(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

PCT

(43) International Publication Date
15 February 2007 (15.02.2007)

(10) International Publication Number
WO 2007/018352 Al

(51) **International Patent Classification:**
EOIF 15/00 (2006 01)

(21) **International Application Number:**
PCT/KR2006/002654

(22) International Filing Date: 7 July 2006 (07 07 2006)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
20-2005-0022843 8 August 2005 (08 08 2005) KR

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(81) **Designated States** *(unless otherwise indicated, for every kind of national protection available):* AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LV,LY,MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available):* ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

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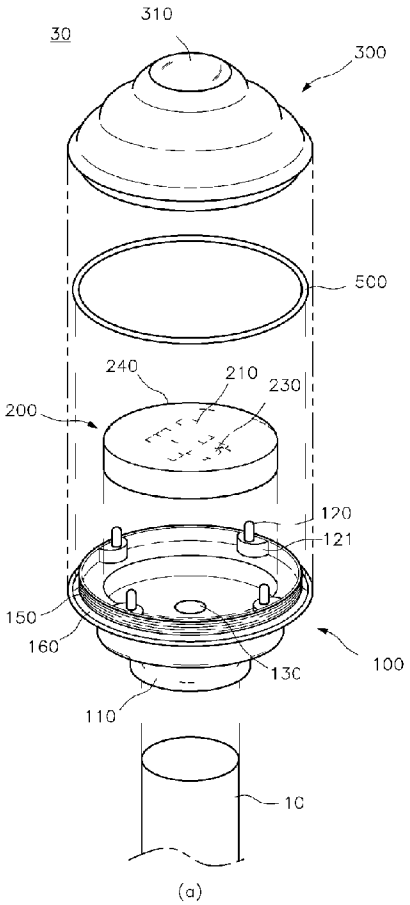
(54) Title: POST CAP FOR GUARDRAIL WITH LUMINOUS LAMP



(57) Abstract: Disclosed herein a post cap for a guardrail with a luminous lamp, which has a structure that can be simply attached to a post of a guardrail installed on a road or a bridge, so that the post cap can be easily repaired and replaced, ensures traffic safety, and improves the appearance of a city The post cap for a guardrail with a luminous lamp includes a lower cap (100) having a hemi¬ spherical shape and including a coupling unit (110) joined with an upper end portion of a post (10) for supporting a guardrail (20), a plurality of luminous lamps (120) arranged at regular intervals inside the lower cap (100), and a lamp terminal (130) connected to the luminous lamps (120) in a circuit, a solar cell (200) including a solar cell module (210), a storage battery for storing electricity produced by the solar cell module (210), a battery terminal (220) in contact with the lamp terminal (130) and connected to the storage battery in a circuit, and an upper cap (300) detachably coupled to the lower cap (100), including a convex lens (310) installed on the upper surface thereof, and having a bud shape made of a transparent material

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FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Description

POST CAP FOR GUARDRAIL WITH LUMINOUS LAMP

Technical Field

[1] The present invention relates to a post cap for a guardrail with a luminous lamp, and more particularly to a post cap for a guardrail with a luminous lamp, which can be easily repaired and replaced because it can be attached to the top of a guardrail post installed on a bridge or a road in a simple manner, and which ensures traffic safety and improves the appearance of surroundings.

Background Art

[2] Generally, a guardrail is a protective railing designed to prevent vehicles driving on a bridge from falling into open spaces. However, when visibility is not good, such as at night or in bad weather, crashes or falling accidents frequently happen because drivers have difficulty in seeing the guardrail.

[3] Accordingly, for traffic safety, many efforts to improve the visibility of guardrails have been made. As a result, a post cap for guardrails having a luminous lamp which is more visible is disclosed in Korean Utility Model Application No. 20-1992-22060.

[4] However, the disclosed post cap has the disadvantage in that the entire body of the post cap must be removed from the guardrail along with the uppermost part of the post cap when it is required to replace the post cap because an electric wire between a lamp and the post cap is broken or in the case where a bulb of the lamp must be replaced.

