



## Description

**[0001]** The present invention relates to a sign plate for an illuminated sign, in particular for an illuminated poster.

**[0002]** WO-A-93/07605 discloses a sign plate for an illuminated sign in which indicia, such as alphanumeric characters, are printed on a plurality of sheets of the sign in such a way that when the sign is illuminated from the rearmost surface a viewer looking at the front of the sign is able to see an illuminated aura around the indicia and can discern a three dimensional effect of the indicia. While the signs disclosed that specification create a good display image, and have been commercially successful, nevertheless the sign plate structures disclosed therein have some disadvantages for making large poster-sized signs.

**[0003]** WO-A-97/09707 discloses an edge illuminated sign plate.

**[0004]** The present inventors have addressed this problem and have devised a sign plate which has particular applicability for large dimension poster displays.

**[0005]** Accordingly, the present invention provides a sign plate for an illuminated sign, the sign plate comprising a transparent front flexible sheet, a front image layer on a face of the front flexible sheet, the front image layer having a rearwardly-directed reflective surface, a rear flexible sheet located behind and in spaced relation to the front flexible sheet, the rear flexible sheet having a rear image layer disposed on a face of the rear flexible sheet substantially in registry with the front image layer, the rear image layer being at least partially surrounded by a translucent diffusion area, and at least one spacer frame member disposed between and attached to inwardly directed opposed surfaces of the front and rear flexible sheets along at least one edge of the sign plate.

**[0006]** The present invention further provides a kit of parts for forming a sign plate according to the invention, the kit comprising the front and rear flexible sheets in combination with the at least one spacer frame member for attachment thereto.

**[0007]** The present invention yet further provides an illuminated sign incorporating the sign plate according to the invention in combination with at least one lamp located behind the rear flexible sheet.

**[0008]** Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a schematic perspective front view of a sign plate for an illuminated sign in accordance with a first embodiment of the present invention;  
Figure 2 is a schematic section along line A-A of the sign plate of Figure 1 in combination with a fluorescent tube for illuminating the sign plate; and  
Figure 3 is a schematic section, similar to that of Figure 2, through a sign plate in accordance with a second embodiment of the present invention.

**[0009]** Referring to Figures 1 and 2, a sign plate, designated generally as 2, in accordance with a first embodiment of the present invention is illustrated. The sign plate 2 comprises a front flexible sheet 4 and a rear flexible sheet 6 which are separated by top and bottom spacer frame members 8,10 thereby to define an air space 12 between the opposed parallel front and rear sheets 4,6.

**[0010]** The front flexible sheet 4 is transparent and composed of a plastics material such as polyvinyl chloride, a polyester, an acrylic plastics material or polycarbonate. A typical thickness is 240 microns. The front face 14 of the front flexible sheet 4 is provided with a front image layer 16 which is patterned in the shape of an image to be displayed by the sign plate 2. The image may comprise alphanumeric characters and/or shapes and/or patterns. In the illustrated embodiment, the front image layer 16 defines alphanumeric characters, in particular a word to be displayed by the sign plate 2.

**[0011]** The front image layer 16 is provided with a rearwardly directed reflective surface 18 which in the illustrated embodiment is provided by an additional reflective layer 20 which is located rearwardly of and covered by the front image layer 16. Both the front image layer 16 and the reflective layer 20 may be paint layers, for example formed from ultra violet curable paints or solvent-based paints. Typically, the paint layers are screenprinted onto the front flexible sheet 4. Alternatively, one or both of the front image layer 16 and the reflective layer 20 may comprise self-adhesive plastics films, for example vinyl films.

**[0012]** The front image layer 16 in combination with the reflective layer 20 may be opaque or translucent, and when translucent may be fluorescent. The reflective layer 20 may be omitted whereby the front image layer 16 itself has a rearwardly directed reflective surface which may be provided by a metallic and/or brightly coloured (e.g. white) paint layer or by a metallised or brightly coloured coating on or in a plastics film which is used for the front image layer 16. The front surface 22 of the front image layer 16 is provided with any suitable colour, pattern or image, which is either present in the layer or has been applied thereto.

**[0013]** The front surface 14 of the front flexible sheet 2 may also be provided with a secondary front image layer 24, which may comprise alphanumeric characters or other shapes, patterns or images. The secondary front image layer 24 may comprise a self-adhesive plastics film or a printed or painted layer.

