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(54) **Improved heat sink structure for light-emitting diode based streetlamp**

(57) A heat sink structure for light-emitting diode (LED) based streetlamp is provided, comprising an upper cover (1) on which heat sink fins (12) are formed integrally

and a lower cover (2). The heat energy generated from the LEDs (4) mounted within the upper and lower covers can be removed through the heat sink fins (12), achieving the effect of rapid removing of the heat energy.

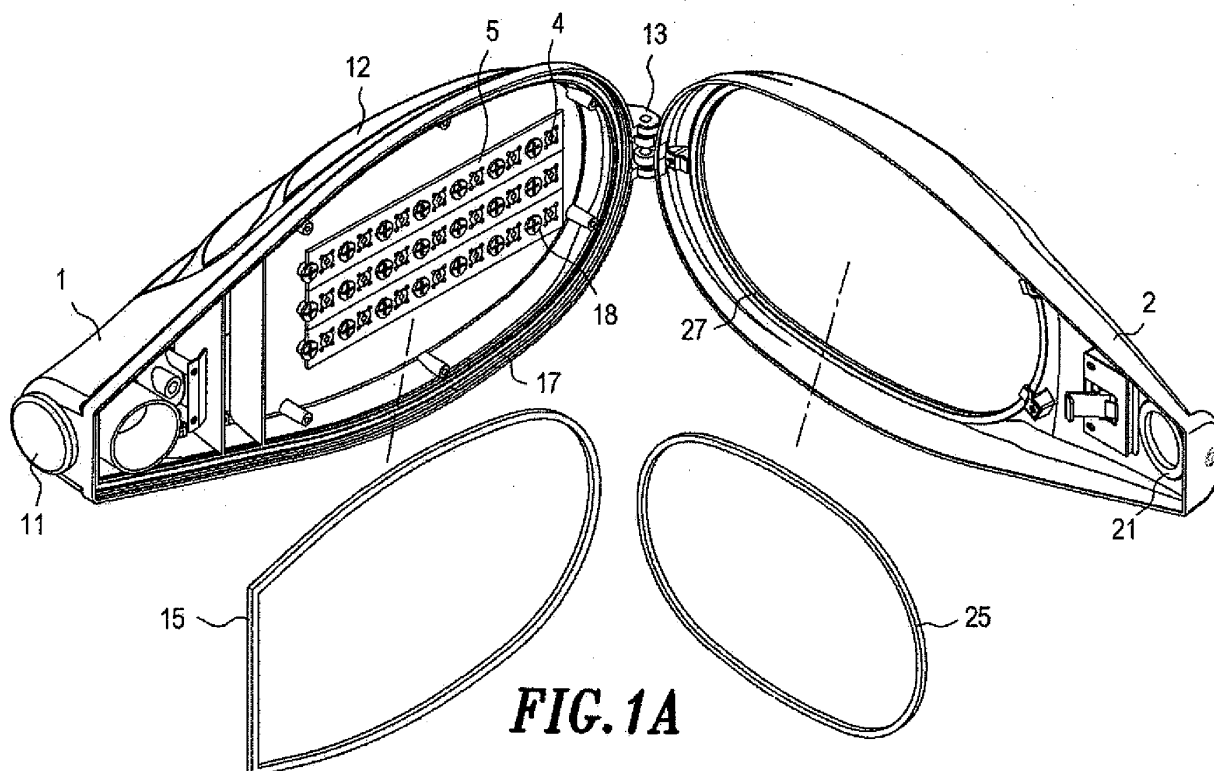
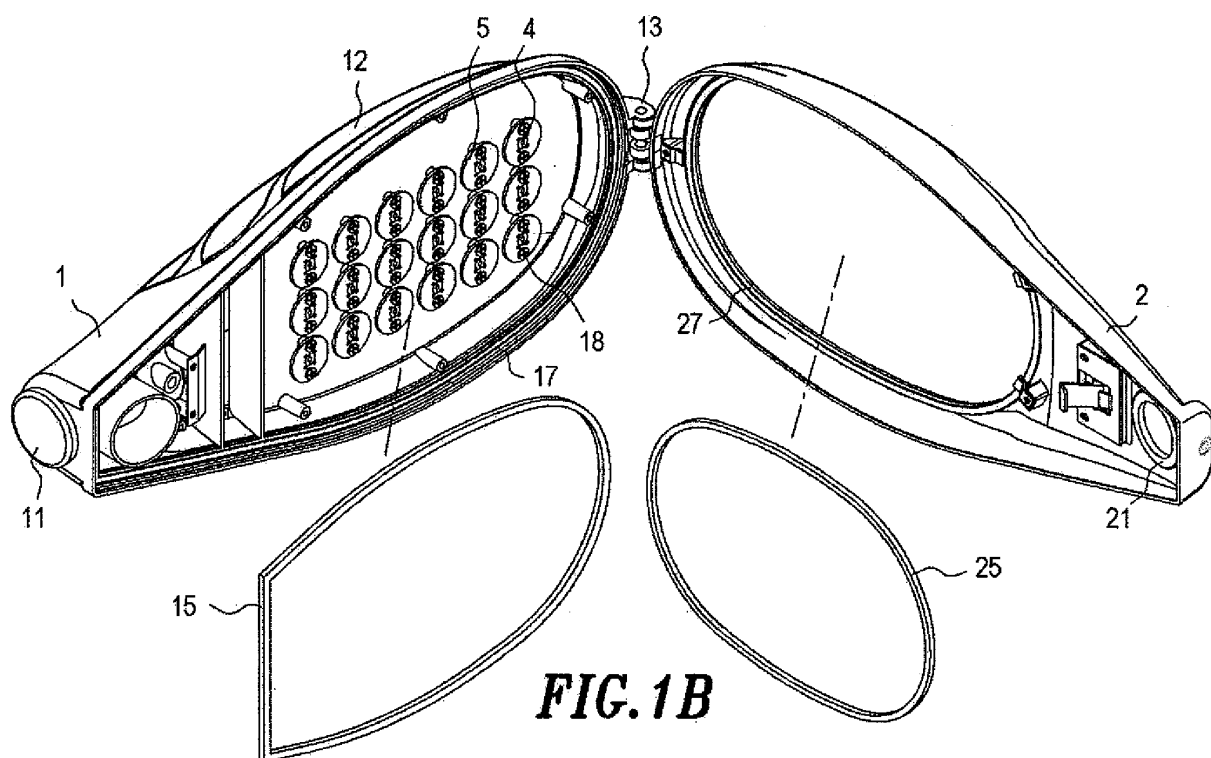


