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(54) **LED lamp set for enhancing illumination and eliminating ghost images**

(57) An LED lamp set for enhancing illumination and eliminating ghost images includes a lamp shade (20), a diffusion membrane (10) and a circuit board (30). The lamp shade (20) has a plurality of light cups (23) each having a housing chamber (24) to hold at least one LED (40). The housing chamber (24) has an aperture (28) at the bottom run through by the LED (40) to form electric connection with the circuit board (30) and an opening (27) remote from the aperture (28) to define a light output surface (271). The diffusion membrane (10) covers the light output surface (271) and is made of a transparent material and includes a plurality of transparent bumps (11) on the surface. The circuit board (30) is located below the lamp shade (20). Through the concave shape of the light cups (23) and repetitive reflection of the bumps (11), light can be condensed to avoid scattering and loss. Moreover, as the light is greatly and uniformly condensed, ghost images can be eliminated.

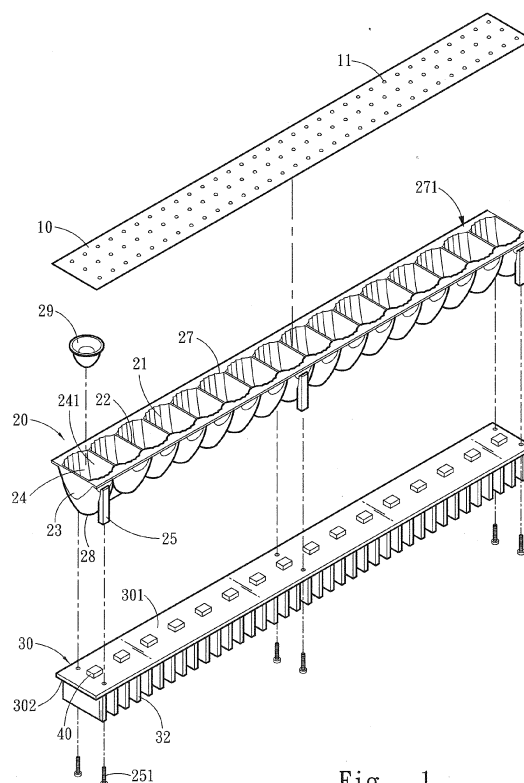


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a lamp shade and particularly to an LED lamp set for enhancing illumination and eliminating ghost images.

BACKGROUND OF THE INTENTION

[0002] Conventional lamp sets are quite bulky and often need a higher socket coupled with a bowl-shaped lamp shade formed at a smaller depth. When used for a prolonged period of time a higher temperature is generated that could be hazardous. Moreover, when the conventional lamp sets are configured in multiple numbers, multiple images are generated and overlapped, they also are called ghost images. In addition, the conventional lamp sets often produce flicker illumination that easily causes fatigue of users' eyes and results in ill effect to users' vision.

[0003] Light emitting diode (LED), compared with the conventional lamp sets, adopts a different approach to receive power supply and generate light. Hence the lighting fixtures for LED cannot adopt the conventional design and require a new approach. Due to smaller size and higher illumination of the LED, the light scatters in all directions through the conventional lamp shade that could cause discomfort to users' eyes. Many methods have been proposed to remedy the aforesaid problems, such as increasing the number or illumination of the LEDs. While illumination is increased, power consumption is reduced and temperature is lowered, the problem of multiple images becomes even more severe due to light scattering. This problem must be resolved by taking into account of light refraction and reflection, and design of the lamp shade.

SUMMARY OF THE INVENTION

[0004] Therefore, the primary object of the present invention is to provide an LED lamp set for enhancing illumination and eliminating ghost images.

[0005] To achieve the foregoing object, the LED lamp set according to the invention includes a lamp shade, a diffusion membrane and a circuit board. The lamp shade has a plurality of light cups each having a housing chamber to hold at least one LED. The housing chamber has an aperture at the bottom run through by the LED to form electric connection with the circuit board and an opening remote from the aperture to define a light output surface.

[0006] The diffusion membrane provides a uniform light facing surface. It includes a substrate added with chemical particles for light scattering. When light passes through the diffusion membrane, it travels through the media with two different refraction indexes to generate refraction, reflection and scattering. Hence an optical diffusion phenomenon is formed. In addition, the diffusion

membrane covers the light output surface and contains a plurality of transparent bumps to further enhance light uniform.

