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(54) **High-power compact fluorescent light bulb**

(57) Compact fluorescent light bulb of relatively high-power (more than 25W) comprising a tubular bulb (1) extending from a base (2) containing an electronic power and control circuit (3) comprising solid-state components (11), and a socket (4), connected to the tubular bulb (1)

by means of said base (2), with a side wall (5). Pockets (7) are provided on the side wall (5) in said socket (4) to house said solid-state components (11) so that they remain in contact with said side wall (5) and the heat they generate is consequently dissipated to the outside of said wall.

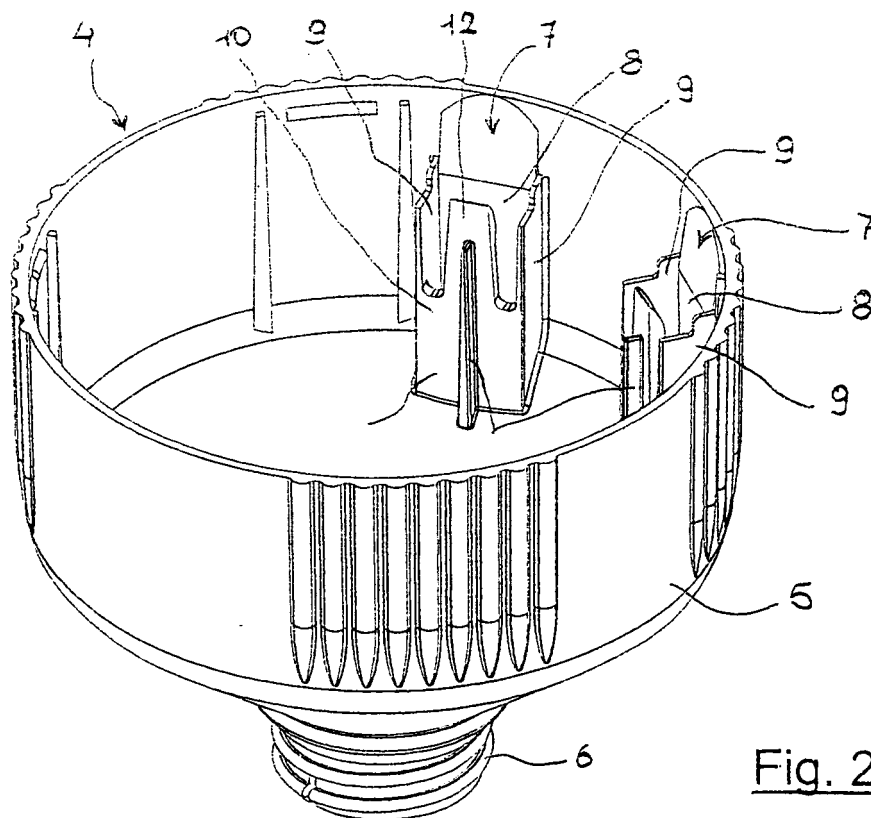


Fig. 2

Description

[0001] The present invention relates generally to the field of the electronic light bulb, and particularly refers to a high-power self-ballasted compact fluorescent light bulb.

[0002] As is known, a compact fluorescent light bulb comprises a variously-shaped tubular bulb extending from a base containing an electronic circuit that controls the power to the electrodes, commonly known as a "ballast". In particular, the electronic circuit is provided on a board attached to said base. The light bulb also includes a plastic case, or "socket" ending with a screw base for connection to a lamp holder. The light bulb screw base and socket are generally held together by a snap-on connection.

[0003] Light bulbs of the above-described type are in increasingly widespread use for various domestic and industrial plant applications. In the case of compact, or energy-saving, fluorescent lights for domestic uses, the maximum power does not usually exceed 25W. For outdoor applications, on the other hand, where a greater luminous flux may be required, compact fluorescent light bulbs are available with a relatively high power, in excess of 25W.