FIG. 1A



Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present invention relates to a heat sink structure for a light-emitting diode (LED) based streetlamp, and particularly to an improved heat sink structure for LED based streetlamp.

2. Description of the prior art

[0002] Conventionally, the streetlamps are generally in the form of bulbs. However, they are considered having the disadvantages of high power consumption and short lifetime. Recently, light-emitting diode (LED) has been used for the torch as a power source. High power LED is a kind of LED which can emit light normally even only with the power 0.5 to 3 watts supplied. In addition to the torch, such kind of LED has also been used in the headlight. However, the high power LED still can not be effectively used as a backlight source for liquid crystal display (LCD) since the light emitting efficiency thereof is too low therefor. So far, there are still few LEDs for the LCD on market, since they have to be further developed for the practical use.

[0003] With development of the LEDs for the recent decade, the high power LEDs have gradually become indispensable in our daily life. Being technically limited by the LED materials and packaging technology, the LEDs still have not lived up to the specifications of the general lighting means in luminance and lifetime. Further, the heat energy, generated when the LED emits light, has to be properly removed therefrom. If the heat sink mechanism is not properly provided, the high temperature contributed by the heat energy will cause the luminance and lifetime reduced and the light wavelength shifted with respect to the LEDs. In the case of the streetlamp, the poor heat sink mechanism also leads to a quick damage thereof.

