A display device as described in U.S. Pat. No. 3,457,400 is provided with photosensitive means for accurately identifying the outline of the light-transmitting area.

6 Claims, 5 Drawing Figures
BEAM DEFINING APPARATUS

This invention relates to display devices as particularly exemplified by traffic control highway signals.

In U.S. Pat. No. 3,457,400 there is described a traffic signal which directs a traffic control light beam toward a specified and sharply defined viewing area. The signal comprises a source of diffuse illumination, a condensing lens, and an aperture-defining means located at the rear of the lens. The shape of the aperture is established in accordance with the viewing area.

The present invention provides improved means and methods for defining and establishing the shape of the aperture in a signal of the type just described. It is particularly useful in providing for the conversion of prior art wide-angle signals to the type described in the aforesaid US patent. For this purpose there is provided an attachment fitting onto the face of the wide-angle signal and including both a condensing lens and a light-diffusing aperture plate, the latter carrying a removable opaque light-sensitive covering. The device is rigidly attached in position on the front of the rigidly mounted signal, the light-sensitive surface is exposed to the image of the highway area which is focused thereon by the condensing lens, and a corresponding visible image is developed. Removal of portions of the covering corresponding to the desired viewing area is easily accomplished by reference to the visible image of that area. The signal is then returned to service.

In the drawing,

FIG. 1 is a side elevation, partly cut away, showing the complete signal in position adjacent a highway,

FIG. 2 is a front elevation of the signal of FIG. 1,

FIG. 3 is a longitudinal cross-sectional elevation of the attachment portion of the signal of FIGS. 1 and 2,

FIG. 4 is a front elevation of a typical aperture plate, and

FIG. 5 is an enlarged portion of the roundel 31 of FIG. 3.

The signal 10 of FIG. 1 comprises a housing 11 supported on a standard 12 and with which is combined an attachment 13 and a hood 14. A source of illumination, indicated by bulb 15, is supported in socket 16 and extends 17 within a parabolic reflector 18 which is disposed within the housing.

The housing 11 is provided with an inner end frame 19 to which an outer frame 20 is attached by hinges 21, being normally held in closed position by a latch 22. The barrel 23 of the attachment 13 is fastened to the frame 20, e.g. by bolts 24.

Over the forward end of the barrel 23 is placed a cover 25 containing a Fresnel condensing lens 26 and a transparent clear or appropriately colored protective plate 27 within a rim 28, the latter being held in place by screws 29. A conventional protective hood or visor 14 may be installed if desired, the hood serving to lessen the possibility of reflections from the outer surface of the plate 27.

Within the barrel 23 is contained an annular support plate 30 which in turn supports a roundel 31, the latter being removably held in place by clamps 32. As shown in more detail in FIG. 5, the roundel comprises a transparent body 33 having a light-diffusing roughened convex surface 34 and covered on the concave surface with an opaque inner film 35 and a photosensitive outer film 36, the two being removably held in place by adhesive layers 37 and 38 respectively. The roundel assemblly is supported approximately at the focus of the lens 26. Suitable indexing means, here indicated as a straight edge segment 39, serve to ensure accurate positioning of the roundel.

The addition of the extender or adapter 17 positions the light source forwardly of the focus of the parabolic reflector 18 and results in a converging light beam, which together with the roughened surface 34, assures that uniform diffuse illumination is provided to the lens 26 from the position of the roundel 31.

A typical procedure for installation of the attachment to a conventional traffic signal installation is as follows. The outer frame member 20 of the original wide-angle signal is unlocked and swung to the open position, the lens normally contained therein is removed, and the attachment 13, minus the roundel 31, is bolted in place. The bulb 15 is removed and the extender 17 installed, the bell then being returned. The forward end of the attachment, if not previously covered, is masked to prevent entry of light, and a roundel is removed from its protective package and fastened in place on the plate 30. Alternatively, the attachment may be supplied with the roundel already in position, the opaque inner layer and the temporary mask being fully effective in preventing pre-exposure of the light-sensitive layer. The frame 20 is closed and locked, and the photosensitive roundel is exposed to the light-image of the traffic control area by removing the mask covering the cap assembly 25. For best results it is found desirable first to place suitable illuminating markers along the pertinent traffic control area, positioned to represent points along the line of view of a motorists approaching the signal along the boundaries of said area. After a suitable exposure time the apparatus is again opened and the roundel is removed, and, if necessary, is subjected to an image developing process in order to obtain a visible reproduction of the view area or outline. Appropriate portions of the imaged layer 36 and underlying opaque layer 35, together with their adhesive coatings, are removed by cutting and stripping, as indicated by uncovered segment 40 in FIG. 4 for a typical roadway or traffic lane.

The roundel is replaced and the apparatus closed and locked. With the light turned on, the full area of the viewing surface appears uniformly illuminated to an observer located within the designated traffic control area. Substantially no light is directed toward adjacent areas, the line of demarkation being remarkably sharp.

A presently preferred structure employs a transparent glass roundel. The convex surface is made light-diffusing by vapor honing. The concave surface is smoothly covered with a sheet of thin bright aluminum foil bonded in place with an age-resistant transparent adhesive. Over the foil layer is next bonded a thin photosensitive film consisting of a thin coating of a mixture of photosensitive acid-stabilized diazo resin and azo dye coupler in a transparent plasticized vinyl resin binder on a white pigmented vinyl film base. After exposure to the light-image, the coating is treated with ammonia vapor to develop the latent image to a colored image which is readily visible against the white base. The portion representing the desired viewing area is outlined by cutting with a sharp blade and is removed by stripping. The entire covering comes away, exposing the glass surface, at the viewing area. The cut edges of
Coatings containing photochromic compounds, such for example as bromonitrobenzolindolinopyrylospin, have this self-developing capability.

A temporary stop may be placed before the lens during exposure of the light-sensitive coating where coatings of relatively high photographic speed are employed or for improving the sharpness of the resulting image; and various other modifications coming within the scope of the invention and of the appended claims will suggest themselves to those skilled in the art upon consideration of the foregoing disclosures.

What is claimed is as follows:
1. A light-transmitting and light-diffusing concavo-convex roundel adapted for use in defining an aperture for a display device and characterized by having over its concave surface a strippable opaque light-sensitive covering including an outer separately strippable light-sensitive layer.
2. The roundel of claim 1 wherein said inner layer includes an inner reflective metallic surface.
3. The roundel of claim 2 wherein said inner layer includes an outer light-absorptive surface.
4. The roundel of claim 1 wherein said light-sensitive covering is photochromic.
5. An attachment for a light-box comprising an opencended housing, a condensing lens at one end of said housing, the other end of said housing fitting over a light-emitting opening in said light-box and containing an aperture support plate, and, mounted in said plate and approximately at the focus of said lens, a roundel as defined in claim 1.
6. A traffic control signal comprising a shell adapted to be rigidly mounted in position for traffic control, containing a source of light and having a light-emitting opening facing the traffic control area, and, rigidly secured to said shell and fitting over said opening, an attachment comprising an opencended tubular housing having a condensing lens at the end opposite said opening, and having, near the end adjacent said opening, an aperture support plate, and, mounted in said plate and approximately at the focus of said lens, a roundel as defined in claim 1. * * * * *