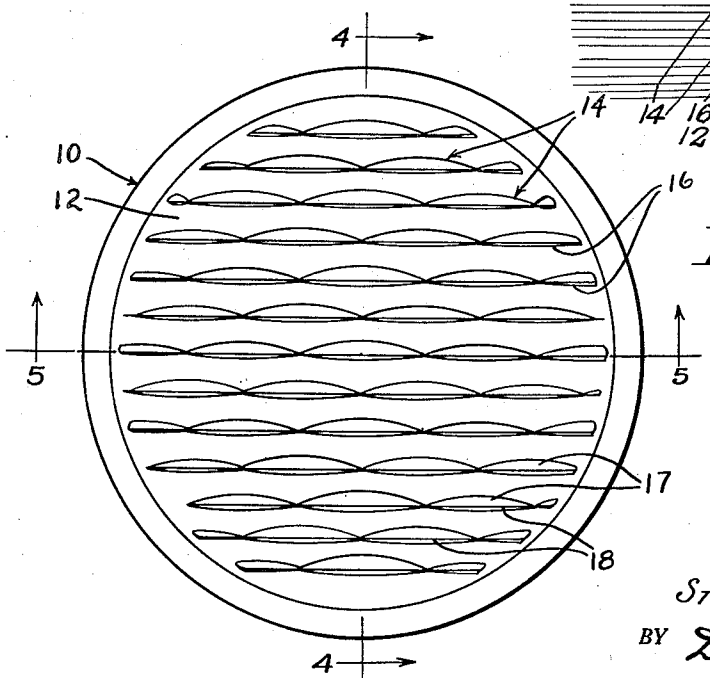


Fig. 3

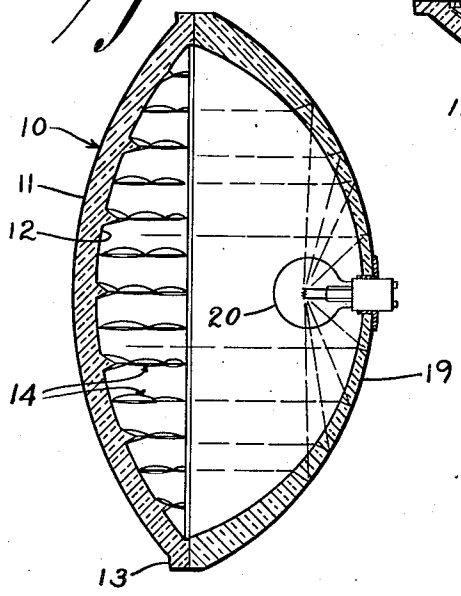
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Fig. 4



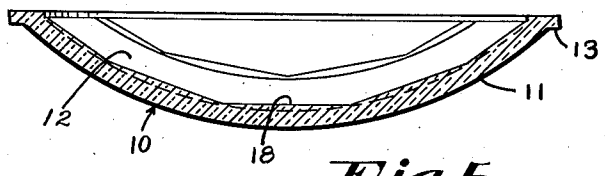
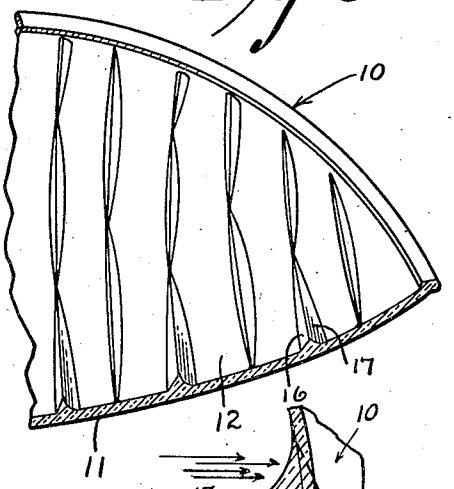