[0004] The European Standards (and EN 61000-3-2 in particular, which specifies limits for harmonic current emissions) demand the use of a power factor correction device in this type of light bulb whenever the power of the light bulb exceeds 25W. This makes it necessary to add some complicated circuitry on the electronic board, which increases the crowding of the components and leads to the generation of a considerable amount of heat by the system's additional solid-state components in the socket. If it is not dissipated adequately, said additional heat can cause even permanent damage to the electronic components, especially when the light bulb is fitted in a lighting fixture with a closed diffuser.

[0005] The currently most widespread solution adopted to solve the heat dissipation problem in compact fluorescent light bulbs with a power in excess of 25W involves the use of non-integrated electronic ballasts containing the necessary circuitry in a larger space. These separate ballasts are wired by the user to non-integrated fluorescent light bulbs. The drawback of this solution lies in the need to provide housing for the separate circuit supply and control ballast, which can sometimes prove difficult or give rise to an undesirable aesthetic end result, depending on the applications.

[0006] The object of the present invention is to produce a compact fluorescent light bulb with a relatively high power, i.e. in excess of 25W, equipped with a power factor correction device incorporated in its socket and nonetheless capable of dissipating the heat generated thereby well enough to avoid any risk of damage to the electronic components contained therein.

[0007] This object is achieved by the compact fluorescent light bulb according to the present invention, the

fundamental feature of which consists in the fact that pockets are provided inside the socket, in the side wall surrounding the inner chamber containing the electronic power and control circuit, said pockets being designed to house the circuit's solid-state components so that, these are in contact with the side wall to dissipate the heat they generate to the outside air through said wall.

[0008] Further characteristics and advantages of the compact fluorescent light bulb according to the present invention will become clearer from the following description of an embodiment, given as a non-limiting example with reference to the attached drawings, wherein:

- figure 1 is a partially sectional, exploded view of the compact fluorescent light bulb according to the present invention;
- figure 2 is a top perspective view of the socket of the light bulb of figure 1;
- figure 3 is a cross-sectional view of the socket of figure 2;
- figure 4 is a top plan view of the socket shown in figure 2.

[0009] With reference to figure 1, the compact fluorescent light bulb according to the present invention comprises a tubular bulb 1, shaped into "U"-shaped loops in the present embodiment, extending from a base 2, with ventilation slots 2a, to which a printed circuit 3 is attached, containing the ballast and the power factor corrector. The light bulb according to the invention conventionally also includes a socket 4 consisting of a tubular wall 5 converging towards a screw base 6 for connection to a lamp holder (not shown). The base 2 of the light bulb can be attached to the socket 4 by means of a snap-on connection or other equivalent means.

[0010] According to the invention, the inner surface of the tubular wall 5 contains pockets 7 for housing solid-state components 11 of the printed circuit 3. In particular, the solid-state components in the present embodiment of the invention are two transistors and one MOSFET, so there are three pockets 7 in the socket 4, angularly spaced at the same distance from one another as the aforementioned components 11.

[0011] The pockets 7 comprise a rear wall 8, from which two substantially side walls, or sides, 9 extend, the free ends of which are joined by a front wall 10 substantially parallel to the rear wall.

[0012] As also shown in figures 3 and 4, the rear wall 8 is formed as a localized thickening of the tubular wall 5 of the socket 4. The front wall 10, on the other hand, is formed by a solid portion 10a, from which a tab 12 extends towards the base 2. The free end of said tab is enlarged on the side facing the rear wall 8. A stiffening ribbing 13 runs along the solid portion 10a of the front wall 10 and along part of the tab 12.

[0013] When the base 2 is attached to the socket 4, a light pressure makes the solid-state components 11 engage in the corresponding pockets and the enlarged por-

tion of the tab 12 has the effect of exerting a moderate pressure to keep the respective component in contact with the rear wall 8 of the pocket 7. The heat generated by the components 11 is thus transferred by conduction to the rear wall 8, from where it is dissipated through the tubular wall 5 of the socket 4 to the outside.