[0004] In view of these problems encountered in the prior art, the Inventors have paid many efforts in the related research and finally developed successfully a heat sink structure for LED based streetlamp, which is taken as the present invention.

SUMMARY OF THE INVENTION

[0005] It is, therefore, an object of the present invention to provide a heat sink structure for light-emitting diode (LED) based streetlamp, through which heat energy generated from LEDs therein can be rapidly removed therefrom.

[0006] In accordance with the present invention, the heat sink structure for LED based streetlamp comprises an upper cover on which a plurality of heat sink fins are formed integrally and a lower cover. The heat energy

generated from the LEDs, mounted on a polymer-coated gold substrate, within the upper and lower covers can be removed through the heat sink fins, effectuate rapid removing of the heat energy. Depending on the power specification for the LEDs, the polymer-coated gold substrate may be varied in area and shape. An upper silicon glue and a lower silicon glue are provided in the upper and lower covers, respectively, so that the heat sink structure can be water resistant. A fastening member is disposed between the upper and lower covers so that the upper and lower covers may be not totally separated from each other when one of them is moved from the other for maintenance and replacement of elements in the heat sink structure. A rear hole and a lower hole are formed on the upper and lower covers, respectively, for insertion and fixation of a lamp post. When the lamp post is absent, an upper plug and a lower plug may be used to choked up the rear and lower holes, respectively, so that the heat sink structure can be water resistant.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The drawings disclose an illustrative embodiment of the present invention which serves to exemplify the various advantages and objects hereof, and are as follows:

FIG. 1A is an exploded view of a heat sink structure for light-emitting diode (LED) based street light according to an embodiment of the present invention; FIG. 1B is an exploded view of the heat sink structure for LED based street light according to another embodiment of the present invention; FIG. 2A is a side view of the heat sink structure for LED based street light shown in FIG. 1A; FIG. 2B is a side view of the heat sink structure for LED based street light shown in FIG. 1B; FIG. 3 is a perspective view of the heat sink structure for LED based street light shown in FIG. 1A; and FIG. 4 is a perspective view of the heat sink structure for LED based street light shown in FIG. 1B.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0008] The present invention discloses a heat sink structure for light-emitting diode (LED) based streetlamp, which will be described taken with the preferred embodiments in conjunction with the drawings. However, they should not be deemed limitative but merely for description.

[0009] Referring to FIG. 1A, the heat sink structure for high power LED based streetlamp according to an embodiment of the present invention is schematically shown therein. The heat sink structure comprises an upper cover 1, a lower cover 2 and a polymer-coated gold substrate 5. Between the upper cover 1 and the lower cover 2, there is a fastening member 13 for fixing the two covers

1, 2 together. The fixation member 13 is disposed on an outer surface of the upper cover 1 at a front end thereof, or on an inner surface of the upper cover 1 at a rear end thereof. As such, the upper cover 1 may be moved from the lower cover 2 but without being totally separated from the lower cover 2. Referring to FIG. 4, the upper and lower covers 1, 2 are each a rectangular body. On the outer surface of the upper cover 1 at the rear end, a rear hole 11 for fixation of a lamp post is formed. On the outer surface of the lower cover 2 at a lower end, a lower hole 21 for fixation of the lamp post is formed. With the rear hole 11 and the lower hole 21, the lamp post can be firmly fixed. Viewed externally, each of the upper and lower covers 11, 21 may also have a circular or other structure.

[0010] Referring to FIG. 2A, an upper plug 16 and a lower plug 26 may be used to choke up the rear and lower holes 11, 21 so that the heat sink structure can be water resistant. In addition, a lamp mask 3 is disposed on the outer surface of the lower cover 2.