[0007] Thus, the invention uses the LED with high illumination and low power consumption for illumination. Through the concave shape of the light cups and repetitive reflection of the bumps, and light can be condensed to avoid scattering and loss. Moreover, as the light is greatly and uniformly condensed, the problem of ghost images can also be eliminated.

[0008] The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying embodiments and drawings. The embodiments serve merely for illustrative purpose and are not the limitations of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1 is an exploded view of the invention.

FIG. 2 is a top view of the lamp shade of the invention.

FIG. 3 is a side view of the lamp shade of the invention.

FIG. 4 is a schematic side view of the invention.

FIG. 5 is a schematic view of one embodiment of the invention showing illumination enhancing and ghost image eliminating effect.

FIG. 6 is a schematic view of another embodiment of the invention showing illumination enhancing and ghost image eliminating effect.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] Please refer to FIGS. 1 through 4, the present invention includes a lamp shade 20, a diffusion membrane 10 and a circuit board 30. The lamp shade 20 includes a plurality of opaque reflective mirror surfaces 22 inside to reduce light scattering of abutting light sources and a plurality of light cups 23.

[0011] Each light cup 23 is formed in a concave shape and has a housing chamber 24 to hold at least one LED 40. The housing chamber 24 has an aperture 28 at the bottom run through by the LED 40 to form electric connection with the circuit board 30 and an opening 27 remote from the aperture 28 to define a light output surface 271. The opening 27 is formed at a length L equal to the distance D from the opening 27 to the aperture 28 (referring to FIG. 3) to form an optimal light travel path.

[0012] The housing chamber 24 contains a reflective surface 241 proximate the opening 27 and perpendicular to the light output surface 271. The reflective surface 241 confines the light travel path to prevent light scattering and loss.

[0013] The entire lamp shade 20 is plated with alumi-

num 201 in a silver-white color to increase light reflection. Hence, the reflective mirror surface 22 can reduce light scattering of the abutting LEDs, and the concave light cups 23 can enhance concentration of the light emitted from the LEDs 40. Each light cup 23 further may have a plurality of light reflection protrusive traces 21 on the wall to increase light reflection.

[0014] The diffusion membrane 10 covers the light output surface 271 to provide a uniform light facing surface. It includes a substrate added with chemical particles for light scattering. When light passes through the diffusion membrane 10, it travels through the media with two different refraction indexes to generate light diffusion effect. The diffusion membrane 10 is made of a transparent material and contains a plurality of bumps 11 which are evenly distributed and can evenly diffuse light to further reduce the light diffusion problem caused by multiple sets of light sources.

[0015] As the LED 40 provides higher illumination, cooling issue becomes more important. Hence the lamp shade 20 has a plurality of support brackets 25 on an outer side thereof that are fastened to the circuit board 30 through screws 251. The circuit board 30 has an upper surface 301 and a lower surface 302. The LED 40 is fastened to the upper surface 301. The circuit board 30 also has one set of radiation fins 32 located on the lower surface 302 connecting to the light cups 23 via the circuit board 30. Hence heat generated by the LED 40 can be channeled out quickly. The LED 40 further is encased by a transparent light condensing hood 29 to enhance illumination.

[0016] Referring to FIG. 5, when the LED 40 emits light 50, the light 50 enters the light cup 23 and is reflected repeatedly by the transparent bumps 11, reflective mirror surface 22 and light condensing hood 29 and condensed to project towards the light output surface 271. Therefore, light condensing effect is accomplished and a uniform illumination is also realized. Through such optical reflection and refraction structure, illumination can be enhanced and ghost image can be eliminated to meet use requirements.

[0017] Referring to FIG. 6, in practical use, the light condensing hood 29 can be omitted. As the light condensing hood 29 aims to control light condensing angle of the LED, even the light condensing hood 29 is omitted, the light condensing effect still can be achieved through reflection of the reflective mirror surface 22.

[0018] While the preferred embodiments of the invention have been set forth for the purpose of disclosure, modifications of the disclosed embodiments of the invention as well as other embodiments thereof may occur to those skilled in the art. Accordingly, the appended claims are intended to cover all embodiments which do not depart from the spirit and scope of the invention.