Fig. 5

Fig. 6



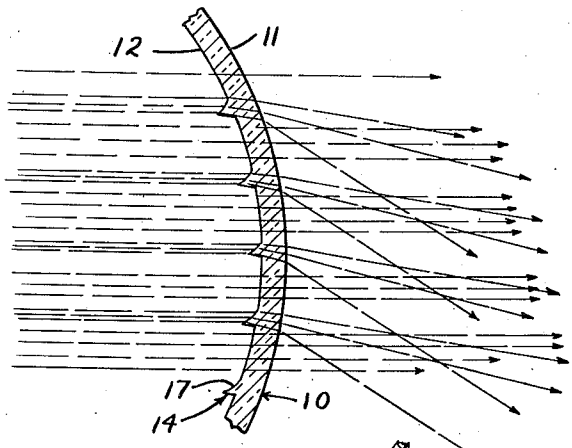


Fig. 7

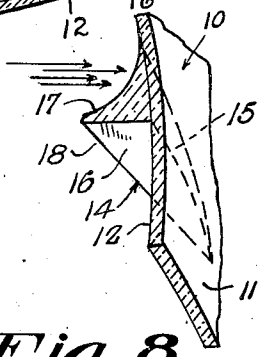


Fig. 8

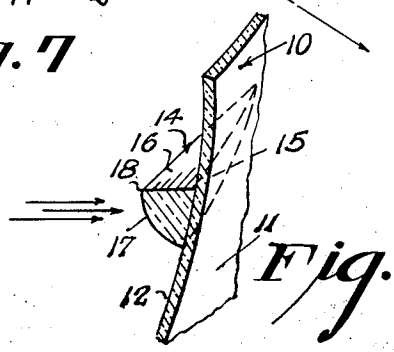


Fig. 9

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UNITED STATES PATENT OFFICE

2,068,805

COVER GLASS

States Lee Lebby, Corning, N. Y., assignor to Corning Glass Works, Corning, N. Y., a corporation of New York

Application February 4, 1935, Serial No. 4,922

4 Claims. (Cl. 177—329)

This invention relates to cover glasses, and more particularly to a cover glass having certain refractive characteristics that render it especially adapted for use in signalling.

In signalling equipment, such as railway and traffic signals, it is customary to utilize cover glasses placed in front of the light projecting system to shield it and also to modify the direction of the beam of light coming therefrom. Inasmuch as there are times when a signal is lighted and therefore intended to serve as an indication, and there are other times when it is unlighted and is not intended to serve as an indication, it is necessary that the signal be such that there will be no uncertainty as to whether it is lighted or not.

In many previous signals it has been noticed that when the rays of the sun or the light from an approaching vehicle enter the signal and fall upon portions of its projecting system, it will appear to be lighted when in fact it is not, so that a person approaching the signal will misconstrue the state of facts of which the condition of the signal is supposed to be an indication, often with disastrous results.

Such false signal indications, which are in reality "reflex" indications and are often referred to as "phantom indications", usually appear as a small spot of light and, inasmuch as the close-up indications of previous signals have generally appeared as a similar spot of light, confusion has often resulted.

It is an object of this invention to produce a new and improved type of signal indication.

Another object is to project a primary beam of substantially parallel light of high intensity and a secondary asymmetric beam of light which in one plane spreads through a relatively wide angle and progressively decreases in intensity as the angle from which it is viewed recedes from the axis of the main beam while in a plane at right angles to the first plane, it is spread symmetrically with relation to and slightly in excess of the main beam with similar diminishing intensity.

A further object is to so intermingle the primary and secondary beams at their source that the cover glass will always present the appearance of a filled aspect when viewed from any position within the primary or secondary beams.

The above and other objects may be accomplished by employing my invention which embodies among its features a concavo-convex transparent plate having distributed over its concave surface a plurality of transparent light deflecting members, each having three sides, one of which is contiguous with the concave face of the plate while the other two sides converge to form a ridge lying along a line which intersects the the concave face of the plate at two spaced points. One of the faces of each member simply serves as a riser while the other or active face is of cylindrical contour as it recedes from the ridge.

Other features embody the symmetrical distribution of the light deflecting members in spaced rows over the concave face of the plate and so proportioning them with relation to the plate that they will intercept only a limited portion of the light projected upon the plate when it is employed as the cover glass of a projecting system.

In the drawings:

Fig. 1 is a diagrammatic view illustrating the paths of the primary and secondary beams produced by my cover glass when it is used in conjunction with a traffic signal;

Fig. 2 is a graph upon which is plotted a curve showing the varying intensity in one type of secondary asymmetric beam which my cover glass is capable of producing;

Fig. 3 is an elevation of the inside of a cover glass embodying my invention;

Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 3 illustrating the cover glass in use with a conventional type of light projector;

Fig. 5 is a horizontal transverse section on the line 5—5 of Fig. 3;

Fig. 6 is an enlarged sectional view of a fragment of my improved cover glass showing the light deflecting members in detail;

Fig. 7 is an enlarged vertical view similar to Fig. 4 of a fragment of my cover glass showing the light distribution therethrough;

Fig. 8 is a detail perspective view, partly in section, of a fragment of a cover glass showing one of the light deflecting members;

Fig. 9 is a view similar to Fig. 8 of a modified form of light deflecting member, and

Fig. 10 is a fragmentary sectional view through a cover glass showing the light distribution therethrough when it is equipped with light deflecting members of the type shown in Fig. 9.

Referring to the drawings in detail, my improved cover glass consists of a transparent plate designated generally 10 having a convex outer face 11, a concave inner face 12 of a curvature equal to that of the outer face, and a circumferential flange 13. The plate is preferably of glass pressed to form with light deflecting members to be more fully hereinafter described formed integral therewith, though of course in some instances the latter may be separately formed and attached to the plate 10 by a suitable transparent cement.

