Street Litter bin with Solar Powered Advertising Displays

Field of the Invention

This invention relates generally to the field of collection of waste and litter, and more particularly, to a street litter bin with a solar power system to illuminate advertising displays in a non-glaring and environmentally benign and beautiful manner.

Background of the Invention

Street bins provided as public hygiene facilities are commonly found in the streets. Use of the street bins for posting advertising has been reported, for example, in GB2415886A and CN201325723.

GB2415886A discloses a recycling unit with advertising displays, which houses various sized bins for the collection of waste material. The two sides of the recycling unit may have advertising displays that may be illuminated by lighting powered by solar panels and/or mains electricity.

CN201325723 discloses an advertising garbage bin which integrates a garbage bin with an advertising box. The advertising garbage bin comprises a rectangular box and an advertisement carrier arranged on at least one lateral surface of the rectangular box, wherein the advertising box is powered by mains electricity.

Although a variety of bins with advertising displays exist in the prior art, these bins usually utilize neon lights, fluorescent lamps or even LEDs for the illumination purpose, the advertising lights are such strong and glaring that the landscape or the environment are seriously affected, causing a light pollution problem. In addition, the currently available bins without the advertising lights are not eye-catching enough for the visibility of the bins at night or in relatively dark environment, which would be possible to decrease the usage of the bins.

Therefore, the invention entails the task of creating a simple and cost-effective street litter bin that is able to illuminate an advertising article at a no-glare manner and is environmental benign. The street litter bin according to the invention

increases the use of the bin by drawing people's awareness more of the bin at night and provides an aesthetically pleasing appearance.

In addition, the street litter bin of the invention enables visual display of advertising materials and the use of Bluetooth technology to communicate messages either visually or in the case of Bluetooth through mobile phones or any other blue-tooth enabled device, which definitely increases awareness of the bin in a second way and furthermore promotes increased usage of the bin.

Another advantage of the invention is that a router may be arranged in the street bin, allowing for additional wireless internet service to people within the transmission distances away from the bin. This also promotes the usage and awareness of the bin.

Summary of the Invention

The present invention has been developed to fulfill the needs noted above and therefore has a principle object of the provision of a street litter bin for providing advertising displays which is cost effective, non-glaring and environmentally benign and enables visual display of advertising materials.

Another object of the invention is to provide a street litter bin which is significantly more visible at night or in a dark environment so as to increase the usage of the bin.

A further object of the invention is to provide a street litter bin which utilizes an aesthetically pleasing light technology that is all the more stunning at night. This improves the look of streets, side-walks and the whole city.

A yet further object of the invention is to provide a street litter bin which is able to provide bluetooth wireless transmission of messages either visually or through any other bluetooth enabled device including mobile phones.

A yet further object of the invention is to provide a street litter bin in which a router is arranged to provide an additional wireless internet service to people within the transmission distances away from the bin.

These and other objects and advantages of the invention are satisfied by providing a street litter bin with solar powered advertising displays, comprising:

a housing having at least one opening through which the street litter is deposited at an upper portion thereof and having a door,

a waste collection unit housed within the housing, said waste collection unit having an opened top for capturing the street litter and being accessible through the door of the housing,

at least one advertising panel for displaying an advertising article, the advertising panel comprising a support frame attached to a side wall of the housing and having a spacing within which the advertising article is arranged, and a clear layer covering the support frame and having frosted borders, the frosted borders being sized such that the advertising article is visible,

a plurality of first LEDs mounted on each of left and right sides of the support frame to illuminate the advertising article with light beam directing to the advertising article,

a second LED mounted on a bottom of the clear layer and in front of the support frame, said LED reacting with the frosted borders of the clear layer to create no-glare glow around the frosted borders,

a solar power system comprising a solar panel attached to another side wall of the housing, said solar power system being operable to provide electric power to the first LEDs and the second LED, and

a light sensitive element for continuously detecting an ambient brightness and connected to the solar power system for controlling switching of the first LEDs and the second LED responsive to the detected ambient brightness.

In one preferred embodiment, the housing has four side walls and each of the side walls has an opening through which the street litter is deposited at an upper portion thereof.

