A display panel for optical signs comprises a transparent base member with the information grooves on it. Furthermore, a transparent color glue material is filled into the information grooves to form an information layer, which presents a three-dimensional visible effect. In order to improve the visible effect and enhance the light intensity of the information to be presented, the transparent base member is coated on its one surface with a reflective layer before an opaque layer is applied. A light source is positioned on a surface opposite to that of coatings and a housing encloses the light so that the surface of transparent color glue layer is a face of the housing.
DISPLAY PANEL FOR OPTICAL SIGNS

TECHNICAL FIELD

The present invention relates to a display panel for optical signs, in particular, to a display panel including a transparent base member and an information layer of transparent color glue for presenting information and images such as symbols, letters, characters, numbers, and pictures. A major objective of the present invention is to provide a display panel for optical signs that can uniformly render color and generate bright information in three-dimension.

BACKGROUND ART

Modern information display is closely associated with optical signs. Edge-illuminated signs are known in which a transparent plastic sheet is illuminated by a light source disposed along one edge thereof so that light passes through the sheet material in a direction along the plane of the sheet. An image to be displayed is formed on one of the faces of the sheet whereby the light contrast between the image and the remainder of the sheet increases the visual impact of the image to a person viewing the sign.

A typical known edge-illuminated sign includes a transparent plastic sheet with its edge received in a lamp housing in which a bulb and electrical fittings are received. The bulb extending along the length of the edge. In use, an end cap is fitted over each end of the lamp housing. The transparent plastic sheet is provided with, on its frontmost face or its rearmost face, the direction being with respect to the intended position of a viewer of the sign, with an image. The image may be formed by engraving the surface of the sheet or by printing a partially transmissive printed ink layer on the surface of the sheet, for example by screen printing. When the bulb is illuminated, light emitted from the bulb passes along the sheet from the edge reflected and refracted at the engraved edges thereby illuminating the edge of the image. When the image is printed, the internally reflected light is incident on the rear surface of the image and is partially transmitted to the front surface of the image thereby to provide an illuminated image.

In such a typical edge-illuminated sign, the light from the bulb is transmitted in the transparent plastic sheet from the edge received by the lamp housing to the opposite edge. As a result, the distribution of light over the edge-illuminated sign is not uniformed. The closer to the lamp housing the region of the sheet is, the brighter it is. Also, the intensity of the light is not powerful enough to uniformly illuminate a sign within large area. Furthermore, prior art edge-illuminated sign is not daytime visible.
What is needed is a display panel for optical signs that, even in daytime, can render uniform and bright information presentation in three-dimension.

DISCLOSURE OF INVENTION

In accordance with the present invention, a display panel for optical signs comprises a transparent base member with information grooves engraved on it. A transparent glue material is filled in the information grooves, thereby forming an information layer. In particular, the transparent base member has a surface coated with a reflective layer, followed by an opaque layer is applied on the surface. A light source enclosed by a housing is positioned on a second surface opposite to the first surface so that the display panel becomes a face of the housing.

In accordance with the present invention, the transparent base member is made from transparent plastic, glass, or rubber material. The information layer filled in the information grooves may join the flats of the first surface, or project over or depress in the first surface in order to provide a three-dimension visible effect.

Furthermore, the transparent glue material filled into the information grooves may be a varies of color mixture of at least one transparent color dye with a transparent glue, plastic or clear rubber material. In terms of the characters that the transparent color glue material can gather light in the housing, it is desired that the information layer be maximally explored in the housing to gather as much light as possible to uniformly and brightly present information. In accordance with the present invention, the display panel for optical signs has a design that allows a maximum area of the information layer to gather as much light rays as possible to render the brightest information presentation. Also, with the variation of the thickness of the information layer, the brightness and visible effect of the information to be presented is changed. As a result, the visible effect and brightness of the information presentation may be adjusted on the basis of the thickness of the information layer.

With the color information layer filled into the information grooves, the information to be presented becomes visible even in daytime. By means of the light source, the display panel for optical signs becomes visible in nighttime. Therefore, the display panel for optical signs of the present invention is visible in both daytime and nighttime. Moreover, in accordance with the present invention, the housing may be taken any configurations, such as circular, oval, or muti-sided configurations may be utilized as desired. These other features and advantages of the present invention are apparent from the description below with reference to the following drawings.
BRIEF DESCRIPTION OF DRAWINGS

FIGURE 1 is an illustration of an optical sign of the display panel of the present invention;

FIGURE 2 is a section view along line A-A of the optical sign of FIG. 1 showing its construction;

FIGURE 3 shows that transparent color glue material is filled into the engraved information grooves to form an information layer whose surface is lower than that of the transparent base member;

FIGURE 4 shows that transparent color glue material is filled into the engraved information grooves to form an information layer which surface joints the flats of the first surface of the transparent base member;

FIGURE 5 shows that transparent color glue material is filled into the engraved information grooves to form an information layer which surface is higher that of the transparent base member;

FIGURE 6 shows that transparent color glue material is filled into the information grooves that run through the transparent base member; and

FIGURE 7 is an illustration of the display panel that presents information three-dimensionally.

