

A SAFETY MIRROR WITH A SOLAR POWERED LIGHT

TECHNICAL FIELD

[0001] The present invention relates to a safety mirror.

BACKGROUND

[0002] Safety mirrors are often positioned in an outdoor environment, especially around road junctions, road bends or road corners with an obstructed view due to trees, buildings, walls etc. The safety mirrors, when positioned correctly, allows the driver of a vehicle which is approaching the road junctions, road bends or road corners to observe an area as to whether there is an incoming vehicle, an approaching pedestrian or a dangerous object in the observed area, which without the safety mirror would be blocked from the view of the driver (i.e. blind spot). The placement of a safety mirror allows the driver to react accordingly.

[0003] With increasing population density in cities, the placements of safety mirrors is becoming increasingly important, as there are more and more intersections or crossings of pedestrian walkways and vehicle roads. Higher density would also mean obstructing buildings or walls around intersections or crossings, thus areas of obstructed views around intersections or crossings become common.

[0004] Further, safety mirrors are also positioned at junctions, bends or corners of pedestrian walkways. The placement of safety mirrors can reduce the risk of collision of pedestrians. Further, the mirror can allow an approaching pedestrian to check whether there is a potential risk around the corner, such as a robber or an attacker.

[0005] However, it is noted that safety mirrors do not function well at night time due to low light level, unless the environment is well-lit by street lights.

[0006] The invention offers an alternative safety mirror arrangement as a new and inventive safety mirror.

SUMMARY

[0007] According to a first aspect of the present invention, there is provided a mirror arrangement, including: a mirror; a solar panel for providing electricity; a light source for receiving the electricity to provide light to the mirror; and an energy storage unit for storing electricity provided by the solar panel,

and for providing electricity to the light source; wherein at least a portion of the solar panel is flexible and is configured to follow a shape of a portion of the mirror.

[0008] In one form, a periphery of the mirror is substantially circular, and the flexible portion of the solar panel forms a curve along a portion of the periphery. In one form, the light source is a LED. In one form, the light source is a LED strip. In one form, the mirror is a convex mirror. In one form, the mirror arrangement further including a mirror shade, wherein the solar panel is positioned on one side of the mirror shade and the light source is positioned on the other side of the mirror shade. In one form, the mirror arrangement further includes an energy storage unit for storing electricity provided by the solar panel, and for providing electricity to the light source. In one form, the mirror arrangement further includes a controller for controlling electricity from the solar panel to the energy storage unit, and from the energy storage unit to the light source.

[0009] In one form, the controller turns on the light source when the solar panel is not generating electricity. In one form, the mirror arrangement further includes a mounting means for mounting the mirror at an intended location. In one form, the mirror is mounted on a pole. In one form, the mirror is a safety mirror.

[0010] According to a second aspect of the present invention, there is provided a retrofitting kit for a safety mirror, including: a solar panel for providing electricity; a light source for receiving the electricity to provide light to the mirror; an energy storage unit for storing electricity provided by the solar panel, and for providing electricity to the light source; wherein at least a portion of the solar panel is flexible and is configured to follow a shape of a portion of the safety mirror.

[0011] In one form, the retrofitting kit further includes a shade for at least partially shielding the safety mirror from weather effect. In one form, the light source is a LED or a LED strip.

BRIEF DESCRIPTION OF DRAWINGS

[0012] Embodiments of the present invention will be discussed with reference to the accompanying drawings wherein:

[0013] Figure 1 depicts one scenario illustrating a use of a safety mirror;

[0014] Figure 2A and 2B depict one embodiment of a safety mirror;

[0015] Figure 3 depicts one embodiment of a flexible solar panel;

[0016] Figure 4 depicts the flexible solar panel of Figure 3 when bent;

[0017] Figure 5A to 5F depict a safety mirror similar to the safety mirror of Figure 2 but with a bracket attached at the back of the safety mirror; and

[0018] Figure 6 shows an alternative base to base of Figure 5E.

[0019] In the following description, like reference characters designate like or corresponding parts throughout the figures.

DESCRIPTION OF EMBODIMENTS

[0020] In an embodiment of the present invention, the mirror arrangement includes a light source powered by solar panels. In particular, the mirror arrangement includes a mirror; a solar panel for providing electricity to an energy storage; and a light source for receiving the electricity from the energy storage to provide light to the mirror.

[0021] The mirror can be in various shapes and configurations. Usually, the mirror is circular, oval, square or rectangular in shape. However, other shapes can be used too depending on the location and preference, for example, a dome mirror, a semi-dome mirror or a quarter-dome mirror can be used. The mirror can be made from various known techniques. A mirror made in the future using new techniques may also be used, as long as the mirror functions to reflect light. The mirror can be a single mirror or can be a combination of more than one mirror. While the mirror is normally a convex mirror, other types of mirror can be used, although are not as effective as a convex mirror. The base of the mirror can include a rim made of stainless steel to increase its reliability. Further the rim allows the mirror to be mounted.