**[0014]** In the illustrated embodiment, the front image layer 16 and, when present, its underlying reflective layer 20, and the second front image layer 24 are provided on the front surface 14 of the front flexible sheet whereas in an alternative embodiment, any or all of those layers may be provided additionally or alternatively on the rear face 26 of the front flexible sheet 4.

**[0015]** The rear flexible sheet 6 is, like the front flexible sheet 4, composed of a plastics material such as

polyvinyl chloride, a polyester, an acrylic plastics material or polycarbonate and may have a typical thickness of 240 microns. In the illustrated embodiment, the rear flexible sheet 6 is translucent whereby light transmitted therethrough is diffused by the translucent rear flexible sheet 6. The translucent diffusion characteristic may be provided by the plastics material of that sheet being of an opal or milky white appearance. The front face 28 of the rear flexible sheet is provided with a rear image layer 30 which is substantially in registry with, and is correspondingly patterned with respect to, the front image layer 16 so as to define the shape of an image to be displayed by the sign plate 2. Thus the rear image layer 30 substantially coincides with and is located behind the front image layer 16, but has slightly larger dimensions than the front image layer 16. Accordingly, the rear image layer 30 defines a peripheral margin 32 at least partially surrounding and highlighting the image conveyed by the front image layer 16.

**[0016]** The rear image layer 30 in the illustrated embodiment comprises a layer of fluorescent material of any desired colour or combination of colours which preferably has been printed, for example by screen printing, onto the front face 28 of the rear flexible sheet 6. Preferably, the rear image layer 30 is at least partially transmissive for visible light. In an alternative embodiment, the rear image layer 30 may comprise a self-adhesive plastics, e.g. vinyl, film which is preferably fluorescent and translucent. The front and rear image layers 16,30 may incorporate phosphorescent materials. In an alternative embodiment, the rear image layer 30 may be provided on the rear surface 34 of the rear flexible sheet 6.

**[0017]** The rear flexible sheet 6 is also provided, in the illustrated embodiment, with a secondary rear image layer 36 which is on the front face 28 of the rear flexible sheet 6. In an alternative embodiment the secondary rear image layer 36 may be provided on the rear face 34 of the rear flexible sheet 6. The secondary rear image layer 36 is not in registry with any corresponding image layer on the front flexible sheet 4. The secondary rear image layer 36 may be provided by printing or a self-adhesive plastics film. The secondary rear image layer 36 may be opaque or translucent in visible light. Fluorescent colours may be printed on the rear flexible sheet 6.

**[0018]** The front and rear flexible sheets 4,6 are assembled together to form a unitary structure constituting the sign plate 2 of the present invention. At the top edge 40 of the sign plate 2 the top spacer frame member 8 has a rectangular cross-section and includes front and rear parallel faces 42,44 against which the opposed inner faces 26,28 of the front and rear flexible sheets 4,6 are held. In this way, the front and rear flexible sheets 4,6 are spaced a desired distance from each other to define the air space 12. Typically, the spacer frame member 8 has a width of from 2 to 50mm, most typically around 8 to 10mm. The front and rear flexible sheets 4,6 are attached to the top spacer frame member 8. The

surfaces 42,44 of the spacer frame member 8 are each provided with an array of outwardly directed lugs 46, each of which is adapted to snap-fit into a corresponding hole 48 provided in the respective front or rear flexible sheet 4,6. In this way, the front and rear flexible sheets 4,6 are securely attached to the spacer frame member 8. In alternative embodiments, the front and rear flexible sheets 4,6 may be otherwise attached to the spacer frame member 8, for example by an adhesive or by heat bonding. Typically, the spacer frame member 8 is composed of a metallic body or a plastics body.

**[0019]** The bottom spacer frame member 10 is correspondingly attached, for example by the provision of an array of lugs 50 cooperating with holes 52, to only one of the front and rear flexible sheets 4,6 in the illustrated embodiment the rear flexible sheet 6. The bottom spacer frame member 10 has the same width of that of the top spacer frame member 8 whereby the two flexible sheets 4,6 when spaced by the spacer frame members 8,10 are maintained in a parallel configuration. Alternatively, the spacer frame members 8,10 may have different thicknesses, whereby the flexible sheets 4,6 are slightly inclined to each other.

