

United States Patent

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[54] PROGRAMMED TRAFFIC SIGNAL AND METHOD OF USING

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[58] Field of Search **340/25, 84, 87, 383, 110**

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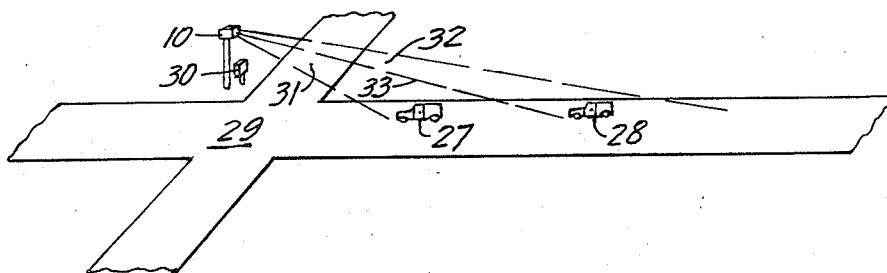
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[57] ABSTRACT

A signal or display device comprising a condensing lens, aperture means having all aperture-defining edges located substantially at the focus of the lens, and a light source for providing diffuse illumination to the lens from the focus and from the entire aperture, contains a moveable filter member for interposing between source and lens and located substantially at said focus.

12 Claims, 10 Drawing Figures



PROGRAMMED TRAFFIC SIGNAL AND METHOD OF USING

This invention relates to highway beacon and other display devices. An important embodiment is in the form of a traffic control light having particular utility as a distance-dependent stop-and-go signal, and the invention will for convenience be described primarily in such context.

The invention makes possible the control of traffic at an intersection in somewhat the following manner. During the period of change from "go" to "stop" indication, normally involving the change from a green to a red signal, the green signal will remain visible to a motorist who is sufficiently close to the intersection to permit him to cross safely before completion of the change. At the same time, a motorist who is at too great a distance to safely pass the intersection will receive a red or "stop" indication on the signal, and will therefore be aware that he must stop on reaching the intersection.

Appeldorn U.S. application Ser. No. 571,639, now U.S. Pat. No. 3,457,400, describes a highway beacon or other display device in which the entire viewing surface appears uniformly illuminated to a viewer located within a prescribed viewing area. The device comprises a condensing lens defining the viewing surface, aperture means with all aperture-defining edges located substantially at the focus of said lens, and lighting means providing diffuse illumination to the lens from the focus and from the entire aperture. The shape and size of the aperture is conformed to correspond with the desired viewing area. Movement of an observer from within to outside of that area provides that observer with a sharp cutoff of the illumination, whereas from all points within the defined area the observer sees the signal as fully and uniformly illuminated.

The present invention adds to the display device of the Appeldorn disclosure the further capability of progressively altering the appearance of the signal within the predetermined field of view. The entire signal area may remain in view and illuminated but the appearance, e.g., the color, of the signal may be changed; or the viewing area may be restricted, or expanded, or otherwise altered in any of a number of ways.

The invention will now be further described in connection with the appended drawing, in which:

FIG. 1 is a front elevation of the display device,

FIG. 2 is an elevation in section approximately as indicated by section 2—2 of FIG. 4,

FIG. 3 is a top plan view in section approximately as indicated by section 3—3 of FIG. 4,

FIG. 4 is a view in perspective of the control device of FIGS. 1-3,

FIG. 5 is a view in elevation of the cam member of FIG. 3,

FIG. 6 is a schematic representation showing a typical installation of a device of this invention in use as a traffic control signal,

FIG. 7 is a view in elevation of one form of aperture means as used in the device of FIG. 6,

FIGS. 8 and 9 are views in front elevation showing alternate forms of image-changing screen elements and associated supporting members, and

FIG. 10 is a schematic representation in perspective showing the relationship between selected components of a modified form of the device.

As shown in FIGS. 1-4, the highway beacon 10 consists of a housing 11 supported on a fixed standard 12 and having at the open forward end a transparent protective panel and a condensing or view lens 13, here illustrated as a Fresnel lens. A transparent curved plate 14 centrally located at the rear of the housing 11 is situated substantially at the focus of the lens 13 and is illuminated from a source 15 supported within an extension 16, of the housing 11, serving as a light box. Diffuse illumination of the lens area from the focus is provided, for example by employing a diffuse reflecting surface within the housing extension 16 or on a separate reflector 38 inserted therewithin, as shown in FIG. 2, and by using a frosted envelope for the source 15; or by providing a frosted or light diffusing surface on the plate 14; or preferably by introducing a separate diffusion plate 37. The requirements of condensing

lens, source of diffuse light, and aperture means are further described and illustrated in application Ser. No. 571,639.

A light-transmitting filter plate 17 is supported on vanes 18, 19 which are pivotally mounted at the sides of the casing 11 on pivots 20, 21. The filter plate is in the form of a narrow elongate segment of a sphere having a slightly shorter radius than that of the plate 14, the width being approximately that of the plate 14 and the length approximately twice the width as indicated in FIGS. 2 and 3 and in FIG. 8. The convex surface of the filter plate 17 and the concave surface of the transparent plate 14 are nearly in contact and both surfaces are substantially at the focus of the lens 13 over the area of the plate 14.

Vane 18 carries an outwardly extended peg 22 passing through a suitable slot in the housing 11 and serving as a cam follower. The peg meshes with a face cam 23 rotatably supported on a constant-speed motor drive unit 24 contained within an extension 35 of the housing 11.