Claims

1. An LED lamp set for enhancing illumination and eliminating ghost images, **characterized by:**

a lamp shade (20) including a plurality of light cups (23) each being formed in a concave shape to form a housing chamber (24) to hold at least one light emitting diode (40), the housing chamber (24) including an aperture (28) at the bottom thereof and an opening (27) remote from the aperture (28) to define a light output surface (271); a diffusion membrane (10) which is located on the lamp shade (20) to cover the light output surface (271) and is made of a transparent material and includes a plurality of transparent bumps (11) on the surface thereof; and a circuit board (30) located below the lamp shade (20) to form electric connection with the light emitting diode (40) which runs through the aperture (28).

2. The LED lamp set of claim 1 further including a light condensing hood (29) to encase the light emitting diode (40).
3. The LED lamp set of claim 1 or 2, wherein each light cup (23) includes a plurality of light reflection protrusive traces (21) inside.
4. The LED lamp set of any of the claims 1 to 3, wherein the lamp shade (20) includes a plurality of support brackets (25) on an outer side thereof, each of the plurality of support brackets (25) fastening to the circuit board (30) through a screw (251).
5. The LED lamp set of any of the claims 1 to 4, wherein the circuit board (30) includes an upper surface (301) connecting to the light emitting diode (40) and a lower surface (302).
6. The LED lamp set of claim 5, wherein the circuit board (30) includes one set of radiation fins (32) on the lower surface (302).
7. The LED lamp set of any of the claims 1 to 6, wherein the lamp shade (20) is plated with aluminum.
8. The LED lamp set of any of the claims 1 to 7, wherein the lamp shade (20) includes a plurality of opaque reflective mirror surfaces (22) to separate the light cups (23).
9. The LED lamp set of any of the claims 1 to 8, wherein the opening (27) is formed at a length equal to a distance from the opening (27) to the aperture (28).
10. The LED lamp set of any of the claims 1 to 9, wherein

the housing chamber (24) includes a reflective surface (241) proximate the opening (27) and perpendicular to the light output surface (271).

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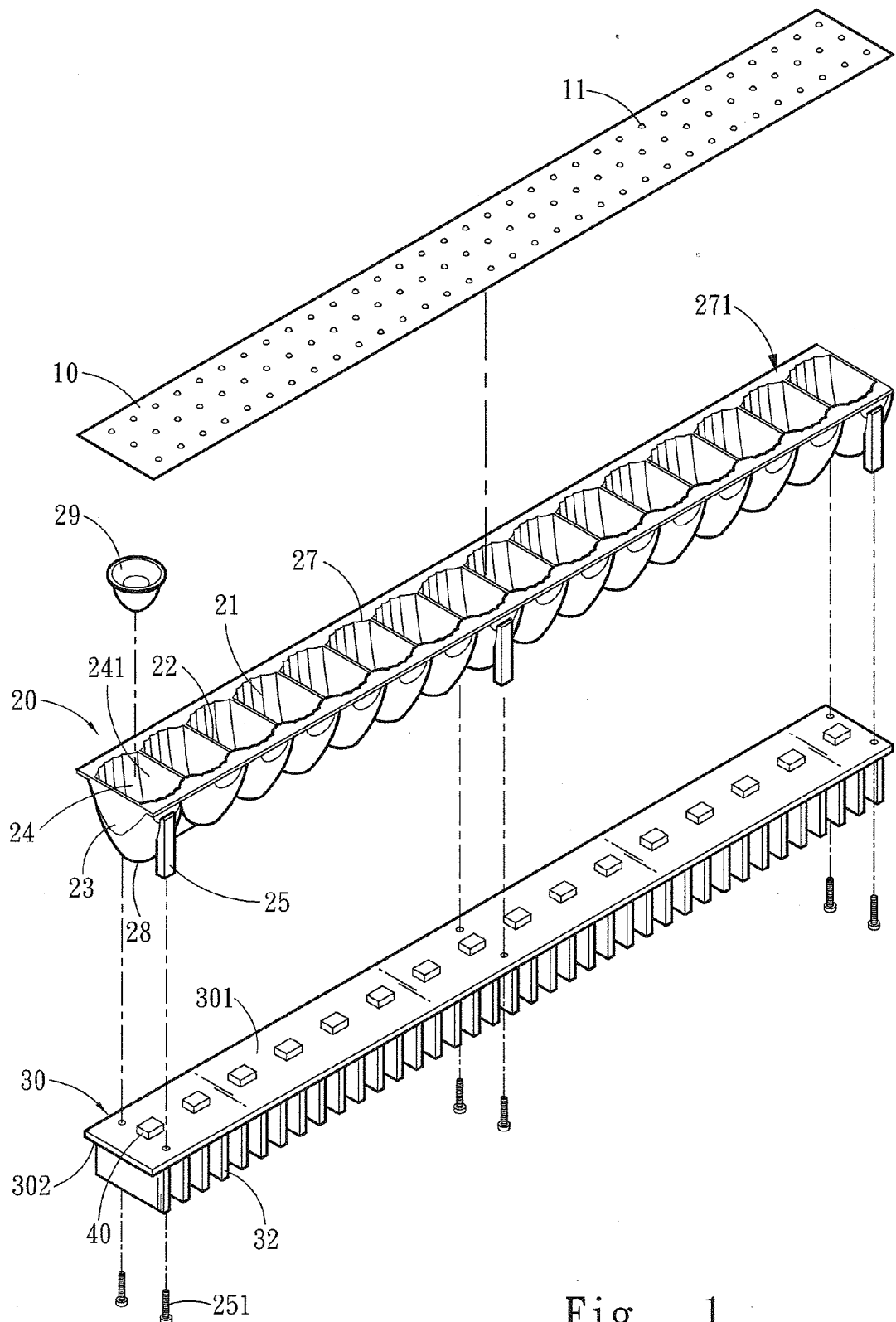