[5] The above-described post cap has a further disadvantage in that an electric wire buried in the soil under a guardrail post and connected to a lamp is always in danger of short circuiting because water can permeate into the electric wire in bad weather.

Disclosure of Invention

Technical Problem

[6] In order to solve the above problems, it is an object of the present invention to provide a post cap for a guardrail with a luminous lamp, which can be easily attached to a guardrail post, can be easily repaired and replaced, can ensure driver's and passenger's safety, and is readily visible by people at night.

Technical Solution

[7] In order to achieve the above objects and advantageous effects, according to one aspect of the present invention, there is provided a post cap for a guardrail with a luminous lamp, comprising a lower cap having a hemispherical shape and including a coupling unit joined with an upper end portion of a post for supporting a guardrail, a plurality of luminous lamps arranged at regular intervals inside the lower cap, and a lamp terminal connected to the luminous lamps in a circuit; a solar cell including a

solar cell module, a storage battery for storing electricity produced by the solar cell module, a battery terminal in contact with the lamp terminal and connected to the storage battery in a circuit; and an upper cap detachably coupled to the lower cap, including a convex lens installed on the upper surface thereof, and having a bud shape made of a transparent material.

[8] The coupling unit may have a shape corresponding to the shape of a section of an upper end portion of the post, so that the coupling unit is either a recess into which the upper end portion of the post is inserted or a projection inserted into the upper end portion of the post, and the coupling unit and the upper end portion of the post is secured by bolts and nuts.

[9] The solar cell further has a microprocessor and a luminance intensity sensor therein.

Advantageous Effects

[10] The post cap according to the present invention has the following advantageous effects.

[11] First, it has a structure comprising an upper cap and a lower cap which are detachably attached to each other, so that it can be easily and simply attached to a guardrail post having a variety of sectional shapes, can be easily repaired or replaced, and has improved visibility at night or in bad weather thanks to a luminous lamp using electric power continuously recharged without an additional power supply, thereby enhancing the safety of vehicles and improving the appearance of a city.

[12] Second, it has an upper cap having high durability, so that it can endure external impact. Further, it gathers solar energy using a convex lens, thereby producing electricity.

[13] Third, a short circuit or an electric shock can be prevented in bad weather since it can be securely sealed thanks to an o-ring.

Brief Description of the Drawings

[14] FIG 1 and FIG 2 are exploded perspective views illustrating a post cap for a guardrail with a luminous lamp according to one embodiment of the present invention;

[15] FIG 3 and FIG 4 illustrate the state in which the post cap for a guardrail with a luminous lamp according to the present invention is assembled;

[16] FIG 5 is a block diagram illustrating a post cap for a guardrail with a luminous lamp according to one embodiment of the present invention; and

[17] FIG 6 is a perspective view illustrating the state of use of the post cap for a guardrail with a luminous lamp according to one embodiment of the present invention.

[18] *Detailed description of key elements in drawings*

[19] 30: post cap 100: lower cap

[20] 110: coupling unit 120: luminous lamp

[21] 130: lamp terminal 200: solar cell

[22] 210: solar cell module 220: battery terminal

[23] 230: illumination intensity sensor

[24] 300: upper cap 310: convex lens

[25] 500: 0-ring

Best Mode for Carrying Out the Invention

[26] Preferred embodiment of the present invention will be described below with reference to the accompanying drawings.

[27] FIG 1 and FIG 2 are exploded perspective views illustrating a post cap for a guardrail with a luminous lamp according to one embodiment of the present invention, and FIG 3 and FIG 4 illustrate the combined state of the post cap for a guardrail with a luminous lamp according to the present invention.

[28] FIG 1 illustrates the case in which a coupling unit has a groove shape, FIG 2 illustrates the case in which the coupling unit has a projection shape, FIG 3 illustrates the coupling unit shown in FIG 1 combined with a post cap, and FIG 4 illustrates the coupling unit shown in FIG 2 combined with a post cap.