**[0020]** The provision of in combination the front and rear flexible sheets 4,6 and the spacer frame members 8,10 provides a unitary sign plate assembly which can be readily transported. Moreover, the property of the flexibility of the sheets 4,6 coupled with the sheets 4,6 being attached together at one top edge 40 thereof but not attached together at the opposite bottom edge 54 thereof that the sign plate 2 can be rolled up into a tube for easy transport. Since the two sheets 4,6 are not attached together directly along the bottom edge thereof by the bottom spacer frame member 10, when the sign plate 2 of Figures 1 and 2 is rolled up from the top edge 40 thereof, the difference in radius between the two sheets 4,6 when wrapped into a tube can be accommodated by permitting the bottommost ends of the sign plates 4,6 to move circumferentially relative to each other thereby enabling ready wrapping of the sign plate 2 into a tube without rucking of the sheets 4, 6.

**[0021]** Either or both of the spacer frame members 8,10 may be provided with one or more outwardly extending overlapping portions, e.g. a flange, for mounting the sign plate into a sign surround or fitting system.

**[0022]** Figure 2 also shows the sign plate 2 in combination with a fluorescent tube 56 for illuminating the sign plate 2 from a rearward direction thereof. When the sign plate 2 is illuminated, light passes through the translucent rear flexible sheet 6 to provide a diffuse illumination. In the regions of the rear image layer 30, unless the rear image layer 30 is opaque to visible light, light is transmitted through the rear image layer 30 and forwardly towards the front image layer 16 and the reflective layer 20. Light which is incident on the reflective layer 20 is reflected rearwardly therefrom onto the front surface of the rear image layer 30. In the vicinity of peripheral margin 32, such light is reflected forwardly again

from the rear image layer 32 thereby to provide an enhanced aura of light from the peripheral margin, such an aura from the peripheral margin 32 is enhanced when the rear image layer 30 is composed of a fluorescent material. If the front image layer 16 in combination with the reflective layer 20 is partially transmitting, then some light is transmitted forwardly through the combination of the front image layer 16 and the reflective layer 20 whereby the image defined by the front image layer 16 is partially illuminated.

**[0023]** As a result of the lateral spacing of the front and rear flexible sheets 4,6 by the spacer frame members 8,10, in combination with the provision of the rear image layer 30 being correspondingly shaped and in registry with the front image layer 16, when the front and rear image layers 16,30 are illuminated the viewer is able to detect a spacial difference between the front and rear image layers 16,30 which creates a three dimensional effect whereby the front and rear image layers 16,30 appear to be connected by an inclined edge, giving the overall image a massive and solid appearance. The thickness of the three dimensional image corresponds to the width of the air space 12. The shape and angle of inclination of the inclined edge can be varied by altering the relative sizes and positions of the front and rear image layer 16,30. For example, if the rear image layer 30 is slightly larger in lateral dimension than the front image layer 16 around its periphery, then a relatively steep inclined edge will be apparent to a viewer of the sign plate 2 when the sign is illuminated. For the secondary front image layer 24 and the secondary rear image layer 38, if those layers 24,38 are opaque then no visible light is transmitted therethrough from the fluorescent tube 56 and the image conveyed to a viewer is of a darkened nature against the diffuse background established by the translucent rear flexible sheet 6. However, either or both of those secondary image layers 24,38 may be partially transmitting for visible light, in which case corresponding images may be partly illuminated.

**[0024]** A second embodiment of the present invention is illustrated in Figure 3. This embodiment is a modification of the embodiment of Figures 1 and 2 wherein instead of providing a rear flexible layer 6 composed of an opal or milky white plastics material, the rear flexible sheet 60 comprises a transparent plastics material similar to that employed for the front flexible sheet 4, which has been coated, for example by screen-printing or by a self-adhesive plastics film, with a translucent diffusion layer 62. Other layers such as the image layers 30,36 may be printed, e.g. screen-printed, onto the diffusion layer 62. Alternatively the diffusion layer 62 may be printed onto only a portion of the sheet 60 and the remainder of the sheet 60 is printed with other layers, such as the image layers 30,36. In addition the flexible sheets 4,60 are attached to the spacer frame members 8,10 by adhesive layers 64,66,68. Each spacer frame member 8,10 includes a mounting flange 70,72 for mounting the

sign plate to a sign fitting system.