BEST MODES FOR CARRYING OUT THE INVENTION

An optical sign 100 of the present invention includes a housing 102, a display panel 104 on which information grooves 106 forming the word "WELCOME" are formed by engraving, as shown in FIG. 1. The housing 102 may have two display panels 104 positioned at both side of it so that a double information presentation may be provided by the optical sign 100, as shown in FIG. 2. Certainly, other kinds of information presentation such as screen painting may be used along with the present invention to provide a double information presentation.

Referring to FIG. 2, housing 102 is constructed by a reflective material, such as aluminum, so that light rays may be reflected in it. Also, display panel 104 has its outer surface coated with a reflective layer before an opaque layer is applied on the outer surface. With the reflective layer and then, an opaque layer applied on the outer surface of the display panel 104, light rays may be well reflected in the housing 102 and an improved visible effect of the information presentation may be achieved. In order to improve the
reflective effects, the reflective layer is preferably a silver layer.

In accordance with the present invention, the display panel 104 is made through a transparent base member 108 on which the reflective layer and opaque layer are formed. Furthermore, transparent base member 108 are engraved through the surface having the engrave under control of a computer program, to form information grooves 106, and then, a transparent color glue material is filled by a heating gun into the engraved information grooves 106 to form an information layer 110. Then, the display panel 104 is installed with the housing 102 to constitute an optical sign of which the display panel 104 forms at least one face.

Information layer 110 gathers light rays 112, 114, 116, and 118 emitted from bulbs 120 in the housing 102, as shown in FIG. 2. In order to improve the brightness, the information layer 110 of the present invention is designed to extend through the reflective layer, so that its most circumference is explored in the housing 102 to gather light rays. As shown in FIG. 2, the information layer 110 does not gather light rays only by its back end, but also by its circumference all explored in the housing 102 over the reflective layer. Because the light rays may travel through the transparent base member 108 to arrive all explored circumference over the reflective layer, the area of the information layer 110 for receiving light rays is very much increased, so the display panel 104 of the present invention may present bright information.

Specifically, light ray 112 arrives at information layer 110 through the transparent base member 108 directly, light ray 114 arrives information layer 110 after being reflected twice by the reflective layer of the transparent base member 108, light ray 116 is reflected by the wall of housing 102 to information layer 110, and light ray 118 is first reflected by the reflective layer of the transparent base member 108 and then arrives information layer 110. By means of the sound reflective effects and the maximal exploration of the information layer in the housing 102, the light rays are maximally gathered by information layer 110. Therefore, the information to be presented is well illuminated.

Preferably, the transparent color glue material may be obtained from the mixing of a transparent color dye with transparent glue, epoxy, plastic or clear rubber materials. Preferably, the transparent color glue material may be a mixture of transparent fluorescent dye and a transparent glue material. By appropriate mixing of the color dye with the glue base material, desired color information and images can be presented by the display panel of the present invention even in daytime. Moreover, in accordance with the present invention, the opaque layer may be translucent, and the transparent color glue material may be translucent.
As the transparent color glue material is filled into the information grooves 106 by a heating gun, information layer 110 integrates with transparent base member 108 to form display panel 104, as shown in FIGS 3-6. FIG.3 shows that transparent color glue material is filled into the engraved information grooves 106 to form an information layer 110 which depresses in the information grooves 106. Preferably, transparent base member 108 is of a thickness of 0.25 inch, information grooves 106 0.20 inch, and information layer 110 0.12 inch. In accordance with the present invention, the thickness of information layer 110 may be adjusted on the basis of the brightness and visible effects to be achieved. Based on such a character that the thicker information layer 110 becomes, the more it gathers light rays in housing 102, the brightness of display panel 104 varies as the change of the thickness of information layer 110. Accordingly, in another preferred embodiment, information layer 110 is filled into information grooves 106 on the flat of transparent base member 108, as shown in FIG. 4. In order to enhance the brightness and to present information in three-dimension, information layer 110 may be alternatively filled into information grooves 106 at a level of 0.20 inch over the surface of transparent base member 108, as shown in FIG. 5. Further embodiment of the present invention is to form information grooves 106 that run through transparent base member 108 and the transparent color glue material is filled in information grooves 106, either at a level on both surfaces of transparent base member 108, or of 0.20 inch over both surfaces of transparent base member 108, as shown in FIG. 6.