[0014] This solution enables the temperature of the solid-state components 11 to be reduced by approximately 25°C (from 92°C without the pockets 7 to 67°C when the components 11 are housed in the pockets 7, in steady temperature conditions, with the light bulb operating in freely-circulating air and placed in a vertical position with the coupling upwards).

[0015] When the light bulb is fitted in a transparent diffuser globe, i.e. in the most common conditions of use, the temperatures increase significantly: in particular, a mean increase of approximately 10°C of all the temperatures has been recorded with respect to an assembly in freely-circulating air. Without the solution forming the object of the present invention, the solid-state components 11 would easily reach unacceptable temperatures, near the junction melting temperature, with a consequent permanent failure that occurs when the body of the transistors exceeds a temperature of 120-150°C.

[0016] One of the effects of the solution according to the invention is that the temperature of the other electronic components is also advantageously reduced, i.e. the temperature inside the chamber created by the tubular wall 4 is reduced by approximately 11°C (from 83°C to 72°C).

[0017] The benefit deriving from the present invention is consequently not limited to protecting the transistors alone, but also applies to the other components, and the electrolytic capacitor in particular that is the most temperature-sensitive component and that - according to the manufacturers - doubles its lifetime with every 10°C temperature reduction.

[0018] The above description clearly shows that providing for the heat generated by the solid-state components 11 to be dissipated to the outside as in the present invention enables the production of relatively high-power compact fluorescent light bulbs, even 45W or more, which were hitherto impossible to manufacture in compliance with the previously-mentioned European Standard.

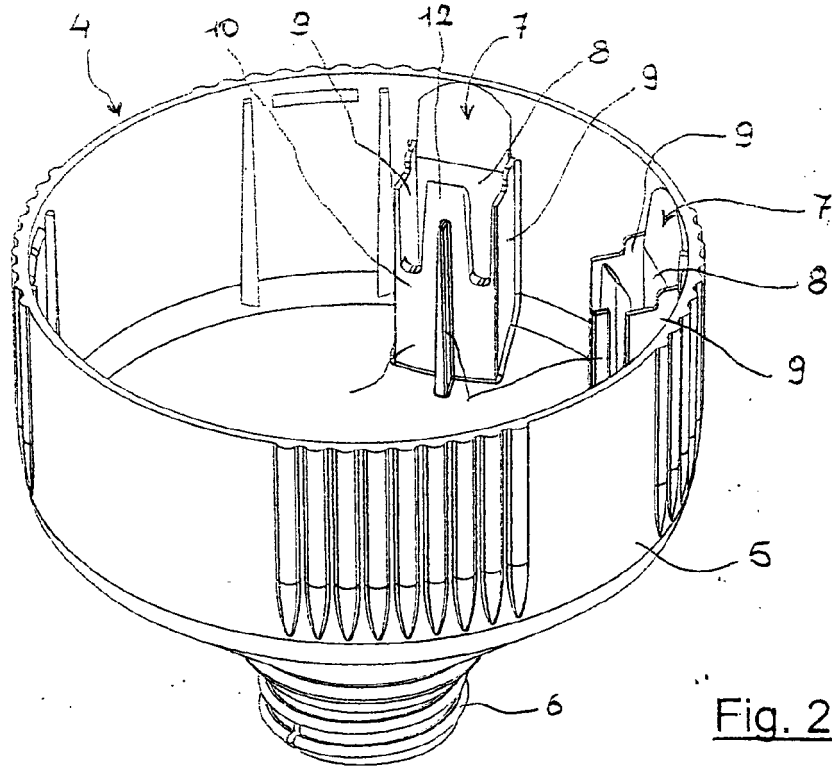
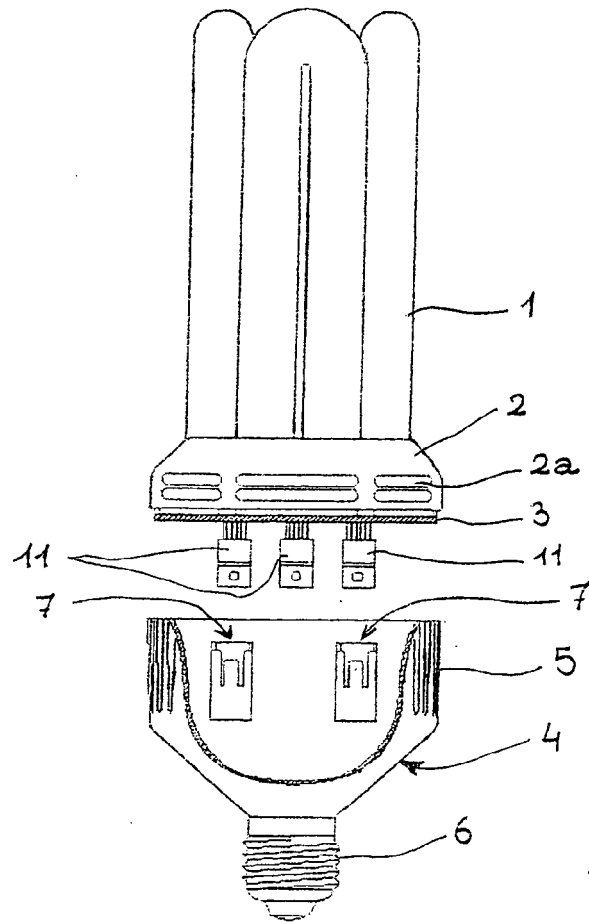
[0019] Variations and/or modifications may be made to the high-power compact fluorescent light bulb according to the present invention without departing from the spirit and scope of the invention as set forth in the following claims.

