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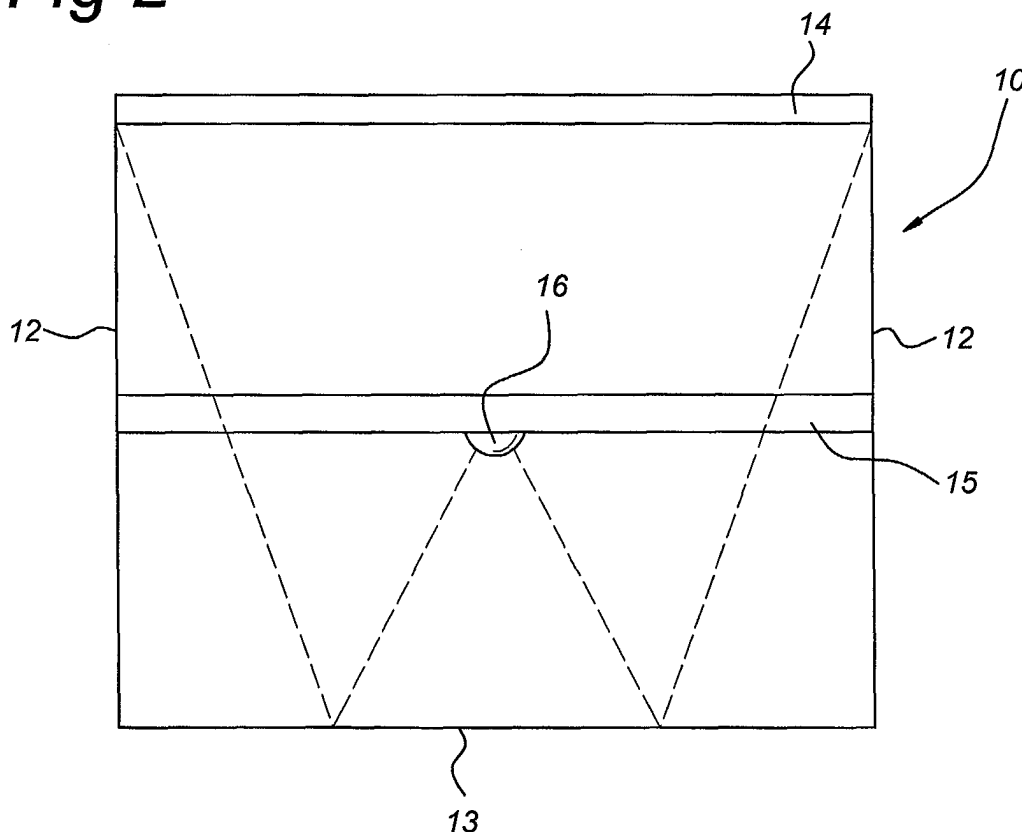
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(54) **Indirectly illuminated sign**

(57) Illuminated sign assembly, comprising a housing with a light source (16) and a backlit image panel (14) forming a front part of the illuminated sign (10). The light source (16) is arranged in the housing such that the

backlit image panel (14) is illuminated indirectly at least via a back panel (13) of the housing. E.g. a transparent attachment plate (15) may be used to mount light sources (16) directed at the back panel (13) of the sign assembly (10).

Fig 2



Description

Field of the invention

[0001] The present invention relates to an illuminated sign assembly, comprising a housing with a light source and a backlit image panel forming a front part of the illuminated sign.

Prior art

[0002] Such an illuminated sign is e.g. known from American patent US-A-5,542,201. This sign uses a light source positioned on a side of housing, substantially perpendicular to the sign image surface. The sign comprises a slightly sloped reflector surface to illuminate the front sign image surface. As in general, a sign of this type has a box like structure of which the depth is smaller than the width and length, the light path from light source to image surface is relatively long, thus a stronger illumination source is needed to provide sufficient back-lighting of the entire image surface. Also, it is very difficult to accomplish an even distribution of light over the entire image surface, especially when the sign is in the form of a letter or number having multiple walls extending from the sign back to the front side, because of shielding, etc. The part of the image surface nearest to the light source will receive much more light than the part at the other end of the sign.

[0003] Other state of the art illuminated signs use a number of light sources, such as LED's, to provide back lighting of an image surface, e.g. in the form of a letter. Also, in this case, it is difficult to provide a uniform and evenly distributed illumination, without shielding effects, etc.