FIG. 7 shows an illustration of the display panel 104 presenting a three-dimensional information. With the alternation of the thickness of information layer 110, both brightness and visible effects of display panel 104 for optical signs may be adjusted. Also, color information layer 110 helps display panel 104 become visible even in daytime.

Furthermore, through appropriate distribution of the lighting source and by means of reflective effects, display panel 104 in accordance with the present invention may uniformly and intensively present information and/or images. As a result, the display panel in accordance with the present invention provides colorful, bright, and daily visible information and/or images with continued and smooth lines and/or area three-dimensionally. Since the transparent color glue material is filled into the information grooves 106 to form information layer 110, the integrated display panel 104 further greatly enhances its strength for installation and transportation.
It will be understood that the previous descriptions and explanations are given by way of example, and that numerous changes in the combinations of elements and functions as well as changes in design may be made without departing from the spirit and scope of the invention as hereinafter claimed. These and other modifications to and variations upon the embodiments described above are provided for by the present invention, the scope of which is limited only by the following claims.
CLAIMS

1. A display panel for optical signs comprising:
   a transparent base member having a first surface and a second surface, said first surface being coated with an opaque layer; and
   a transparent color glue material filled into said first surface to form an information layer.

2. A display panel as recited in Claim 1 wherein said opaque layer is a translucent layer.

3. A display panel as recited in Claim 1 wherein the first surface is engraved to form an information groove on the transparent base member, the transparent glue material being filled into the information groove to form said information layer on the transparent base member.

4. A display panel as recited in Claim 3 wherein said transparent base member is made from transparent plastic material, glass, or rubber material.

5. A display panel as recited in Claim 1 wherein the transparent color glue material is a translucent color glue material.

6. A display panel as recited in Claim 5 wherein the transparent color glue material is filled into the information groove to form an information layer which surface is depressed in the information groove.

7. A display panel as recited in Claim 5 wherein the information layer projects over the first surface.

8. A display panel as recited in Claim 5 wherein the information layer join the flats of the first surface.

9. A display panel as recited in Claim 5 wherein the information groove runs through the transparent base member.
10. A display panel as recited in Claim 9 wherein the transparent color glue material is filled into the information groove to form the information to be presented.

11. A display panel as recited in Claim 10 wherein the transparent color glue material filled into the information groove projects over at least one of the first and second surfaces.

12. A display panel as recited in Claim 4 wherein said first surface is coated with a reflective layer before the opaque layer is formed on it.

13. A display panel as recited in Claim 12 wherein said reflective layer is a white layer.

14. A display panel as recited in Claim 12 wherein said reflective layer is a silver layer.

15. A display panel as recited in Claim 5 wherein said transparent color glue material is from the mixing of at least one transparent color dye with a transparent glue material.

16. A display panel as recited in Claim 5 wherein said transparent color glue material is from the mixing of at least one transparent color dye mixed with a transparent plastic material.

17. A display panel as recited in Claim 5 wherein said transparent color glue material is from the mixing of at least one transparent color dye mixed with a clear rubber material.

18. A display panel as recited in Claim 3 further comprising a lighting source positioned on the side of the second surface.

19. A display panel as recited in Claim 18 further comprising means for housing said lighting source, said transparent base member forming a face of said housing means, light rays from the light traveling through the transparent base member to illuminate the information layer to present information.

20. A display apparatus for visually presenting information comprising a light and means for housing said light, where said display apparatus comprising:

a transparent base member having a first surface and a second surface, said first surface being a face of said housing and coated with a reflective layer as well as an opaque layer on said reflective layer, said transparent base member being engraved through the first surface to form an information groove; and

a transparent color glue material filled into said information groove to form an information layer.
21. A display apparatus as recited in Claim 20 wherein said transparent base member is made from transparent plastic material, glass, or a clear rubber material.

22. A display apparatus as recited in Claim 20 wherein said opaque layer is translucent.

23. A display apparatus as recited in Claim 22 wherein said information groove runs through said transparent base member.

24. A display apparatus as recited in Claim 23 wherein said transparent color glue material is filled into said information groove to form the information layer.

25. A display apparatus as recited in Claim 24 wherein said information layer projects over at least one of said first and second surfaces.

26. A display apparatus as recited in Claim 24 wherein said information layer depresses in said information groove.

27. A display apparatus as recited in Claim 24 wherein said information layer join the flats of at least one of the first and second surfaces.

28. A display apparatus as recited in Claim 20 wherein said information layer projects over said first surface.

29. A display apparatus as recited in Claim 20 wherein the information layer is depressed in the information groove.

30. A display apparatus as recited in Claim 20 wherein the information layer joints the flats of the first surface.

31. A display apparatus as recited in Claim 20 wherein said reflective layer is a white layer.

32. A display apparatus as recited in Claim 20 wherein said reflective layer is a silver layer.