[0022] The solar panel is designed to charge the energy storage unit during day time. Flexible solar panel can make the mirror arrangement more compact as the flexible solar panel is designed to follow the shape of the periphery of the mirror or follow the shape of a shade of the mirror, if presented. While it is best to have all parts of the flexible solar panel to follow the shape of the mirror or the shape of the shade of the mirror, the benefit of having a more compact version of the mirror arrangement can be achieved, albeit slightly, when only a portion of the solar panel is flexible and is configured to follow a shape of a portion of the mirror.

[0023] During night time, the solar panel no longer charges the energy storage unit in the absence of light shining on the solar panel. The energy storage unit, which can be a rechargeable battery, a capacitor etc., then provides electricity to the light source.

[0024] While LEDs would be a first choice as the light source at the time this specification is written, it can be replaced by other type of light sources, for example a fluorescent globe.

[0025] Figure 1 depicts one scenario illustrating a use of a safety mirror. The scenario shows a T junction, where vehicles 3, 5 and 7 are approaching the junction, all from different directions. Walls 11 and 13 obstruct the view of the rider of vehicle 7 to observe the approaching vehicles 3 and 5. Safety mirror 1, when positioned correctly, reflects the image of the approaching vehicles 3 and 5 to the rider of vehicle 7. Thus, the rider of vehicle 7 can take extra precaution when approaching the junction. Without the safety mirror 1, the rider of vehicle 7 has to be very near to the junction before the rider can check whether there is any incoming traffic from other directions. This will put the rider of vehicle 7 in a risky position. While the position of the safety mirror 1 reduces the risk, it was discovered that safety mirror 1 would not function well at night time, especially when there is no nearby road lamp. The present invention allows the illumination of the safety mirror 1, thus the safety mirror 1 is observable even during night time. Further, to provide illumination, a power source is needed. It was discovered that safety mirror is often positioned at a location without convenient power source. For example, in the scenario of Figure 1, the safety mirror 1 is positioned at a road side without any convenient power source. A way is to dig trenches to pull power cable from the nearest power source to the safety mirror 1. The present invention provides a convenient power source, which is easy and cheap to install compared to digging trenches, by having a solar panel. To simplify installation, and to increase the robustness and compactness of the safety mirror, the solar panel is to be flexible and be positioned following the periphery of the safety mirror. Further, as the solar panel blends with the shape of the mirror, the safety mirror has increased aesthetic value.

[0026] Figure 2A depicts a front view of one embodiment of a safety mirror with solar powered light. In this embodiment, the mirror arrangement consists of a single convex mirror 21. A convex mirror provides a wider angle of vision compared to a flat mirror. A mirror shade 23 is positioned on the top of the convex mirror 21 to shield the mirror 21 from weather effect such as sun, rain etc. The shade 23 is curved in shape following the periphery of the convex mirror 21. The mirror arrangement also includes a flexible solar panel 25, a strip of flexible LED tube 27, an energy storage unit (not shown), and a controller (not shown).

[0027] The flexible solar panel 25 is attached to the top of the shade 23 so that it is exposed to the sun during day time to generate electricity. Since the shade 23 is curve in shape, the flexible solar panel 25 follows the same shape. The strip of flexible of LED tube 27 is attached on the bottom of the shade 23 so that it is at least partially protected against weather effect. Depending on the size mirror 21, and hence the size of the shade 23, the energy storage unit and the controller can be positioned in a weather proof box and placed at the bottom of the shade 23. Alternatively, they can be placed at the back of the mirror 21.

The energy storage unit takes the form of a rechargeable battery, such as a Lithium rechargeable battery or a Ni-Cd rechargeable battery. It can also take the form of a capacitor. The controller controls the provision of electricity from the rechargeable battery to the flexible LED tube 27. There are many ways to control such provision. For example, a switch can be used which will be switched on and off based on a timer (such as turned on to provide electricity to the flexible LED tube 27 from 6pm to 6am). Alternatively, the switch can be switched on and off based on a light sensor (such as turned on to provide electricity to the flexible LED tube 27 when the light level is below a predetermined level). Using a light sensor has the benefit of turning on the flexible LED tube 27 during day time of a cloudy or rainy day. In relation to physical wiring, the flexible solar panel 25, the flexible LED tube 27 and the energy storage unit are connected to the controller.

[0028] In this example, the dimensions of the components of this mirror arrangement are:

- a. Flexible Solar Panel: 650mm
- b. Flexible LED tube: 470mm
- c. Shade: 900mm
- d. Mirror: 600mm diameter

[0029] The attachment of flexible LED tube 27 can be effected through a fastener, glue or even double sided tape. The same applied to the attachment of the flexible solar panel 25. The attachment can be performed in a manufacturing factory or the flexible LED tube 27 and flexible solar panel 25 can be supplied separated and are only attached to the shade during installation. In the example of Figure 2B, the flexible LED tube 27 is attached at the bottom of the shade 23 using double sided tape. The attachment is strengthened by glue 29.