Fig . 1

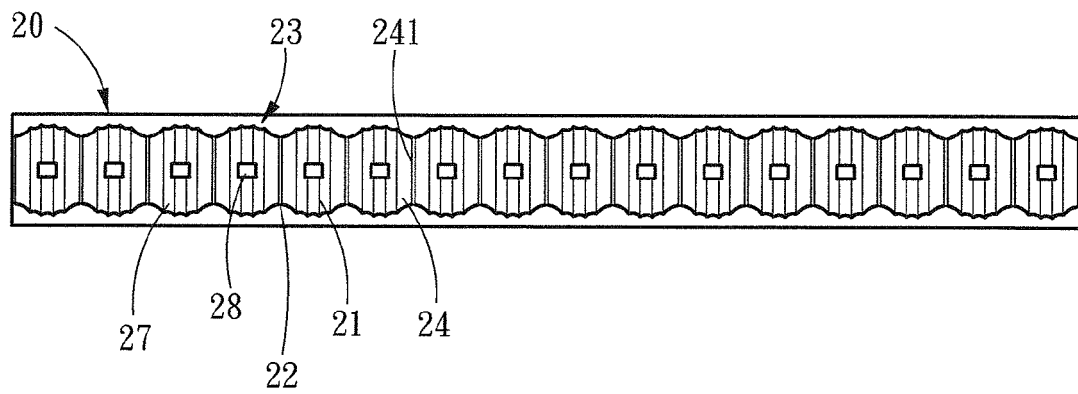


Fig . 2

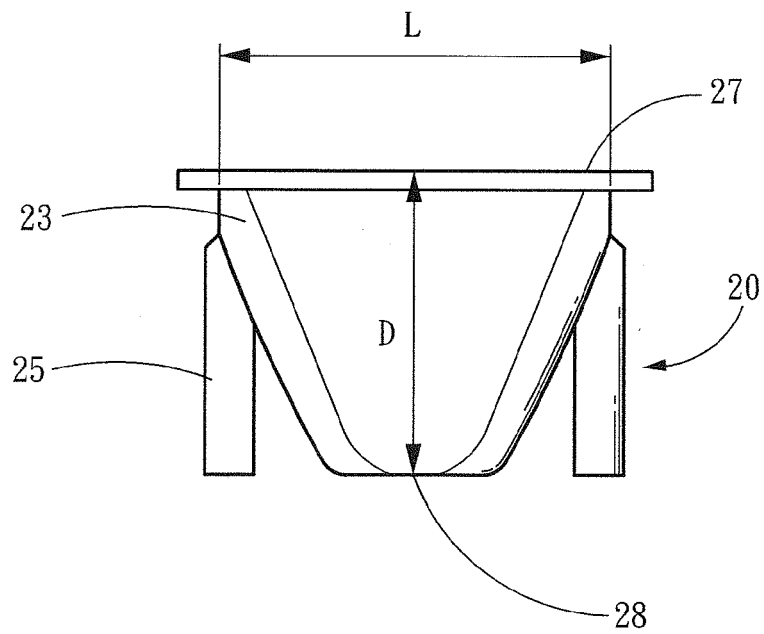


Fig . 3

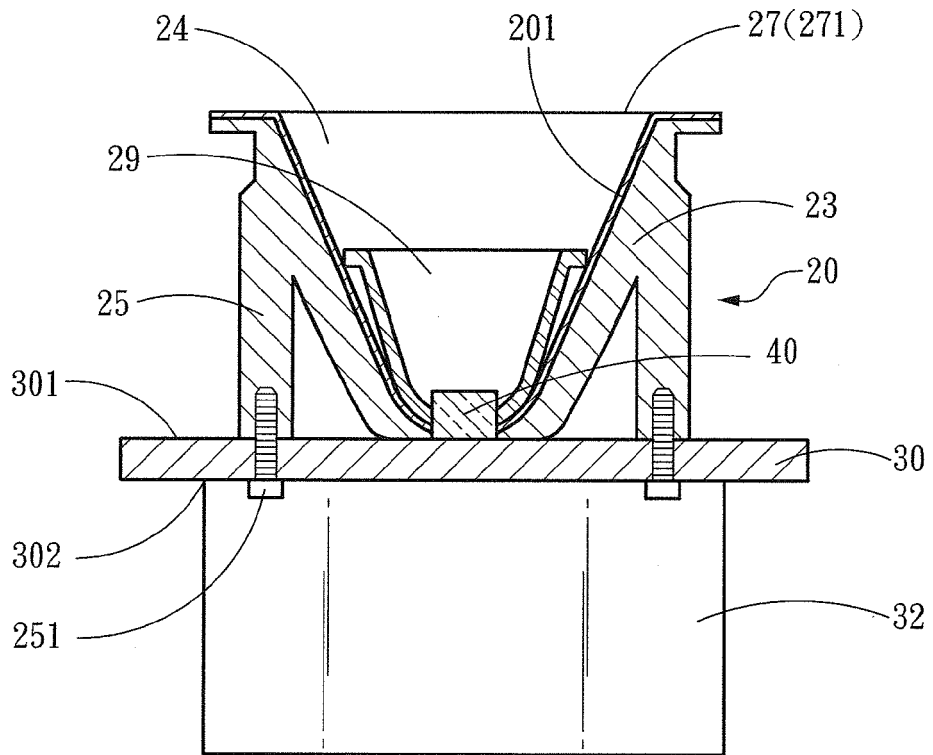


Fig . 4

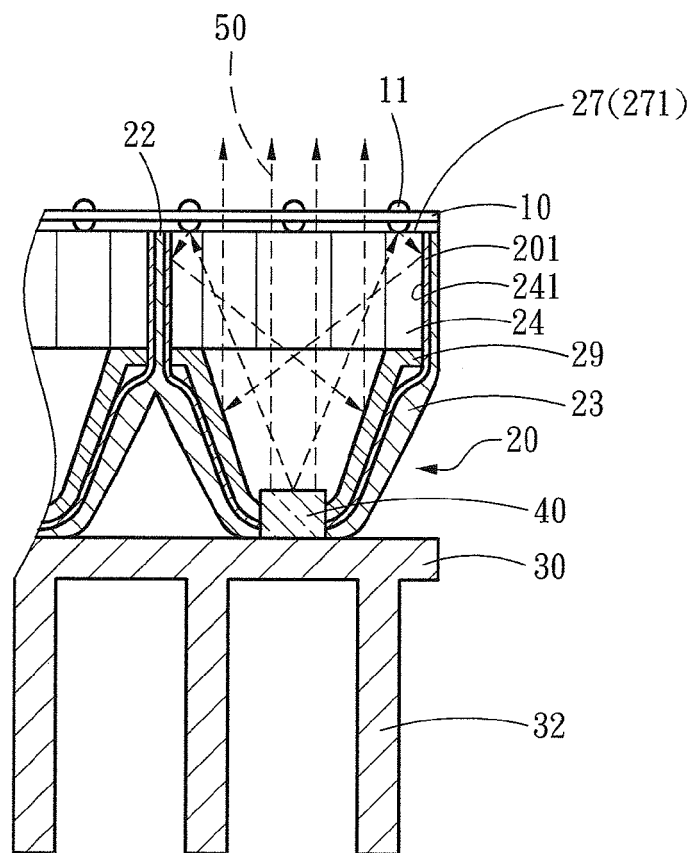


Fig . 5

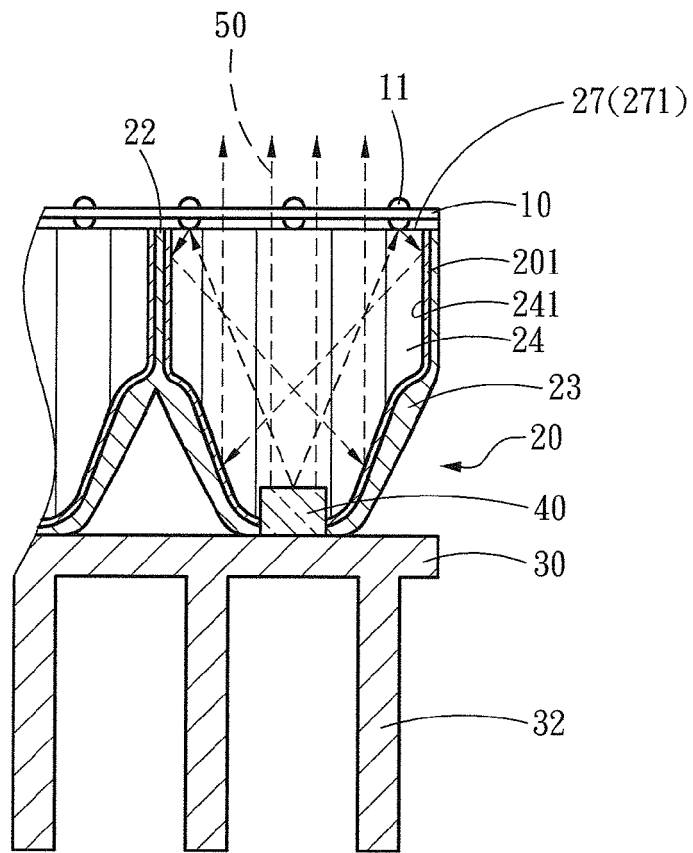


Fig . 6



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 8272

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 101 634 425 A (HUIPENG ZENG) 27 January 2010 (2010-01-27) * abstract; figures *	1-10	INV. F21S4/00 F21V7/00
X	US 5 580 156 A (SUZUKI YOSHIO [JP] ET AL) 3 December 1996 (1996-12-03) * column 3, line 67 - column 4, line 3; figure 3 *	1-10	ADD. F21Y103/00