[29] As shown in FIG 1 through FIG 4, the post cap 30 according to the present invention comprises a lower cap 100, a solar cell 200 and an upper cap 300. The solar cell 200 is detachably installed in the lower cap 100, and the upper cap 300 and the lower cap 100 are coupled in a screw-type manner.

[30] Referring to FIG 1 and FIG 2, the lower cap 100 has a hemispherical shape, the coupling unit 110 is installed on the lower surface of the bottom of the lower cap 100, a plurality of luminous lamps 120 is arranged in the lower cap 100 along the inner surface of the lower cap 100 at regular intervals, and a lamp terminal 130 electrically connected to the luminous lamps 120 is provided on the upper surface of the bottom of the lower cap 100.

[31] An upper end portion of the post 10 to be coupled to the coupling unit 110 has a framed section, as shown in FIG 1, or a planar section, as shown in FIG 2.

[32] As shown in FIG 1 and FIG 2, the coupling unit 110 has a recess 110 or a projection 110' at a bottom thereof so that the coupling unit 110 can adapt to a variety of shapes of the upper end portion of the post 10. In the case in which the coupling unit 110 has the recess 110, the upper end portion of the post 10 is inserted into the recess 110 of the coupling unit 110 as shown in FIG 1, whereas, in the case in which the coupling unit 110 has the projection 110', the projection 110' of the coupling unit 110 is inserted into the empty space of the upper end portion of the post 10 as shown in FIG 2.

[33] As shown in FIG 3, the post 10 is coupled to the recess 110 of the coupling unit by

an insertion joint. In this instance, in order to prevent the joint between the recess 110 and the post 10 from becoming loose or the cap 30 from becoming detached from the post 10, a rubber packing is used, or the recess 10 and the upper portion of the post 10 are coupled using bolts 600 and nuts. Thanks to this joining method, the recess 110 and the post 10 can be securely coupled.

[34] Further, as shown in FIG 2, the projection 110' is inserted into an empty space of the upper portion of the post 10 and, as shown in FIG 4, bolts 600 and nuts are used so that the projection 110' and the post 10 can be securely coupled.

[35] In the lower cap 100, the plurality of luminous lamps 120 is arranged along the inner side surface of the lower cap 100 at regular intervals, and threads 150 are formed on the outer side surface of the lower cap 100 so that the lower cap 100 can be joined with the upper cap 300, which will be described below.

[36] The luminous lamp may be a lamp having excellent brightness in consideration of its power consumption, and having a long lifespan, such as an organic light emitting diode (OLED).

[37] The lamp terminal 130 is provided on the upper surface of the bottom of the lower cap 100 for electric connection to the luminous lamp 120, so that the lamp terminal 130 and the luminous lamp 120 are connected in a circuit.

[38] For secured fixation and support of the luminous lamp 120, and for protection of a wire connected to the lamp terminal 130 in a circuit, the luminous lamp 120 is installed in a lamp holder 121 formed on the inner side of the threads 150.

[39] The solar cell 200 detachably installed in the lower cap 100 comprises a solar cell module 210, a storage battery (not shown) and a battery terminal (220 in FIG 3 and FIG 4).

[40] The solar cell module 210 is provided on the upper surface of the solar cell 200 and serves to generate electricity using collected sunlight.

[41] The storage battery (not shown) is embedded in the solar cell 200 and stores electricity generated by the solar cell module 210.

[42] The solar cell module 210 and the storage battery are selected from generally known ones, so that a detailed description thereof will be omitted.

[43] The battery contact point 220 is provided on the outer surface of the bottom of the solar cell 200 and is in contact with the lamp terminal 300, as shown in FIG 3 and FIG 4. Accordingly, the battery+ contact point 220 is electrically connected to the storage battery and serves to power the luminous lamp 120.

[44] The solar cell 200 optionally employs a microprocessor (not shown) therein and an illumination intensity sensor 230 on the upper surface thereof, so that flashing and illumination time of the luminous lamp 120 can be precisely controlled.