Preferably, the support frame is made of polycarbonate materials and the clear layer is made of acrylic. In one specific embodiment, the second LED is configured to face the advertising article and react with the frosted borders of the acrylic layer such that all the frosted borders glow blue. The number of the first LEDs may be four and they are arranged at an equal interval. The support frame and the clear layer may be secured with each other by any type of connecting means known in the art, such as screws or bolts.

According to the invention, the solar power system further comprises a solar cell electrically coupled to the solar panel for storing the electrical power and to the light sensitive element for switching on or off the first LEDs and the second LED according to a predetermined ambient brightness. The light sensitive element is advantageously a photoresistor. In another embodiment of the invention, the solar power system further comprises an inverter electrically coupled to the solar cell for converting the electrical power into the alternating current electric power.

According to the invention, a GPS device may be arranged in the housing and powered by the solar power system to allow for transmission of digital information to be displayed on the advertising panel. Alternatively, a Bluetooth device may be arranged in the housing and powered by the solar power system to allow for transmission of digital information to an external Bluetooth device within a transmission distance there between.

In addition, a pressure plate connected to an alarm or a break circuit may be arranged at the bottom of the housing and powered by the solar power system to cut the electrical power when the street litter bin is lifted off the ground to activate the alarm.

In contrast to the street litter bins available in the prior art, the street litter bin of the invention utilizes the polycarbonate support frame and the clear plastic layer with frosted borders for advertising displays. The LED mounted on the bottom of the plastic layer reacts with the frosted borders to create a unique and non-glaring blue glow which illuminates all the borders. Further, the solar power system of the invention is the type of an efficient day light solar panel which is able to power the bin through the hours of the night. It is possible to have as little as 5 hours of daylight without any direct sunlight to power up the entire bin 100 through the hours of the night.

To have a better understanding of the invention reference is made to the following detailed description of the invention and embodiments thereof in conjunction with the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a perspective view of a street litter bin constructed in accordance with an embodiment of the invention.

Figure 2 is a front elevation view of a waste collection unit housed within the street litter bin of Fig. 1.

Figure 3 is a front elevation view of a waterproof and graffiti resistant box housed within the bottom of the street litter bin of Fig. 1, and all electronic devices are disposed in the box.

Figure 4 is a partial side view showing an advertising panel of the street litter bin of Fig. 1.

In the various figures of the drawings, like reference numbers are used to designate like parts.

Detailed Description of the Preferred Embodiments

While this invention is illustrated and described in preferred embodiments, the street litter bin may be produced in many different configurations, sizes, forms and materials.

Referring now to the drawings, Figs. 1 to 4 provide a street litter bin 100 constructed consistent with a preferred embodiment of the present invention. In this embodiment, the street litter bin 100 comprises a housing 10 of cubic configuration having four side walls and a waste collection unit 20, such as a 120 litre tin, having an opened top and housed within the housing 10. The housing 10 has an opening 11 at an upper portion of each of the side walls, and the street litter is deposited into the waste collection unit 20 through the opening 11 of the side wall of the housing 10 and the opened top of the waste collection unit 20. The housing 10 further comprises at least one slam shut opening door (not shown) through which the waste collection unit is housed in the bin 100 and accessible and emptied. As shown in Fig. 2, the waste collection unit 20 has one or more roller 22 beneath its bottom to provide the ease of moving the waste collection unit 20.

On each of the four side walls of the housing 10 is attached a polycarbonate support frame 50 which is covered and protected by an acrylic clear layer 60. The support frame 50 and the clear layer 60 may be firmly attached to each other by any

type of connecting means known in the art, such as screws or bolts 51. The support frame 50 has a spacing for receiving an advertising article 40 or a solar panel 30 and has a removable cover (not shown) on its top for placement of the advertising article 40 or the solar panel 30 into the support frame 50. In this embodiment, three side walls of the bin 100 is for advertising displays, and the remaining one side wall is for installing the solar panel 30. The removable cover is fixed by screwing into the support frame 50 after such a placement. The clear layer 60 have frosted borders 61 along its perimeter, and the frosted borders 61 are sized such that they do not block the visibility of the advertising article 40.

A plurality of first LEDs 80 are mounted on a left side 52 and a right side 53 of the support frame 50, and the number of the first LEDs is four in this embodiment. The first LEDs are arranged at an equal interval and the light beams of these LEDs are directing at the advertising article 40 in order to generate more evenly distributed lighting to the advertising article.