[0011] Referring again to FIG. 1A, the upper and lower covers 1, 2 have an upper slot 17 and a lower slot 27, respectively. The upper slot 17 is formed at a rim of the inner surface of the upper cover 1. An upper silicon glue 15 may be received within the upper slot 17. The lower slot 17 2 is formed at a rim of the inner surface of the lower cover 2. A lower silicon glue 25 may be received within the lower slot 27. With the upper and lower slots 17, 27, the heat sink structure can be water resistant when the upper and lower covers 1, 2 are assembled together. A plurality of high power LEDs 4 are fixedly mounted on the polymer-coated gold substrate 5. Referring to FIG. 1 and FIG. 1B, the polymer-coated gold substrate 5 may also take the form of rectangular or circular shape. The polymer-coated gold substrate 5 is fixed on the inner surface of the upper cover 1 by means of a screw 18. In this manner, the heat energy generated from the high power LEDs can be transmitted through the polymer-coated gold substrate 5 to a plurality of heat sink fins 12, which may be made of aluminum, and further to the ambient air.

[0012] Referring to FIG. 3, the plurality of heat sink fins 12 are integrally formed on the outer surface of the upper cover 1. As such, the heat energy generated from the LEDs 4 can be rapidly moved therefrom.

[0013] Many changes and modifications in the above described embodiment of the invention can, of course, be carried out without departing from the scope thereof. Accordingly, to promote the progress in science and the useful arts, the invention is disclosed and is intended to be limited only by the scope of the appended claims.

Claims

1. A heat sink structure for light-emitting diode (LED) based streetlamp, comprising:

an upper cover having an upper outer surface

and an upper inner surface and comprising a fastening member on the upper outer surface at a front end thereof, a rear hole on the upper outer surface at a rear end thereof for fixing a lamp post, an upper slot formed on a rim on the upper inner surface, wherein an upper silicon glue is received on the upper slot and a plurality of heat sink fins are formed on an upper portion of the upper outer surface;

a lower cover having a lower outer surface and a lower inner surface and comprising the fastening member on the lower outer surface at a front end thereof, a lower hole on the lower outer surface at a rear end thereof for fixing the lamp post and a lower slot formed at a rim of the lower inner surface of the lower cover, wherein a lower silicon glue is received in the lower slot; and a polymer-coated gold substrate disposed within the upper cover and being a printed circuit board (PCB) having a copper material for heat conduction.

2. The heat sink structure as claimed in claim 1, wherein the fastening member is disposed at the rear ends of the upper and lower covers, so that the upper and lower covers are still connected to each other when one of the upper and lower covers is moved from the other.

3. The heat sink structure as claimed in claim 1, wherein the rear hole is choked up with an upper plug when the lamp post is absent.

4. The heat sink structure as claimed in claim 1, wherein the lower hole is choked up with a lower plug when the lamp post is absent.

5. The heat sink structure as claimed in claim 1, wherein a plurality of LEDs are fixedly mounted on the polymer-coated gold substrate.