X	US 2009/290340 A1 (HAYAKAWA YASUHIRO [JP]) 26 November 2009 (2009-11-26) * paragraphs [0047] - [0049]; figures 1-4 *	1-10	
X	US 7 950 821 B1 (GEORGITSIS ANTHONY C [US] ET AL) 31 May 2011 (2011-05-31) * figures 9,10 *	1,2,4-6,9	
A	US 2003/156416 A1 (STOPA JAMES L [US] ET AL) 21 August 2003 (2003-08-21) * figure 7 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			F21S F21V
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 July 2012	Examiner Chaloupy, Marc
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
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 15 8272

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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19-07-2012

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CN 101634425	A	27-01-2010	NONE	
US 5580156	A	03-12-1996	CN 1128885 A	14-08-1996
			US 5580156 A	03-12-1996
US 2009290340	A1	26-11-2009	JP 4519148 B2	04-08-2010
			JP 2008198458 A	28-08-2008
			TW 200905128 A	01-02-2009
			US 2009290340 A1	26-11-2009
			WO 2008099753 A1	21-08-2008
US 7950821	B1	31-05-2011	US D656258 S1	20-03-2012
			US 7950821 B1	31-05-2011
			US 2011194287 A1	11-08-2011
US 2003156416	A1	21-08-2003	AU 2002326585 A1	11-11-2003
			US 2003156416 A1	21-08-2003
			WO 03095894 A1	20-11-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82