Summary of the invention

[0004] The present invention seeks to provide an illuminated sign assembly, e.g. in the form of a letter, number, logo or rectangular billboard, which has an evenly distributed illumination and uses as less elements as possible in order to reduce cost.

[0005] According to the present invention, an illuminated sign assembly according to the preamble defined above is provided, in which the light source is arranged in the housing such that the backlit image panel is illuminated indirectly at least via a back panel of the housing. In this manner, the light path between light source and backlit image panel is increased, making it more easy to obtain a uniform distribution of the illumination, while still preserving small dimensions of the illuminated sign (especially depth). The present invention can use the structural surfaces of the illuminated sign to obtain this effect, thus not requiring additional reflectors or the like.

[0006] In an embodiment of the present invention, the light source emits light in a substantially limited angular

cone having a first direction, and the light source is arranged such that the first direction is aimed at the back panel of the housing. An example of such a light source is a Light Emitting Diode (LED), which is available in a large range of colors (even white) and power ranges.

[0007] The light source is, in a further embodiment, attached in the housing using a transparent attachment plate. Such a plate is easy to manufacture, e.g. using the same technology as for the image panel or front plate of the illuminated sign assembly. Even the material may be identical, such as acrylic plastic. Alternatively, the attachment plate may provide structural support for the light sources where needed, and material may be cut out at other places (which provides full transparency to the illumination) to save weight.

[0008] To provide an equal distance from all individual light sources to the image panel, the transparent attachment plate is positioned in the housing substantially parallel to the backlit image panel in an even further embodiment. This will also allow to assemble the sign assembly easily and fast.

[0009] In an embodiment of the present invention the transparent attachment plate is positioned in the housing substantially in the middle between the backlit image panel and the back panel of the housing. This embodiment will increase the light path from the light source to the backlit image panel sufficiently to obtain an even distribution of light.

[0010] The internal surfaces of the housing, in a further embodiment, comprise a reflective layer. At least the back panel, but possibly all internal surfaces of the illuminated sign assembly except the attachment plate are provided with such a reflective layer. The layer should be reflective for the light source radiation, and may e.g. comprise white paint or a white coating.

[0011] The light source of the illuminated sign assembly according to the present invention may comprise a plurality of LED's. Using more than one light source allows to more easily obtain an even distribution of light, even in the case of a letter sign having shielding side walls. It is also possible to use other types of light sources, such as incandescent lights, electroluminescent (EL) lights, or neon lights, especially when the illuminated sign has a larger size.

[0012] As mentioned earlier, the illuminated sign assembly according to the present invention may have the shape of a letter or number. Then, a number of these illuminated signs may be used e.g. for providing a name sign on a building. Alternatively, the illuminated sign assembly has the shape of a logo, or is of a rectangular shape to form a billboard. Dimensions of the sign (size and depth), and thus of its components, may vary and be in a wide range according to the requirements.

Short description of drawings

[0013] The present invention will be discussed in more detail below, using a number of exemplary embod-

iments, with reference to the attached drawings, in which

Fig. 1 shows a cross sectional view of an illuminated sign according to the state of the art;

Fig. 2 shows a cross sectional view of an illuminated sign according to an embodiment of the present invention; and

Fig. 3 shows a top view of an illuminated sign in the shape of a letter 'A' according to an embodiment of the present invention.

Detailed description of exemplary embodiments

[0014] In Fig. 1, a simplified cross sectional view is shown of an illuminated sign 1 according to the present state of the art. The illuminated sign 1 comprises a housing formed by side walls 2 and a back panel 3. The front of the housing is formed by an image surface 4, which comprises a back lit panel. The image surface 4 may be rectangular and comprise e.g. a translucent image. Also, the illuminated sign 1 may be in the shape of a letter, number or logo, in which case the image surface 4 usually has an even colored surface. The illuminated sign 1 further comprises light source attachment means 5, on which one or more light sources 6 may be positioned. The attachment means 5 fix the position of the light sources 6 in the illuminated sign 1. A much used type of light source 6 is a LED (Light Emitting Diode), which has a limited spatial angle in which light is emitted, indicated by the broken lines in Fig. 1. In order to be able to evenly illuminate the image surface 4 from the back, the light sources 6 have to be provided in a pattern which provides an evenly distributed illumination of the backlit image surface 4. However, because of the limited distance available from light sources 6 to the image surface 4, point shaped light sources 6 will almost always result in an uneven lit image surface 4. Especially when the illuminated sign 1 has the shape of a letter, number or logo, with side walls at the perimeter of the letter, number or logo, it is very difficult to obtain an evenly distributed illumination because of shielding effects by the side walls. Usually, it is only possible to obtain an almost uniform illumination by using a very large quantity of LED's, which increases the cost for such an illuminated sign 1.