**[0025]** In a yet further embodiment of the present invention, as well as providing top and bottom spacer frame members 8,10 for the sign plate 2, a pair of opposed side spacer frame members may be provided for assembly between the opposed inwardly-directed surfaces of the front and rear flexible sheets 4,6. The side spacer frame members may be assembled together with the top and bottom spacer frame members 8,10 after the sign plate 2 has been unrolled from its tubular form. Alternatively, all the spacer frame members may be pre-assembled together if the sign plate is pre-assembled and intended to be transported in a flat rigid configuration. The provision of side spacer frame members is particularly useful for large dimension signs to impart greater rigidity to the sign plate.

**[0026]** In accordance with a further embodiment of the invention, the sign plates of the invention may be provided as a kit of parts, comprising the pair of front and rear flexible sheets with the image layers provided thereon in combination with the spacer frame members therefor. Such a kit may be assembled on-site to form a poster to be illuminated from a rearwardly located lamp or array of lamps.

**[0027]** Although the illuminated embodiments are rear-illuminated sign plates, they may be edge-illuminated in further embodiments of the invention. For example, fluorescent tubes may be provided adjacent the opposed vertical edges of the sign plate of the illustrated embodiments. The lamps direct visible light into the air space between the sheets. This is shown in phantom in Figure 1, using fluorescent tubes 74,76.

## Claims

1. A sign plate for an illuminated sign, the sign plate comprising a transparent front flexible sheet, a front image layer on a face of the front flexible sheet, the front image layer having a rearwardly-directed reflective surface, a rear flexible sheet located behind and in spaced relation to the front flexible sheet, the rear flexible sheet having a rear image layer disposed on a face of the rear flexible sheet substantially in registry with the front image layer, the rear image layer being at least partially surrounded by a translucent diffusion area, and at least one spacer frame member disposed between and attached to inwardly directed opposed surfaces of the front and rear flexible sheets along at least one edge of the sign plate.
2. A sign plate according to claim 1 wherein the at least one spacer frame member comprises a pair of spacer frame members respectively located on opposed edges of the sign plate.
3. A sign plate according to claim 2 wherein a first

spacer frame member is attached to both of the front and rear flexible sheets and a second spacer frame member is attached to only one of the front and rear flexible sheets.

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4. A sign plate according to claim 2 or claim 3 wherein the pair of spacer frame members are respectively located at top and bottom edges of the sign plate.
5. A sign plate according to claim 2, 3 or 4 further comprising a pair of additional spacer frame members extending between the first pair of spacer frame members on respective opposed edges of the sign plate.
6. A sign plate according to any foregoing claim wherein the at least one spacer frame member is removably attached to the front and rear flexible sheets.
7. A sign plate according to claim 6 wherein the at least one spacer frame member is removably attached by lugs provided on the spacer frame member co-operating with holes provided in the front and rear flexible sheets.
8. A sign plate according to any foregoing claim further comprising a secondary image layer on at least one of the front and rear flexible sheets.
9. A kit of parts for forming a sign plate according to any foregoing claim, the kit comprising the front and rear flexible sheets in combination with the at least one spacer frame member for attachment thereto.
10. An illuminated sign incorporating the sign plate of any one of claims 1 to 8 in combination with at least one lamp located behind the rear flexible sheet.