A single small second LED 70 is mounted on the bottom of the clear layer 60 and in front of the support frame 50 and faces the advertising article 20. This second LED 70 is configured such that the light from the second LED 70 hits the frosted borders61 of the acrylic clear layer 60 to create a distinct non-glaring and blue glow around all the frosted borders 61. This is the reaction from white light hitting the frosting. The distinct non-glaring blue glow is the most unique feature of the invention, allowing that there is enough light to clearly see the adverting article 40 but not enough light to disturb or destroy the landscape or the environment, and allowing that the bin 100 stands out and can be seen from distances. This feature is in great contrast to other forms of advertising that are seemingly over-bearing in most countries and areas.

Because the street litter bin 100 of the invention is lit up in the dark of the night, it helps to improve visibility of the bin 100, which would increase the usage of the bin 100. This thereby decreases litter on the street and places where the bin 100 is placed.

According to the invention, the street litter bin 100 is powered by a fully functional solar power system which receives solar energy through the solar panel 30, without the need of requiring any other source for energy supply. Referring again

to Fig. 1, the solar panel 30 is placed in the support frame 50 on one side wall of the bin 100, in this situation, there is no need for the mounting of the first LEDs 80. As illustrated, only a single small second LED 70 is mounted on the bottom of the clear layer 60 to create the non-glaring blue glow around all the frosted borders 61, which is the case for the advertising displays on the other three side walls of the bin 100.

In this embodiment, the solar panel 30 includes a plurality of solar photovoltaic modules made up of individual cells which convert solar radiation into electricity. When the sunlight or daylight shines on the modules, the cells produce a stream of direct current (DC) electricity.

The solar power system further comprises a solar cell electrically coupled to the solar panel 30, which allows for recharging of the solar cell. The solar cell then stores the electricity from the solar panel and provides the electricity to the first LEDs 80 and the second LED 70 or other implemented electronic devices. Alternatively, an inverter may be connected to the solar panel 30 for converting the direct current electricity into alternating current (AC) electricity. The inverter is also connected to solar cell so that the solar cell stores the alternating current electricity from the inverter and provides the AC electricity to the LEDs and the electronic devices. To stablize the flow of electricity and then redistribute the electricity to the LEDs, a stablizer may be connected in series between the solar cell and the LEDs.

The solar panel 30 is designed to receive the solar energy of daylight even in cloudy and rainy conditions. It has been found that it is possible to have as little as 5 hours of daylight without any direct sunlight to power up the entire bin 100 through the hours of the night.

For the enhanced efficiency of the solar power system, a light sensitive element, for example a photoresistor, is arranged to be connected with the solar cell. The light sensitive element can continuously detect an ambient brightness and determine whether the ambient brightness is below or above a predetermined ambient brightness. If the detected ambient brightness is below the predetermined ambient brightness, the light sensitive element enables the solar cell to switch on the first LEDs 80 and the second LED 70; if the detected ambient brightness is above the predetermined ambient brightness, the light sensitive element enables the solar cell

to switch off all the LEDs. This would avoid wasting the stored power. The predetermined ambient brightness can be set according to the actual needs.

There may be provided a GPS device in the bin 100, which allows for transmission of digital information to be displayed on the advertising panels. A bluetooth device may also be provided to allow for transmission of digital information to an external bluetooth device such as mobile phones that are within the bluetooth required proximity to the bin 100. This aspects offer innovative features of the invention, and offer advertisers a completely new way of reaching pedestrians.

Therefore, the street litter bin 100 allows for the communication of advertising messages directly visually from the bin through the bluetooth technology on any other bluetooth enabled devices including mobile phones.

In addition, a live GPS tracking system may be installed and programmed to provide functions, including but not limited to bluetooth messaging, GPS tracking in case that the bin 100 is moved without permission and/or authorization, digital GPS information displaying on the advertising panels, live monitoring of the bin for its general status, position, vandal distress alarms, when the last maintenance was done. The GPS tracking system is configurable by customized software.

The above various electronic devices including the solar cell, the inverter, the light sensitive element, the GPS device, the bluetooth device and the tracking system are all housed inside a waterproof box 90 installed within the bottom of the bin 100, as shown in Fig. 3. This box 90 protects these devices from being damaged.