Distributed symmetrically over the inner concave face 12 of the cover glass and so proportioned with relation thereto as to interrupt but a limited amount of parallel light passing therethrough, are light deflecting members designated

generally 14 which, as shown, are preferably arranged in uniformly spaced parallel rows with those in one row staggered with relation to those in the next adjacent row. This arrangement causes the secondary beam to emanate from the signal unit from a plurality of uniformly distributed and spaced portions of the cover glass so that when the latter is viewed from any position within the secondary beam, it will cooperate with the function of the eye of an observer known as "the persistence of vision" so as to produce the appearance of being illuminated over its entire surface and effect what is commonly called a filled aspect.

From the fact that approximately seventy-five or more per cent of the light falling upon the cover glass 10 passes directly through a plurality of uniformly distributed surfaces of equal curvature and is unrefracted, it is evident that the cover glass, when viewed from any position within the main beam, will appear in full aspect.

In order to obtain the desired distribution of light intensity in the secondary beam and to simultaneously secure a symmetrical spread thereof in a plane perpendicular to the plane in which it is deflected, the light deflecting members each have three sides 15, 16, and 17. The side 15 of each light deflecting member is contiguous with the inner face 12 of the cover glass 10 and hence is of spherical contour and produces no refraction at its junction with the concave face 12 while the sides 16 and 17 converge to form a ridge 18 which lies along a line which intersects the concave face 12 of the cover glass at two spaced points. The side 16 of the light deflecting member forms a riser which is preferably so shaped and positioned with relation to the light passing through the cover glass as to produce no refraction nor interference with any refracted ray while the side 17 is of cylindrical contour as it recedes from the ridge and consequently produces an asymmetrically deflected beam which, upon emergence through the convex face 11 of the cover glass, is spread symmetrically to a slight degree in a plane prependicular to the deflection produced by the side 17 of the light deflecting member. Due to the fact that the side 17 is cylindrical in form and that the side 15 is of spherical contour, it becomes evident that the active sides 15 and 17 of the light deflecting members 14 progressively diminish in area as the ends of the deflecting members are approached and as a result the long range portions of the secondary asymmetric beams, i. e., those closest to the axis of the primary beam, will be of greater intensity than those portions further away from the axis of the primary beam so as to produce a light distribution in the secondary beam which follows intensities illustrated by the curve plotted in Fig. 2.

As shown in Fig. 4, I illustrate my cover glass in use with a conventional type of light projector for producing a primary beam of parallel light. In this embodiment the projector consists of a projection mirror 19 in which a suitable light source, such as an electric bulb 20, is mounted. The cover glass 10 is shown mounted in front of the open side of the reflector in such a position that the light deflecting members 14 will interrupt the primary beam at uniformly spaced intervals and deflect a predetermined limited portion of the primary beam into an asymmetric secondary beam which spreads through a relatively wide angle in one direction but possesses but limited spread in a direction at right angles thereto. Obviously other suitable types of projectors for producing a primary beam of substantially parallel light may be employed without in any way departing from the spirit and scope of my invention.

This application is a continuation in part of my forfeited application Serial Number 231,140, filed November 4, 1927, and allowed April 4, 1934.

I claim:

1. The combination with a cover glass having a convex outer face and a concave inner face of a plurality of light deflecting members on the inner face of the cover glass, each light deflecting member comprising a transparent body having three sides, one of which is contiguous with the inner face of the cover glass while the other two sides converge and form a ridge which lies along a line which intersects two spaced points on the concave face of the cover glass, the ridges of the light deflecting members being parallel, one of said converging sides of each light deflecting member being an active face of cylindrical contour as it recedes from the ridge, the active faces of the light deflecting members being on the same sides of the ridges.

2. The combination with a cover glass having a convex outer face and a concave inner face of a plurality of light deflecting members on the inner face of the cover glass, each light deflecting member comprising a transparent body having three sides, one of which is contiguous with the inner face of the cover glass while the other two sides converge to form a ridge which lies along a chord of the curve defining the concave face of the cover glass, the ridges of the light deflecting members being parallel and one of the converging sides of each light deflecting member being an active face and cylindrical, the active faces of the light deflecting members being on the same sides of the ridges.

3. The combination with a cover glass having a convex outer face and a concave inner face of a plurality of light deflecting members on the inner face of the cover glass, each light deflecting member comprising a transparent body having three sides, one of which is contiguous with the inner face of the cover glass while the other two sides converge and form a ridge which lies along a line which intersects two spaced points on the concave face of the cover glass, the ridges of the light deflecting members being parallel, one of said converging sides of each light deflecting member being an active face of concave cylindrical contour as it recedes from the ridge, the active faces of the light deflecting members being on the said sides of the ridges.

4. The combination with a cover glass having a convex outer face and a concave inner face of a plurality of light deflecting members on the inner face of the cover glass, each light deflecting member comprising a transparent body having three sides, one of which is contiguous with the inner face of the cover glass while the other two sides converge to form a ridge which lies along a chord of the curve defining the concave face of the cover glass, the ridges of the light deflecting members being parallel and one of the converging sides of each light deflecting member being of concave cylindrical contour, the active faces of the light deflecting members being on the same sides of the ridges.

STATES LEE LEBBY.