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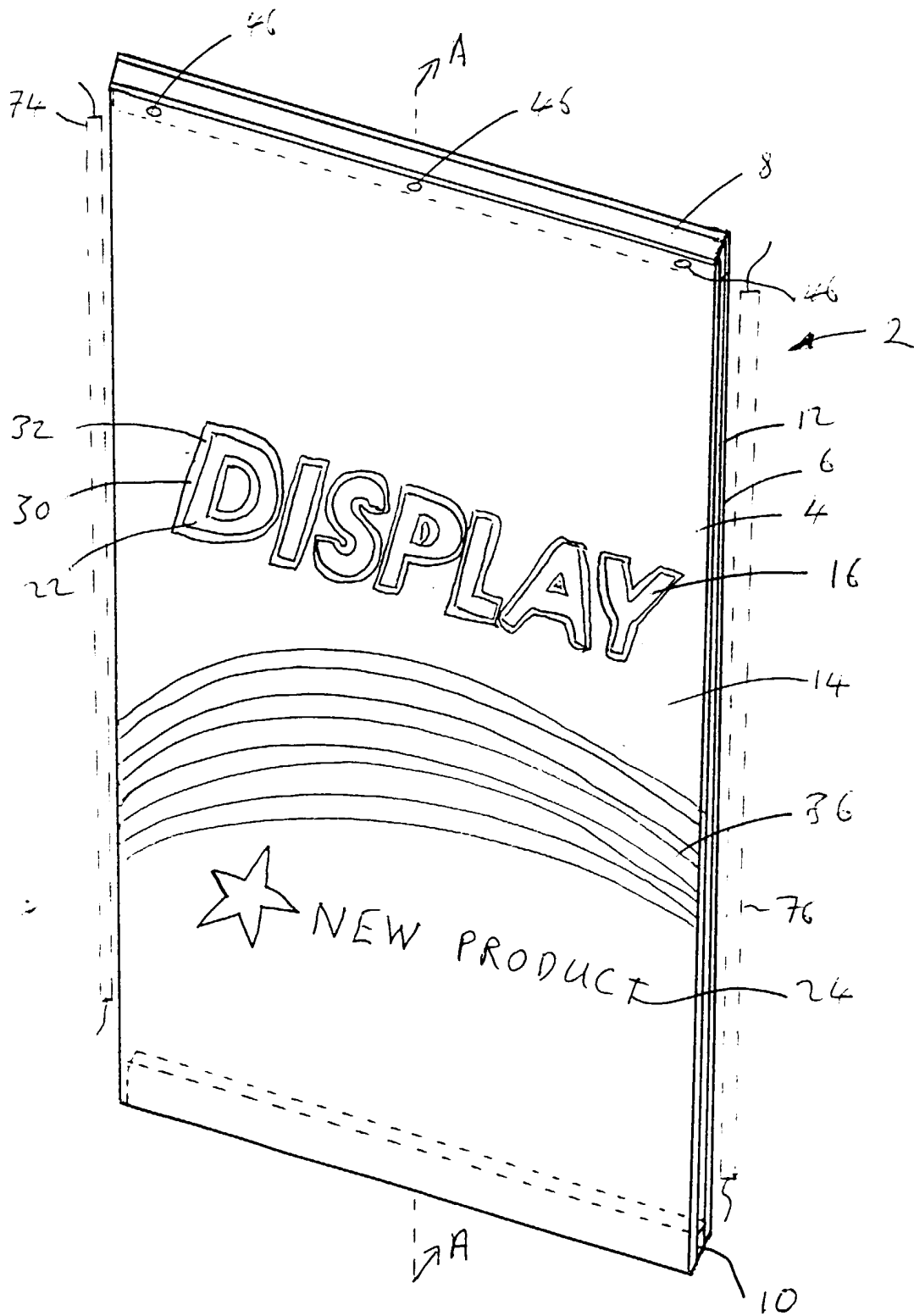