[45] The microprocessor and the illumination intensity sensor 230 will be described in

more detail below.

[46] The upper surface of the solar cell 200 is covered by a cover 240 made of a transparent material in order to protect the solar cell module 210 and the illumination intensity sensor 230.

[47] In the state in which the lower cap 100 and the solar cell 200 are joined, the height of the cover 240 is determined in a manner such that the cover 240 intercepts light emitted from the luminous lamp 120. For example, the cover 240 may be disposed below the threads 150 and the lamp holder 121 or may be disposed at the same height as the threads 150 and the lamp holder 121.

[48] The upper cap 300 is detachably attached to the lower cap 100, has a bud shape, and is made of a transparent material having excellent durability, such as polycarbonate (PC), in order to protect the solar cell 200 from external impact.

[49] The upper cap 300 having a bud shape has threads 320 on the inner side surface near the edge thereof. Further, as shown in FIG 3 and FIG 4, the threads 320 are joined with the threads 150 of the lower cap 100.

[50] According to the preferred embodiment of the present invention, the lower cap 100 and the upper cap 300 are joined in a screwing manner using threads, but the present invention is not limited thereto. That is, the upper cap 300 and the lower cap 100 can be joined in a variety of manners, for example, in an insertion joint manner, in which a projection is inserted into a recess.

[51] Further, although the upper cap 300 has a bud shape in the preferred embodiment of the present invention, the present invention is not limited thereto. The upper cap 300 can have a variety of shapes corresponding to the shape of the lower cap 100, so that the variety of shapes of the upper caps 300 improve the appearance of the city.

[52] The upper cap 300 may further have a convex lens 310 on the upper surface thereof in order to collect sunlight, so that electricity can be produced and charged in the storage battery (not shown) by the solar cell module 210 even when solar radiation is insufficient.

[53] Further, the O-ring 500 is installed between the upper cap 300 and the lower cap 100 in order to securely seal the inner space between the upper cap 300 and the lower cap 100, thereby preventing the invasion of foreign material and permeation by water.

[54] In order to install the O-ring 500, the lower cap 100 has a sloped side 160 corresponding to the contact surface of the O-ring 500 below the threads 150. Accordingly, as shown in FIG 2, the O-ring 500 is installed on the sloped side 160 of the lower cap 100, and the upper cap 300 and the lower cap 100 are then joined and sealed.

[55] FIG 5 is a block diagram illustrating a post cap for a guardrail with a luminous lamp according to the present invention, in which FIG 5(a) illustrates the case in which the solar cell does not employ the microprocessor and the illumination intensity sensor,

and FIG 5(b) illustrates the case in which the solar cell employs both the microprocessor and the illumination intensity sensor.

[56] First, as shown in FIG 5(a), the post cap 30 according to the present invention can be configured in a manner such that electricity produced by the solar cell module 210 is charged in the storage battery and the luminous lamp 120 emits light using the charged electricity.

[57] According to the structure of the solar cell module 210, the storage battery and the luminous lamp 120 described above, light emission from the luminous lamp 120 is performed through the repetition of charge and discharge operations.

[58] That is, if electricity produced by the solar cell module 210 and charged in the storage battery runs out due to light emission from the luminous lamp 120, the solar cell module 210 generates electricity again and charges the electricity in the storage battery.

[59] On the other hand, as shown in FIG 5(b), in the case in which the solar cell module 200 (in FIG 1 and FIG 2) employs a control unit 31 such as the microprocessor and the illumination intensity sensor 230 for light emission from the post cap 30, the luminous lamp 120 can be controlled in a variety of manners.

[60] For example, the charge and discharge operations in FIG 5(a) are controlled by the control unit 31, and the microprocessor controls the illumination intensity sensor 230 in a manner such that the luminous lamp is illuminated within a predetermined illumination intensity range determined according to sunrise time, sunset time and weather.

[61] The illumination intensity sensor 230 detects illumination intensity according to information input into the microprocessor, such as variation in sunrise times and sunset times with the seasons, and turns off the luminous lamp 120 at sunrise when the detected illumination intensity is not less than the predetermined value.