Claims

1. A compact fluorescent light bulb of a relatively high-power comprising of a tubular bulb (1) extending from a base (2) containing an electronic power and control circuit (3) comprising solid-state components

(11), and a socket (4) connected to said bulb (1) through said base (2), said socket (4) comprising a side wall (5), **characterized in that** pockets (7) are formed on said side wall (5) inside said socket (4) for housing said solid-state components (11) so that they remain in contact with said wall (5) and thus dissipate the heat they generate to the outside.

2. Light bulb as set forth in claim 1, wherein each of said pockets (7) comprises a rear wall (8) from which two sides (9) extend, joined by a front wall (10) lying substantially parallel to the rear wall, at least a part of said front wall (10) exerting a pressure on said solid-state components engaged in the pocket (7) to keep them in contact with the rear wall.
3. Light bulb as set forth in claims 1 or 2, wherein the front wall (10) of each of said pockets (7) comprises a solid portion (10a) with at least a tab (12) extending therefrom towards said base (2), the free end of said tab being enlarged so that it presses the solid-state component (11) engaged in said pocket (7) against the rear wall (8).
4. Light bulb as set forth in any of the previous claims, wherein said solid-state components (11) snap engage into said pockets (7).
5. Light bulb as set forth in any of the previous claims, wherein said solid-state components (11) are two transistors and a MOSFET.