Figure 1

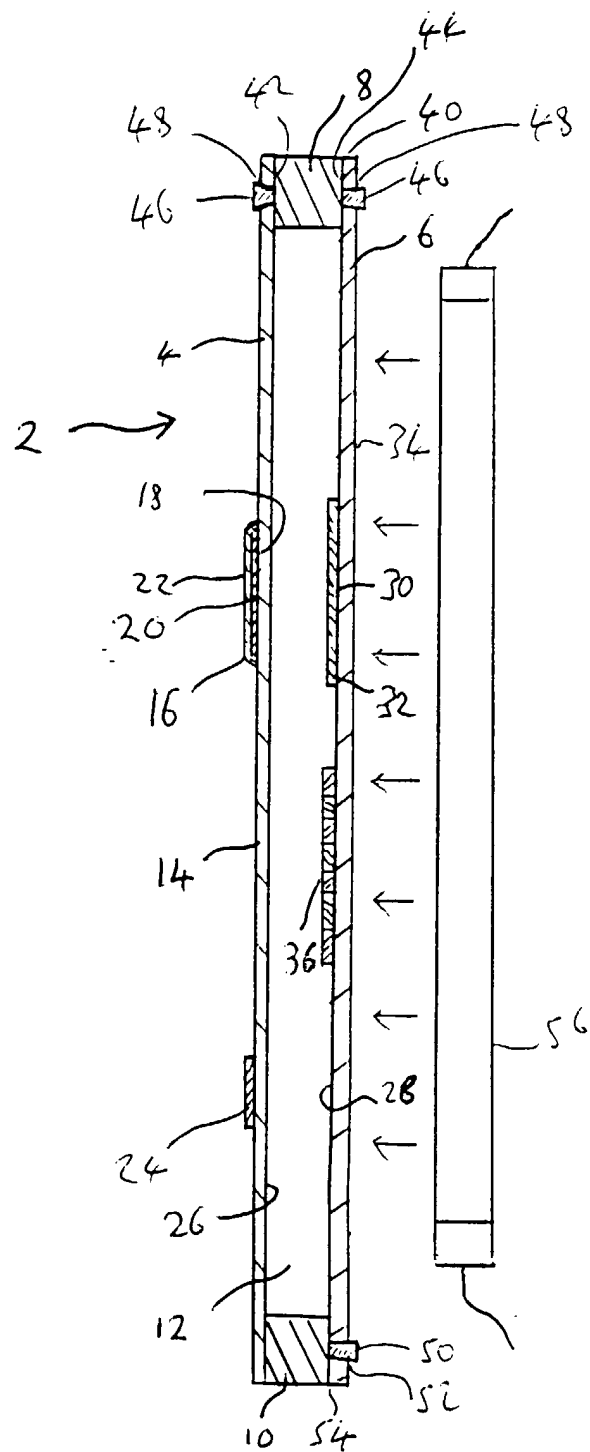


Figure 2

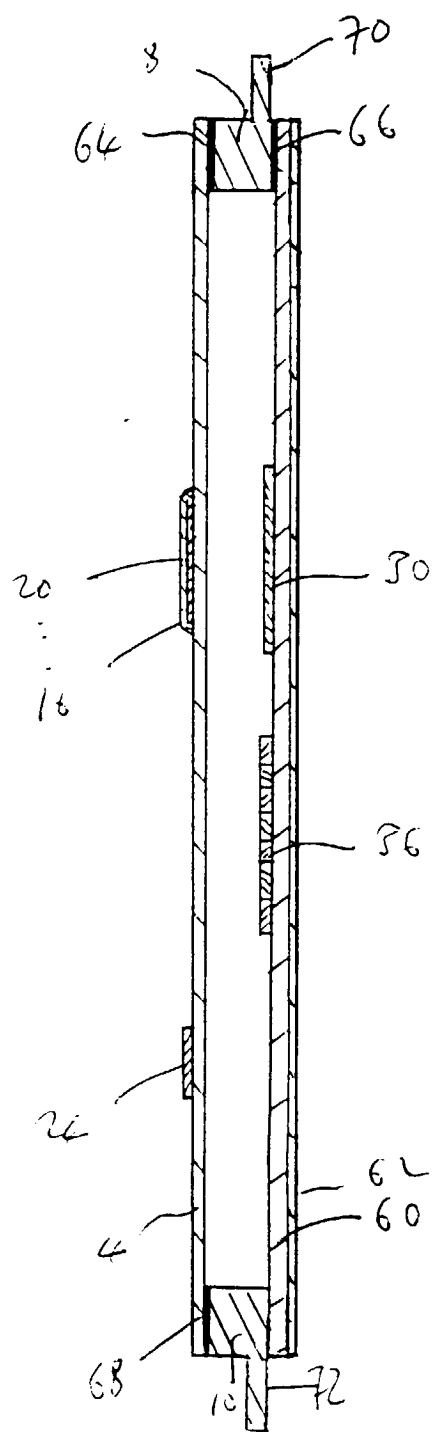


Figure 3



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 30 4244

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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)
A,D	WO 93 07605 A (RITE LITE USA INC) 15 April 1993 (1993-04-15) * page 10, line 6 - page 12, line 6 * * page 15, line 6 - page 17, line 32; figures 4-10 * ---	1,2,4, 8-10	G09F13/16 G09F13/04 G09F13/06
A	GB 2 173 630 A (BENBOW DAVID REES) 15 October 1986 (1986-10-15) * page 2, line 33-73 * * page 3, line 7-101; figures 1,2,6,8-10 * ---	1-7,9,10	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			G09F
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>6 October 1999</b>	Examiner <b>Jandl, F</b>
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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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 99 30 4244

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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06-10-1999

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