[62] When the luminous lamp 120 is turned off, the microprocessor starts to operate, so that the solar cell module 210 collects sun light and charges electricity into the storage battery. At this time, if the illumination intensity is not greater than the predetermined value, that is, when solar radiation decreases at sunset or in cloudy weather, the microprocessor turns on the luminous lamp 120.

[63] When solar radiation decreases around sunset or in cloudy weather, the convex lens (310 in FIG 1 and FIG 2) provided to the upper cap (300 in FIG 1 and FIG 2) enhances the efficiency of collection of sunlight.

[64] The microprocessor and the illumination intensity sensor 230, which are additional elements to the configuration of FIG 5(a) and are shown in FIG 5(b), can perform the following operations.

[65] Luminous lamps 120 having a variety of colors are manufactured and installed in

the post cap 30, so that the luminous lamps 120 emit a variety of colors of light. In a different way, the luminous lamps 120 may flicker at regular intervals when operating. That is, the appearance of a city is enhanced by inputting data that instruct the luminous lamps 120 to operate in a variety of ways into the microprocessor.

[66] FIG 6 is a perspective view illustrating the state of use of the post cap for a guardrail with a luminous lamp according to the present invention.

[67] As shown in FIG 6, the post cap 30 according to the present invention is installed at an upper end portion of a post 10 of a guardrail 20, thus visibility of the guardrail 20 and the post 10 are improved under low illumination intensity conditions, such as at night or in bad weather, thanks to light emitted from the luminous lamps (120 in FIG 1 and FIG 2). Accordingly, accidents can be prevented.

[68] Moreover, the appearance of a city is improved thanks to the light emitted in all directions, including upwards, from the luminous lamp 120.

[69] As described above, the present invention provides a post cap for a guardrail with a luminous lamp, which can be easily repaired and replaced, can ensure traffic safety at night, and can improve the appearance of a city.

[70] The post cap according to the present invention is not limited to the above-described embodiment, but many variations and modifications can be made to the preferred embodiment without substantially departing from the principle and scope of the present invention.

Industrial Applicability

[71] The post cap for guardrails according to the present invention can be easily repaired or replaced. That is, maintenance of the post cap for guardrails according to the present invention is easy and simple. The post cap for guardrails according to the present invention is cost-effective because it can be used without using an external power supply. Still further, the post cap for guardrails according to the present invention has excellent durability and can prevent short circuits and electric shocks in bad weather.