[0015] Fig. 2 shows a simplified cross sectional view of an illuminated sign 10 according to an embodiment of the present invention. Again, the shown embodiment comprises a housing formed by sidewalls 12 and back panel 13. The front (image) side of the illuminated sign 10 comprises a back lit image panel 14. In this embodiment, the illuminated sign 10 further comprises a transparent attachment plate 15, on which a light source 16 is mounted. The light source 16 may e.g. be a LED, which is positioned such that at least the back panel 13 is illuminated by the light source 16. Thus, the image panel 14 is indirectly illuminated by the light source 16,

at least via the back panel 13.

[0016] As indicated in Fig. 2, the light source 16 emits light in a limited spatial angle, indicated by broken lines. The light from the light source 16 is reflected by the back panel, and passes through the transparent attachment plate 15 to the image panel 14. Because of the positioning of the elements of the illuminated sign 10, the light path from the light source 16 to the image panel 14 is made longer, which makes it more easy to obtain an evenly illuminated image panel 14.

[0017] Fig. 3 shows a top view of an illuminated sign 10 according to an embodiment of the present invention, in the shape of a capital letter 'A'. Six LED's 16 are provided inside the letter sign 10 on the positions indicated in Fig. 3, pointing downward as explained with reference to Fig. 2 above. The side walls 12 would normally shield a part of the front image panel 14 from direct illumination by the light sources 16, especially at edges such as those indicated by the arrows. However, by directing the light from the light sources 16 towards the back panel 13, and illuminating the image panel 14 indirectly, this small number of light sources 16 is sufficient for an evenly distributed illumination of the 'A' sign 10.

[0018] The illuminated sign 10 may be made from various materials: the back panel 13 and side walls 12 may be made from aluminum or plastic material of suitable dimensions. Preferably, the inside surfaces of the illuminated sign 10 are reflective for the radiation from the light source(s) 16, e.g. using a white paint or coating. The image panel 14 is from a light transmitting material, such as transparent or translucent plate material. The image panel 14 may be of a colored material (especially suited for signs of letters and numbers) or comprise a further layer with an image (especially suited for billboards and the like).

[0019] The attachment plate 15 is preferably positioned parallel to the image panel 14 and/or back panel 13, to provide an equal distance from all the light sources 16 to the back panel 13 and/or image panel 14. In the embodiment shown in Fig. 2, the attachment plate 15 is positioned roughly halfway the image panel 14 and back panel 13. In further embodiments, the attachment plate 15 may be positioned closer to the image panel 14 or closer to the back panel 13. Also, more than one attachment plate 15 may be used in further embodiments of the present invention.

[0020] The material of the attachment plate 15 is preferably a transparent material, such as acrylic plastic or another type of plastic. The attachment plate 15 may be colored, or provided with a colored coating, in order to act as a filter for the light emitted by light source(s) 16.

[0021] As an alternative to using an attachment plate 15 in the form of a plate like material, other attachment means may be used to position the light source(s) 16 in the proper orientation and position with respect to the back plate 13 and image plate 14. E.g. a wire frame arrangement may be used, which would allow sufficient light reflected from the back plate 13 (and possibly other

internal surfaces of the housing) to reach the image plate 14.

[0022] In the above description, only LED's have been mentioned as possible light sources 6, 16. However, it is also possible to use other light sources, such as incandescent light sources of various types, electro-luminescent (EL) light sources, such as TL or PL tubes, etc., especially for illuminated signs 10 having large dimensions.

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Claims

1. Illuminated sign assembly, comprising a housing with a light source (16) and a backlit image panel (14) forming a front part of the illuminated sign assembly (10), **characterized in that** the light source (16) is arranged in the housing such that the backlit image panel (14) is illuminated indirectly at least via a back panel (13) of the housing.
2. Illuminated sign assembly according to claim 1, in which the light source (16) emits light in a substantially limited angular cone having a first direction, and the light source (16) is arranged such that the first direction is aimed at the back panel (13) of the housing.
3. Illuminated sign assembly according to claim 1 or 2, in which the light source (16) is attached in the housing using a transparent attachment plate (15).
4. Illuminated sign assembly according to claim 3, in which the transparent attachment plate (15) is positioned in the housing substantially parallel to the backlit image panel (14).
5. Illuminated sign assembly according to claim 3 or 4, in which the transparent attachment plate (15) is positioned in the housing substantially in the middle between the backlit image panel (14) and the back panel (13) of the housing.
6. Illuminated sign assembly according to one of the preceding claims, in which the internal surfaces of the housing comprise a reflective layer.
7. Illuminated sign assembly according to one of the preceding claims, in which the light source (16) comprises a plurality of LED's
8. Illuminated sign assembly according to one of the preceding claims, in which the illuminated sign (10) has the shape of a letter or number.