In order for indicating that the bin is moved or lifted off the ground, a pressure plate which reacts responsive to the moving and the lifting of the bin may be arranged at the bottom of the housing. The pressure plate is usually connected to an alarm or a break circuit and configured to cut the electrical power when the street litter bin is lifted off the ground.

As described above, the street litter bin of the invention is designed to be put on the streets outdoor and capture the street litter, while having the ability of advertising displays which are illuminated by a unique non-glaring night-time glow. The invention is environmentally benign by eliminating the light pollution caused by over-illumination of the use of the excessive advertising light.

The invention thus provides a street litter bin which is a simple design and allows for aesthetic and energy-saving integration of street litter bin with advertising.

While the embodiments described herein are intended as an exemplary street litter bin, it will be appreciated by those skilled in the art that the present invention is not limited to the embodiments illustrated. Those skilled in the art will envision many other possible variations and modifications by means of the skilled person's common knowledge without departing from the scope of the invention, for example, the solar power system is replaced with a rechargeable battery. However, such variations and modifications should fall into the scope of this invention.

What is claimed is:

1. A street litter bin with solar powered advertising displays, comprising:

a housing having at least one opening through which the street litter is deposited at an upper portion thereof and having a door,

a waste collection unit housed within the housing, said waste collection unit having an opened top for capturing the street litter and being accessible through the door of the housing,

at least one advertising panel for displaying an advertising article, the advertising panel comprising a support frame attached to a side wall of the housing and having a spacing within which the advertising article is arranged, and a clear layer covering the support frame and having frosted borders, the frosted borders being sized such that the advertising article is visible,

a plurality of first LEDs mounted on each of left and right sides of the support frame to illuminate the advertising article with light beam directing to the advertising article,

a second LED mounted on a bottom of the clear layer and in front of the support frame, said LED reacting with the frosted borders of the clear layer to create no-glare glow around the frosted borders,

a solar power system comprising a solar panel attached to another side wall of the housing, said solar power system being operable to provide electric power to the first LEDs and the second LED, and

a light sensitive element for continuously detecting an ambient brightness and connected to the solar power system for controlling switching of the first LEDs and the second LED responsive to the detected ambient brightness.

2. The street litter bin according to claim 1, wherein the housing has four side walls and each of the side walls has an opening through which the street litter is deposited at an upper portion thereof.

3. The street litter bin according to claim 1, wherein the support frame is made of polycarbonate materials, and the clear layer is made of acrylic.

4. The street litter bin according to claim 3, wherein the second LED is configured to react with the frosted borders of the acrylic layer such that all the frosted borders glow blue.

5. The street litter bin according to claim 1, wherein the number of the first LEDs is four and the four LEDs are arranged at an equal interval.

6. The street litter bin according to claim 1, wherein the solar power system further comprises a solar cell electrically coupled to the solar panel for storing the electric power and to the light sensitive element for switching on or off the first LEDs and the second LED according to a predetermined ambient brightness.

7. The street litter bin according to claim 6, wherein the solar power system further comprises an inverter electrically coupled to the solar cell for converting the electrical power into an alternating current electric power.

8. The street litter bin according to claim 1, wherein the light sensitive element is a photoresistor.

9. The street litter bin according to any one of claims 1 to 8, wherein a GPS device is arranged in the housing and powered by the solar power system to allow for transmission of digital information to be displayed on the advertising panel.

10. The street litter bin according to any one of claims 1 to 8, wherein a Bluetooth device is arranged in the housing and powered by the solar power system to allow for transmission of digital information to an external Bluetooth device within a transmission distance therebetween.

11. The street litter bin according to any one of claims 1 to 8, wherein a pressure plate connected to an alarm or a break circuit is arranged at the bottom of the housing and powered by the solar power system to cut the electrical power when the street litter bin is lifted off the ground.

12. The street litter bin according to any one of claims 1 to 8, wherein a GPS tracking system is arranged in the housing and powered by the solar power system, and the GPS tracking system is programmed to display Bluetooth messages and GPS digital information and to provide live monitoring of the bin.

13. The street litter bin according to any one of claims 1 to 8, wherein a router is arranged in the housing and powered by the solar power system to provide an additional wireless internet service within the transmission distance away from the bin.