6. The heat sink structure as claimed in claim 1, wherein the polymer-coated gold substrate has a rectangular shape.

7. The heat sink structure as claimed in claim 1, wherein the polymer-coated gold substrate has a circular shape.

8. The heat sink structure as claimed in claim 1, wherein each of the upper and lower covers has a circular shape.

9. The heat sink structure as claimed in claim 1, wherein each of the upper and lower covers has a rectangular shape.

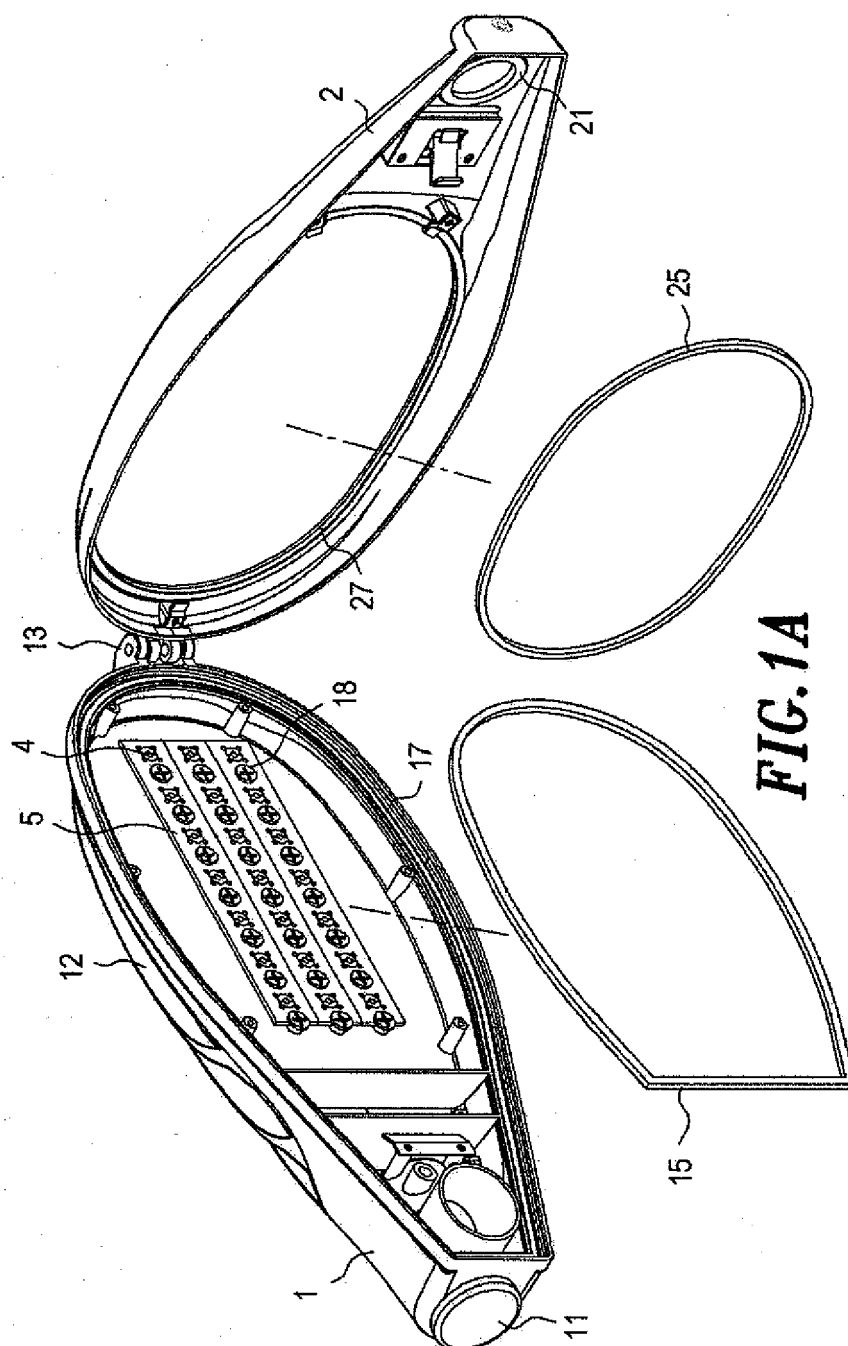
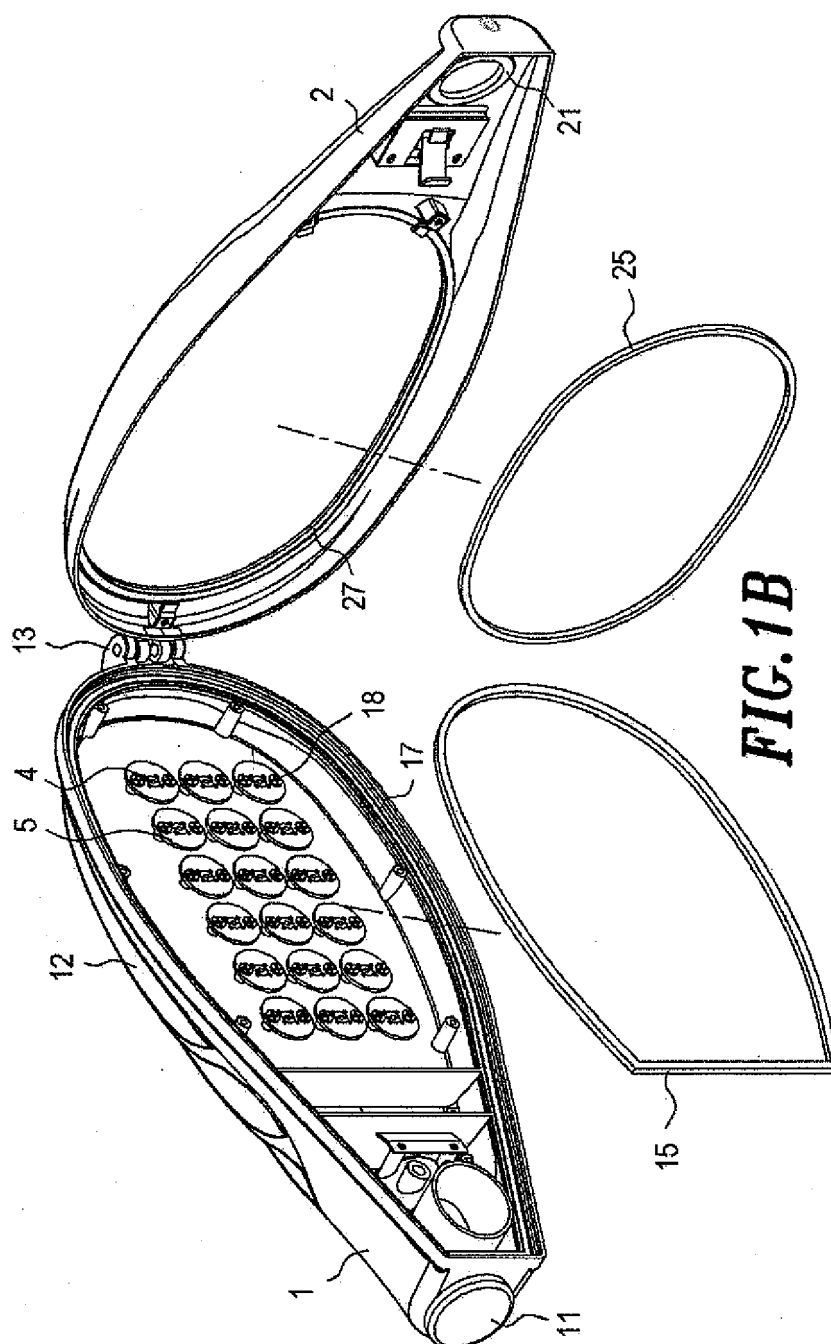