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Fig 1

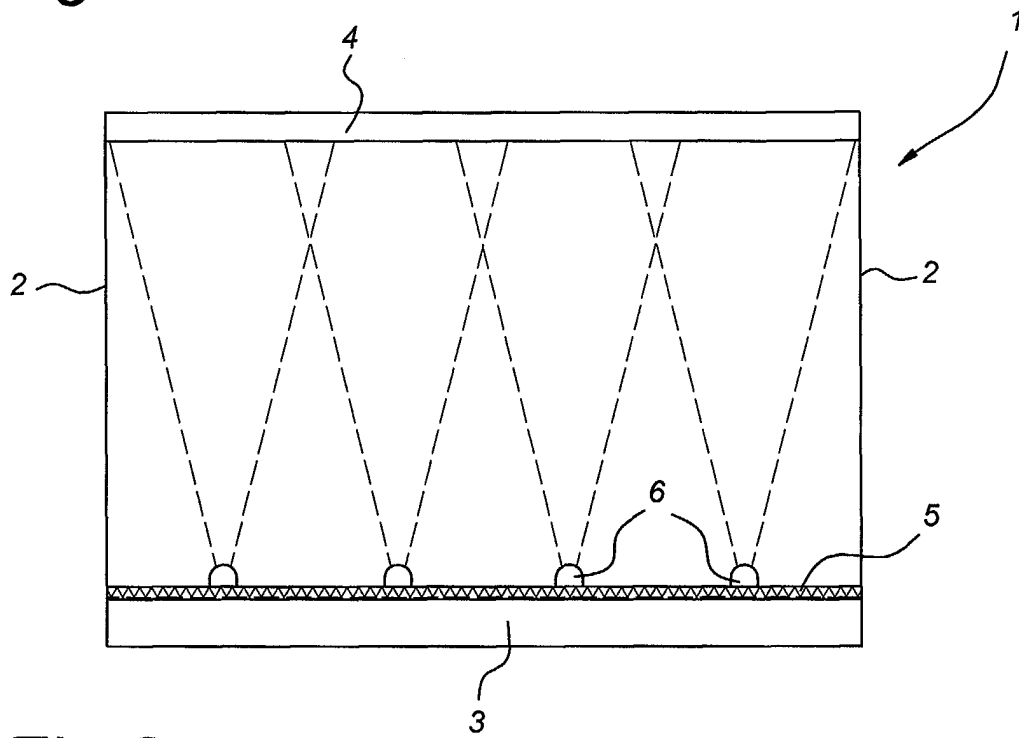


Fig 2

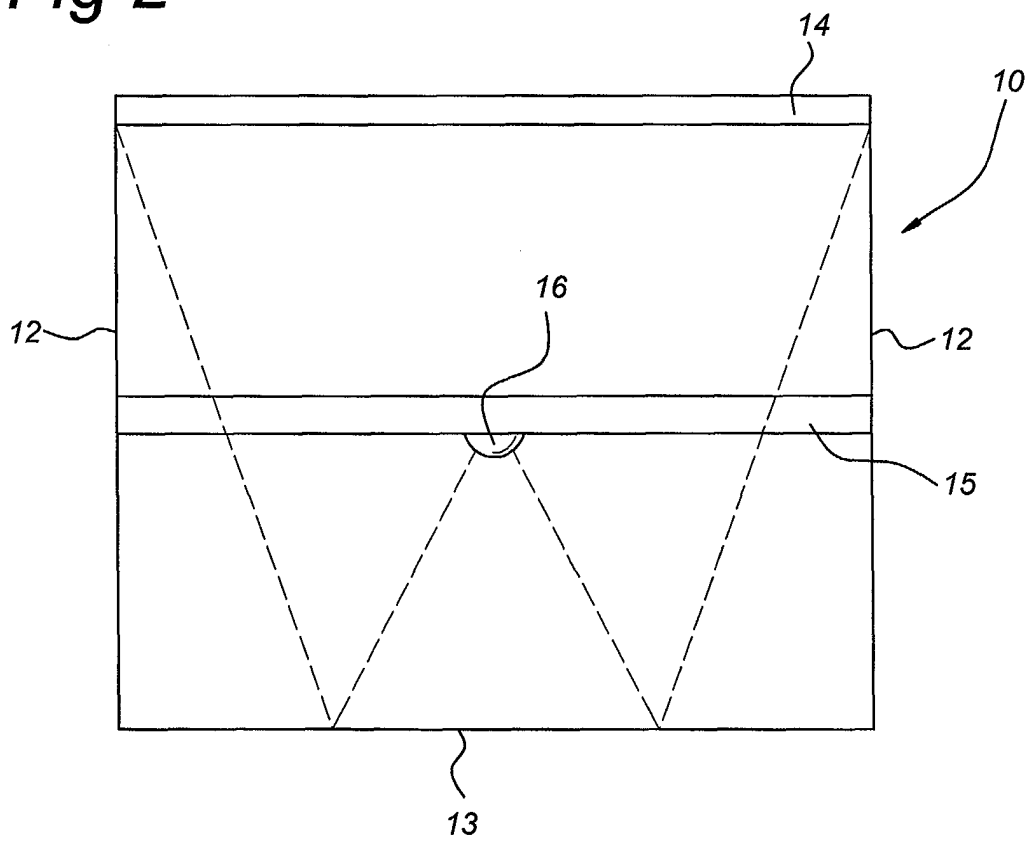
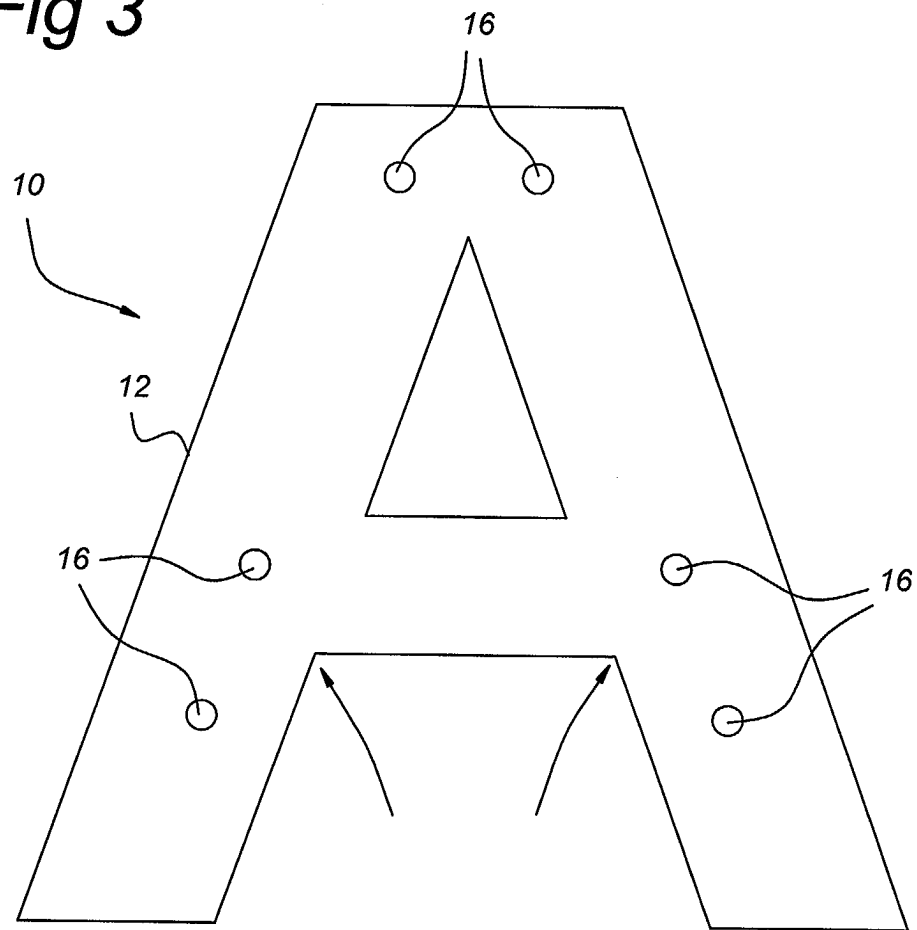


Fig 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 07 6070

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 September 2004	Examiner Pantoja Conde, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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