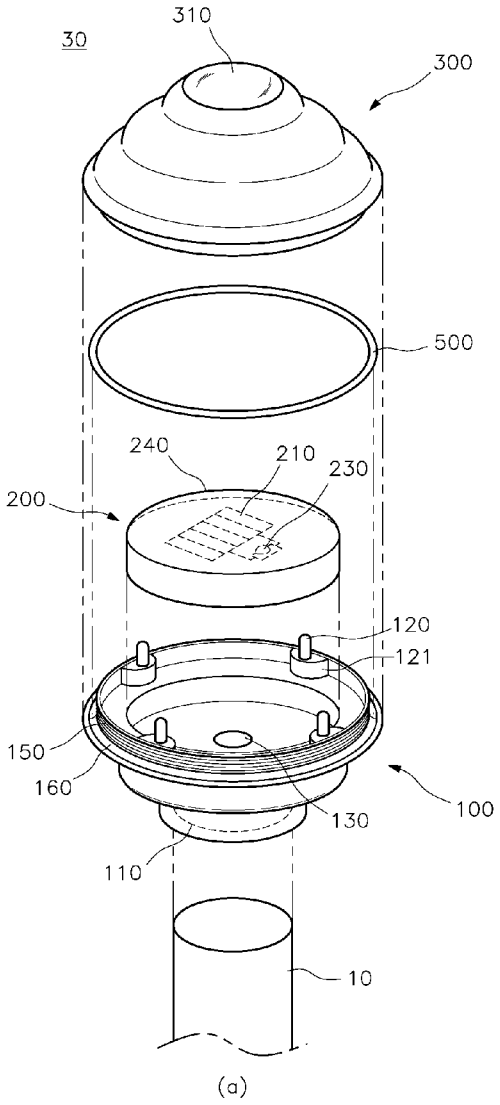
Claims

[1] A post cap for a guardrail with a luminous lamp, comprising:
a lower cap (100) having a hemispherical shape and including a coupling unit (110) joined with an upper end portion of a post (10) for supporting a guardrail (20), a plurality of luminous lamps (120) arranged at regular intervals inside the lower cap (100), and a lamp terminal (130) connected to the luminous lamps (120) in a circuit;
a solar cell (200) including a solar cell module (210), a storage battery for storing electricity produced by the solar cell module (210), a battery terminal (220) in contact with the lamp terminal (130) and connected to the storage battery in a circuit; and
an upper cap (300) detachably coupled to the lower cap (100), including a convex lens (310) installed on the upper surface thereof, and having a bud shape made of a transparent material.

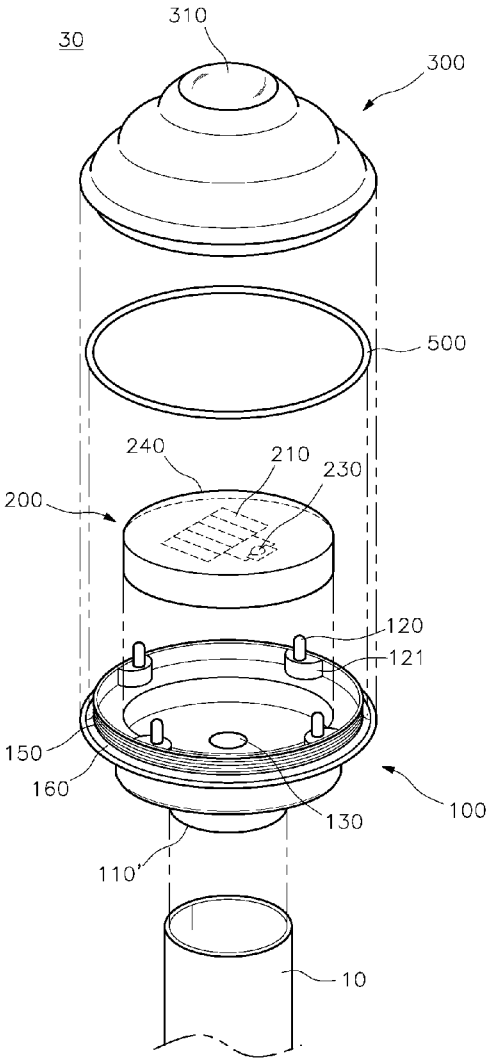
[2] The post cap for the guardrail with the luminous lamp according to claim 1, wherein the coupling unit has a shape corresponding to a shape of a section of an upper end portion of the post (10), so that the coupling unit is either a recess (110) into which the upper end portion of the post (10) is inserted or a projection (110') inserted into the upper end portion of the post (10), and wherein the coupling unit and the upper end portion of the post (10) is secured by bolts and nuts.

[3] The post cap for the guardrail with the luminous lamp according to claim 1 or claim 2, wherein the solar cell further has a microprocessor and a luminance intensity sensor (230) therein.

[Fig. 1]