FIG. 1A



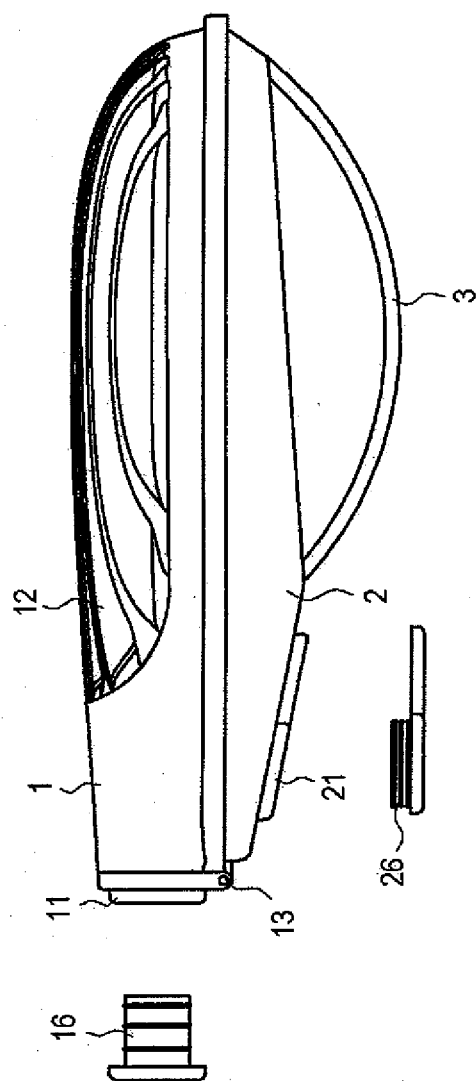


FIG. 2A

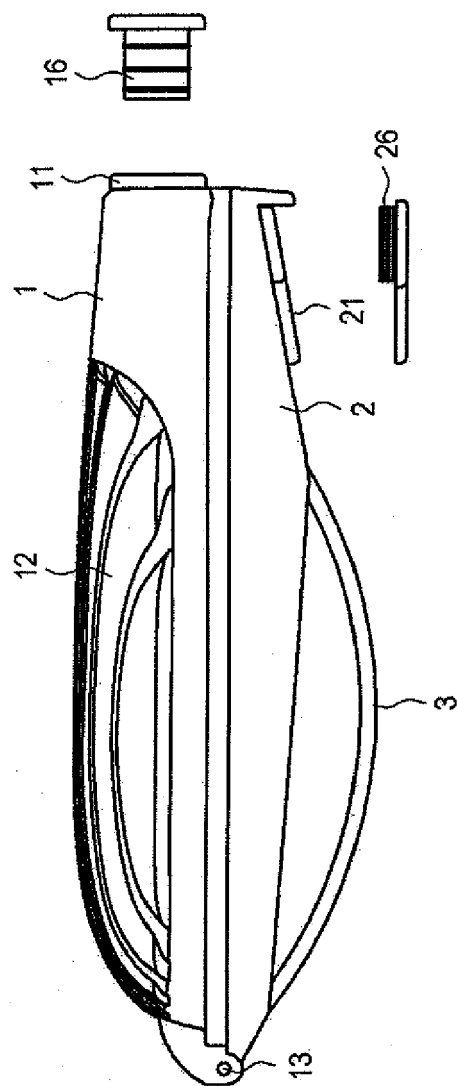
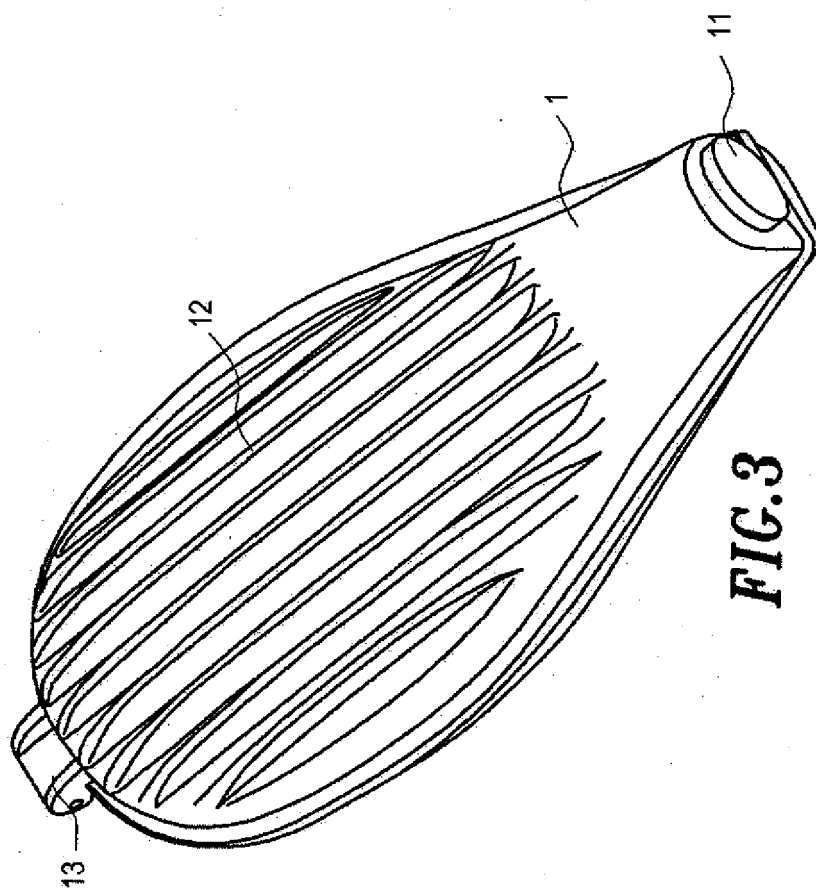
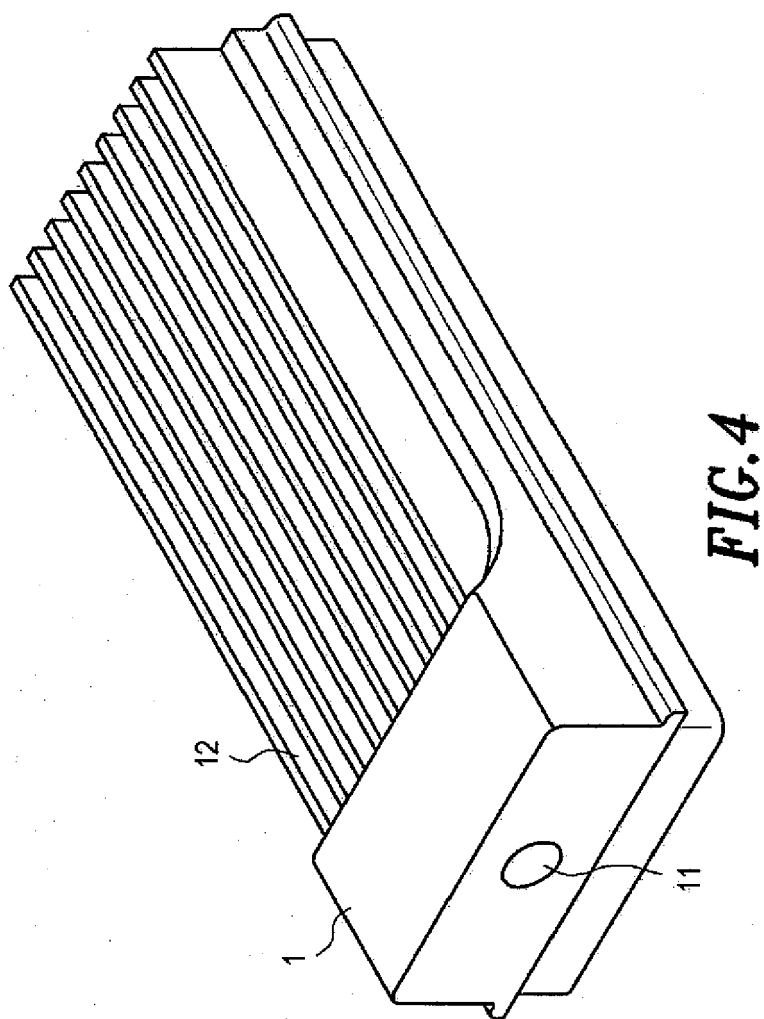


FIG. 2B







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 11 9702

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 6 784 357 B1 (WANG CHAO HSIANG [TW]) 31 August 2004 (2004-08-31) * column 2, line 19 - column 4, line 3; figures 1-9 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			F21V F21K F21S
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 January 2007	Examiner Arboreanu, Antoniu
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 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 06 11 9702

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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