In a typical installation, the filter plate 17 is divided into two equal portions 25 and 26, typically red and green respectively as indicated in FIG. 8. The cam 23 is designed to permit slow uniform progress of the filter plate as it is moved across the plate 14 in the direction from green to red, while causing rapid movement in the reverse direction as the rotation of the cam is continued through a complete cycle.

The action of the signal as just defined will be described with reference to FIG. 6, showing two cars 27 and 28 approaching an intersection 29 protected with a beacon 10 operated by a control station 30. At the position shown in FIG. 6, the control station has just initiated a change in the beacon from the "go" to the "stop" condition. To the driver of car 27 within the area of the lower beam 31, the beacon will continue to exhibit a "go" signal as he approaches and passes the intersection at a normal rate of speed. At the same time, the driver of car 28 who is within the area of the upper beam 32, i.e., in back of the moving boundary line 33, defining the position of the boundary between colored areas 25 and 26 of the plate 17, will observe a change in the signal from the "go" to the "stop" condition, and will therefore be in a position to decelerate smoothly and to stop short of the intersection 29. An additional signal, not shown, will then direct his further actions.

A different application of the display device of this invention is indicated in FIG. 10, showing a transparent colored stencil 34 directly adjacent the lens 13 and a filter plate 17, having a lower segment 26 identical in color to the stencil 34 and an upper segment 25 having a complementary color, in front of the plate 14. Typically, and as indicated in the FIG, the stencil 34 and lower segment 26 will be red, while the upper segment 25 will be green. When the filter plate is in the lowermost position, the transmitted green rays are stopped by the red filter areas of the stencil 34 but reach the lens through the arrow-shaped cutout portion 39, so that to the approaching motorist the signal shows only a central green arrow. As the filter plate is moved upwardly, placing the red lower segment 26 adjacent the plate 14, the transmitted red rays from the source reach the stencil and lens, and the entire surface of the lens then appears substantially uniformly red to the observer from a position within the defined viewing area forwardly of the device.

The outlines of the viewing area may be readily fixed, as described in Ser. No. 571,639, by appropriately locating the edges of the orifice from which the diffuse light from the source passes to the lens 13. One convenient way of establishing the desired orifice is by applying opaque masking tape or other suitable masking means in an appropriate pattern to the rear surface of the transparent or diffuse light-transmitting plate 14, for which purpose the extension casing 16 is made readily removable, e.g., by hinge 40 and screw clamp 41, so that the image focused on the plate by the lens 13, in the manner of a camera obscura, may be readily seen. Where diffusion of the light is obtained by means other than a diffusion plate 14, such plate may be omitted, using in its place a stencil or mask insert the inner edges of which are substantially at the focus of the lens 13 and define the limits of the orifice. In the

latter modification the surface of the filter plate may itself be light-diffusing. A typical orifice pattern is shown in FIG. 7, wherein the transparent central portion corresponds to the view of the highway focused on the plate 14' in a beacon 10 located as shown in FIG. 6.

Various other applications of the principles of the invention may be mentioned. Various patterns may be provided on the filter plate or at the stencil 34, for example in obtaining unique and attention-arresting effects in display advertising. Vehicular headlights and tail-lights incorporating the principles described may be regulated, by appropriate movement of the filter plate member, to provide accurately directed or rapidly changing light beams. These and other analogous modifications are contemplated as coming within the scope of the invention as defined in the appended claims.

I claim:

1. A display device comprising a condensing lens defining a viewing surface and having a focus, aperture-defining means having all aperture-defining edges substantially at said focus, and lighting means, including a diffusion plate substantially at said focus, for providing diffuse illumination to said lens from said focus and from the entire aperture, and said device being further characterized as including a filter plate, and means for mounting said filter plate so as to permit placing any desired portion of its said area adjacent said aperture and substantially at said focus whereby to alter the display at the viewing surface.

2. Apparatus of claim 1 wherein said filter plate comprises at least two differently colored light-transmitting segments.

3. Apparatus of claim 2 wherein said filter plate comprises adjacent segments of complementary colors each of an area equal to that of said aperture.

4. Apparatus of claim 1 including drive means for placing any desired segment of said filter plate adjacent said aperture.

5. Apparatus of claim 4 wherein said drive means includes programmed control means for establishing a repetitive sequence of placings of said segments.

6. For use as a traffic control system, a display device according to claim 1 wherein said filter plate has adjacent red and green segments and including means for advancing said plate across said aperture in the direction from green to red at a slow uniform rate consistent with anticipated rate of traffic advance and for abruptly returning said plate in the reverse direction.

7. Method of controlling stop-and-go traffic in a control zone from a traffic signal adjacent said zone and having a view lens, comprising displaying at said lens a "go" indication to traffic at sufficiently short distances from said signal to permit safe transit through said zone at normal zone speed, while simultaneously displaying at said lens a "stop" indication to traffic at greater distances.

8. Apparatus of claim 1 wherein said lighting means includes a diffusion plate substantially at said focus.

9. Apparatus of claim 1 wherein said diffusion plate and said filter plate are correspondingly concave.

10. Apparatus of claim 9 wherein said filter plate consists essentially of adjacent red and green segments each of an area equal to that of said aperture.

11. A display device comprising a condensing lens defining a viewing surface and having a focus, aperture-defining means having all aperture-defining edges substantially at said focus, and lighting means for providing diffuse illumination to said lens from said focus and from the entire aperture, and said device being further characterized as including a colored filter stencil at said lens, a filter plate comprising at least one colored segment, and means for mounting said filter plate so as to permit placing any desired portion of its said area adjacent said aperture and substantially at said focus whereby to alter the display at the viewing surface.

12. Apparatus of claim 11 wherein said filter plate has one segment of the same color as said colored filter stencil and another segment of a complementary color.

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