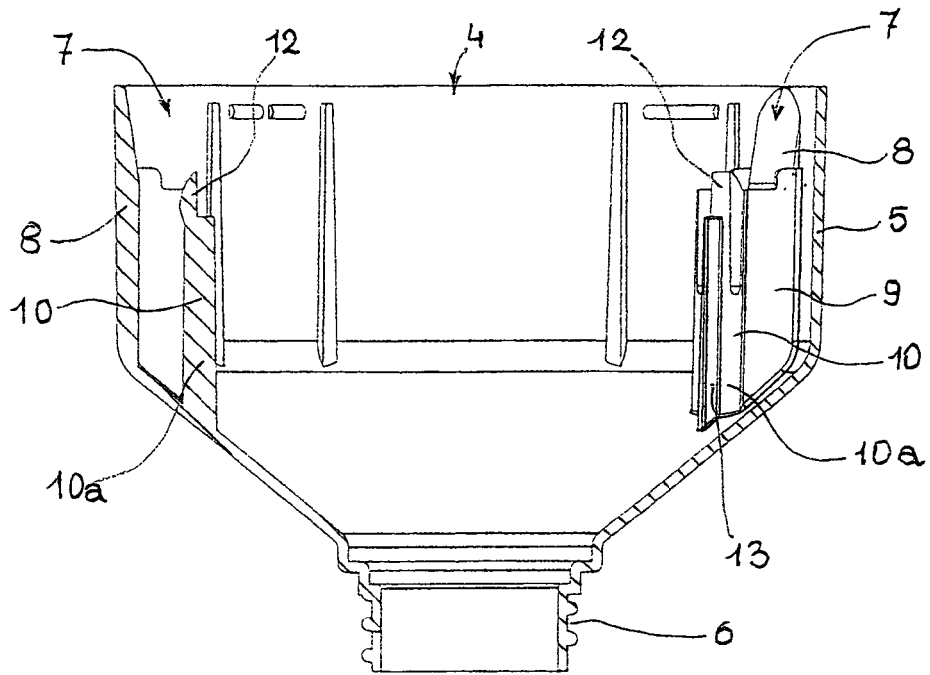


Fig. 3

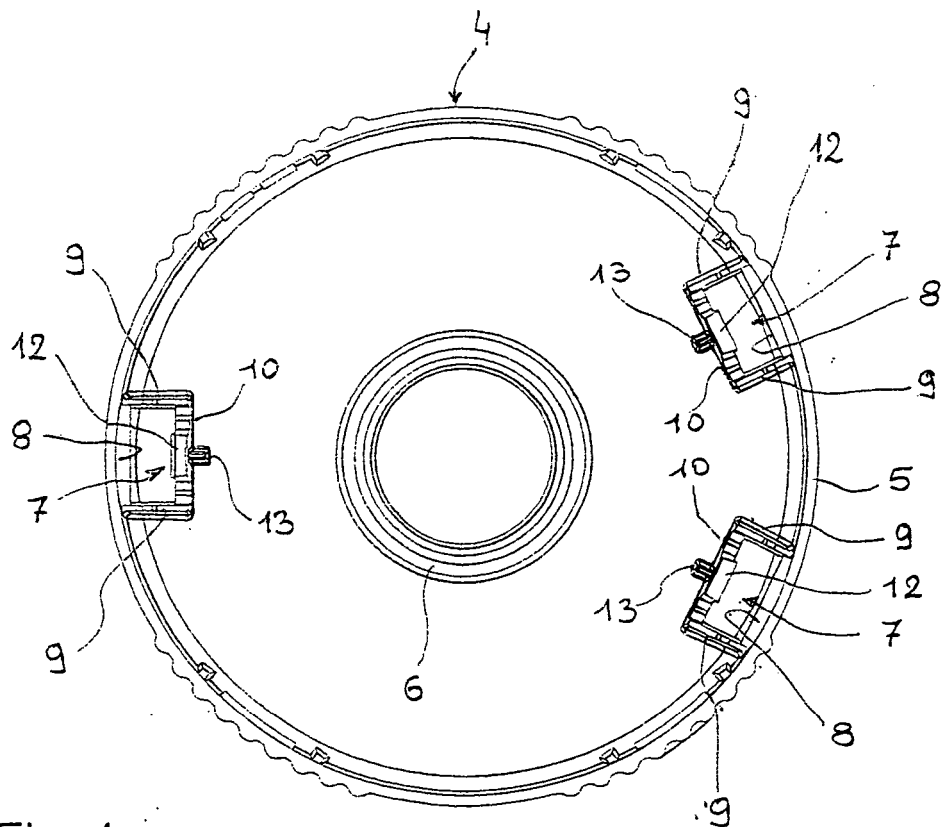


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5786

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A	EP 0 100 121 A2 (PHILIPS CORP [US]) 8 February 1984 (1984-02-08) * page 1 - page 3, column 6 * * page 9 - page 10 *	1-5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			H01J
Place of search		Date of completion of the search	Examiner
The Hague		21 February 2007	But, Gabriela-Ileana
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 42 5786

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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21-02-2007

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