[Fig. 2]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110
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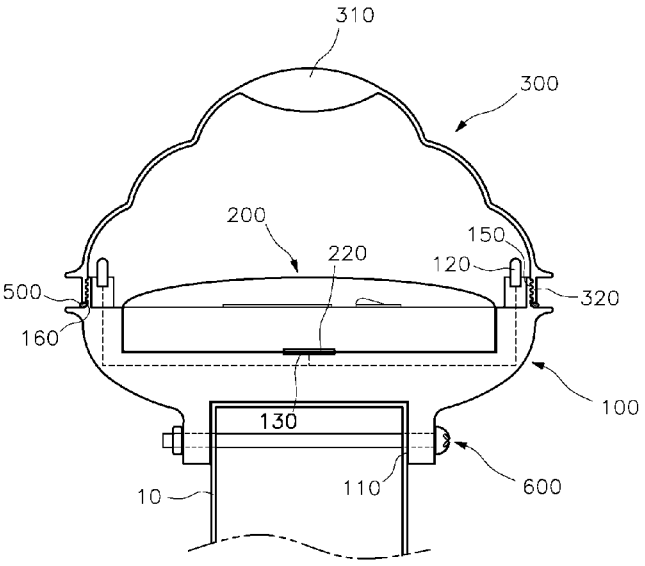
(b)

[Fig. 3]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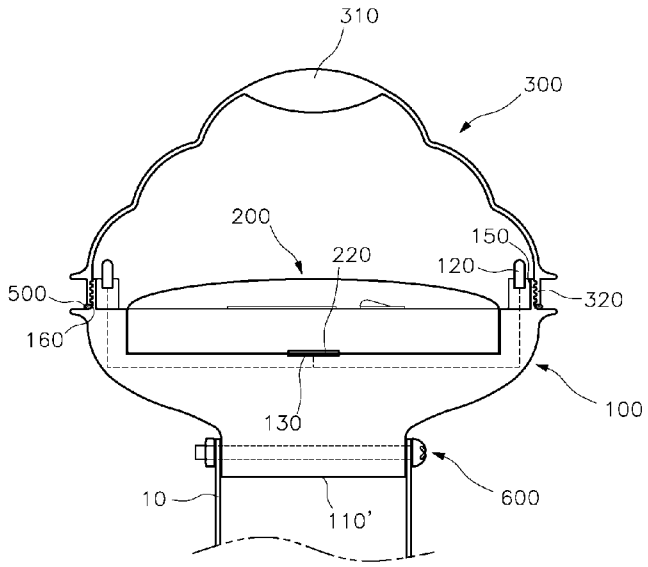
100
130
600
110
10

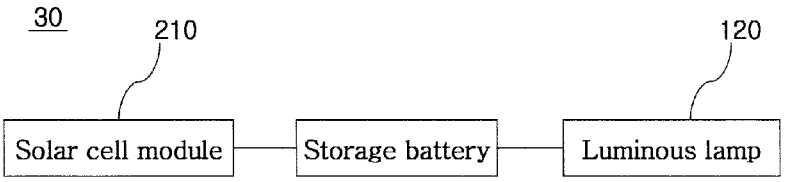
(a)

[Fig. 4]

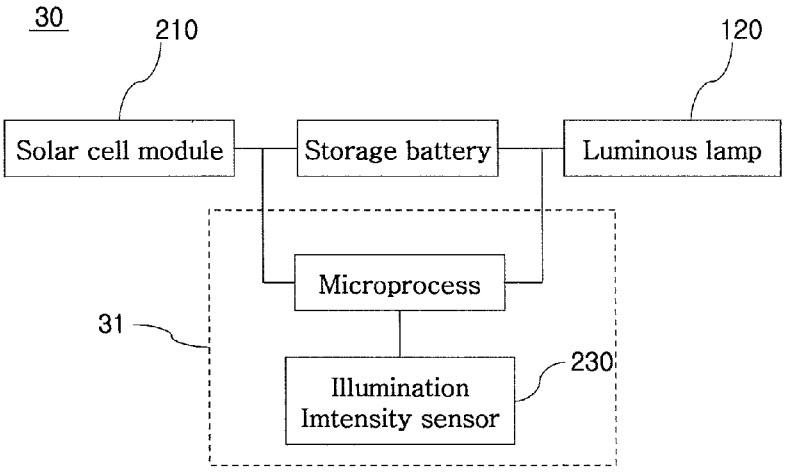


(b)

[Fig. 5]

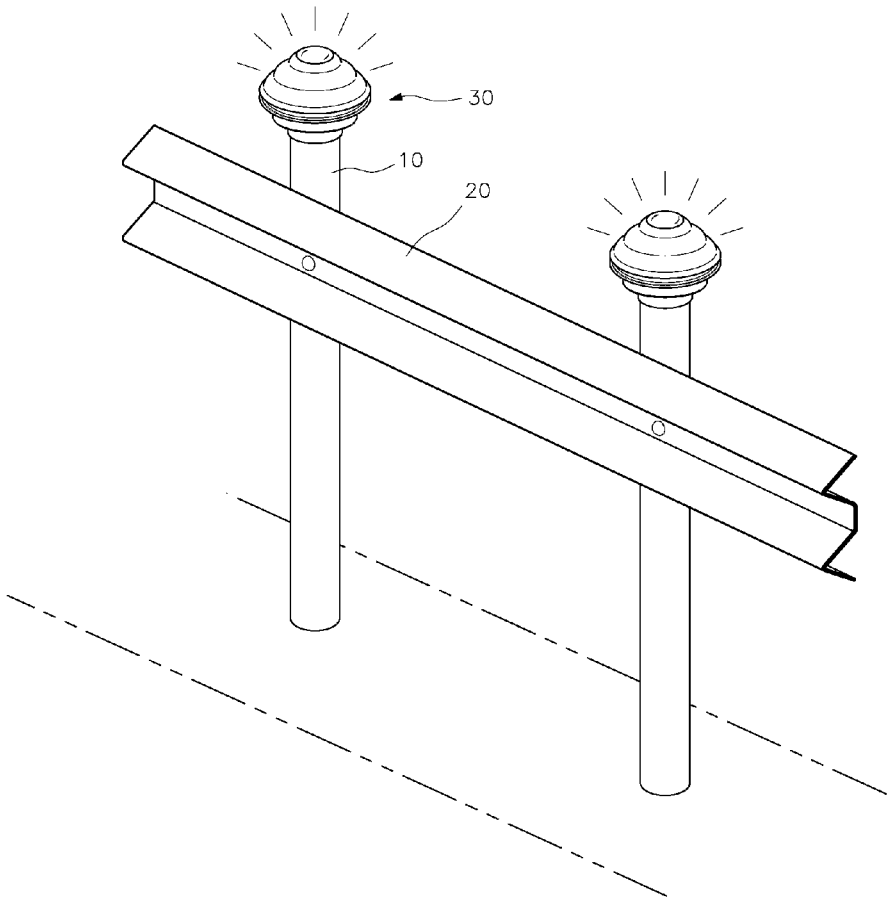


(a)



(b)

[Fig. 6]



INTERNATIONAL SEARCH REPORT

International application No
PCT/KR2006/002654

A. CLASSIFICATION OF SUBJECT MATTER

EOIF 15/00(2006.01)1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8 EOlF 9/00, 13/00, 15/00, 15/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR, JP IPC as above

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal) & keywords "solar cell", "solar lamp", "luminous lamp"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	KR 20-0215163 Y1 (DAESUNG ID CO , LTD et al) 18 December 2000 See claim 1 and figures 1 to 3	1- 3
A	JP 09-67812 A (MATSUSHITA ELECTRIC WORKS LTD) 11 March 1997 See claims 1 to 3 and figures 1 to 6	1- 3
A	JP 07-133607 A (FUJITA CO , LTD) 23 May 1995 See claims 1 to 3 and figures 1 to 3	1- 3
A	US 4,929,942 A (KIKUO NIIMI) 29 May 1990 See claims 1 to 7 and figures 1 to 4	1- 3

☐ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents
"A" document defining the general state of the art which is not considered to be of particular relevance
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 OCTOBER 2006 (19 10 2006)	19 OCTOBER 2006 (19.10.2006)

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No 82-42-472-7140	KIM, Jin Young Telephone No 82-42-481-8220

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/KR2006/002654

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 20-0215163 Y1	18.12.2000	None	
JP 09-067812 A	11.03.1997	None	
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US 4,929,942 A	29.05.1990	None	