[0030] The invention can be readily applied to an existing safety mirror. For a safety mirror already with a shade, the retrofitting is done by attaching the flexible LED tube at the bottom of the shade and attaching the flexible solar panel on the top of the shade. Both of them are connected to the controller which is attached either at the back of the mirror or at the bottom of the shade. The battery is also attached either at the back of the mirror or at the bottom of the shade and is connected to the controller. For a safety mirror without a shade, a shade will be provided to be retrofitted to the mirror and other components are positioned as described above.

[0031] Depending on the size and shape of the mirror 21, adjustment can be made to the flexible LED tube 27, the flexible solar panel 25 and the energy storage unit to ensure sufficient electricity supply for

flexible LED tube 27 for an acceptable period of time. For example, the following arrangement allows the flexible LED tube 27 to provide lights to the mirror for a period of 3 to 4 rainy days: (a) Flexible solar panel: Power output of 5W (output voltage of 17.3V @0.29 A; (b) Flexible LED tube: 250mm length of frosted tube including 9 LEDs model SMD2835 with total power consumption being 0.9W; (c) Controller: size of 150x78x35mm, weight 150g, providing electricity at 12V DC; (d) Energy storage unit: Lithium battery with capacity of 2600mAH, size of 70x57.5x19.5mm, providing output voltage of 11.1V.

[0032] Figure 3 depicts one embodiment of a flexible solar panel 41. In this example, the flexible solar panel is rectangular in shape when not bent. Of course, the flexible solar panel can be other shapes to suit the shade of a safety mirror. The solar panel 41 includes a plurality of solar cells. In an alternative embodiment, the number of solar cells can be any number, as long as the total power output is sufficient to support the light source of the safety mirror for at least a predetermined period of time, say at least eight, ten or twelve hours. The back of the solar panel can be enforced so as to act as a shade to the safety mirror too. Figure 4 depicts the flexible solar panel of Figure 3 when bent. The flexible solar panel will be bent when attached to the safety mirror or the shade of the safety mirror.

[0033] Figure 5A to 5F depict a safety mirror similar to the safety mirror of Figure 2 but with a bracket attached at the back of the safety mirror. In particular, Figure 5A shows a safety mirror 51 being mounted above ground 57. Figure 5B depicts side view of arrangement of 5A. It can be seen from Figure 5B that a bracket 55 is used to hold the safety mirror 51 to a pole 53. Other types of brackets can be used to replace bracket 55 as long as the bracket used can hold the safety mirror 51 to pole 53. Depending on the application, a bracket may not be needed. For example, hooks, screws and other fastening means can be used to attach the safety mirror 51 to pole 53. In situation where a wall is available, the safety mirror 51 can be attached to the wall instead of pole 53.

[0034] Figure 5C shows a close-up view of a portion of the safety mirror 51. In this figure, it can be seen that the shade 61 provides shielding to safety mirror 51. Convex mirror 63 is supported by base 65a (also known as a back plate). Front view and side view of convex mirror is shown in Figure 5D. Front view and side view of base 65a are shown in Figure 5E. Note that mirror 63 has a rim 64 which is spot welded 62 to the rim of the base 65a. The base 65a is designed to receive a bracket with four fasteners. Of course, the design of base 65a, number of fasteners can vary depending on preference and/or application of the safety mirror 51.

[0035] Figure 5F shows a top view of shade 61. The shade can vary in shape, size, colour and material, as long as it provides at least some shielding to the mirror. A flexible solar panel and a light source to be installed on the safety mirror (not shown) are to be positioned on the top and bottom of shade 61 respectively. Note that the shade 61 can be an integral part of the flexible solar panel. In other words, the

flexible solar panel can be designed such that it can be bent and be installed to function as a shade to the mirror and as an electricity generator at the same time. A controller and an energy storage unit can be positioned under the shade 61 or against base 65a or even on the pole 53. Figure 6 shows an alternative base 65b to base 65a of Figure 5E.

[0036] Throughout the specification and the claims that follow, unless the context requires otherwise, the words “comprise” and “include” and variations such as “comprising” and “including” will be understood to imply the inclusion of a stated integer or group of integers, but not the exclusion of any other integer or group of integers.

[0037] The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement of any form of suggestion that such prior art forms part of the common general knowledge.

[0038] It will be appreciated by those skilled in the art that the invention is not restricted in its use to the particular application described. Neither is the present invention restricted in its preferred embodiment with regard to the particular elements and/or features described or depicted herein. It will be appreciated that the invention is not limited to the embodiment or embodiments disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the invention as set forth and defined by the following claims.

CLAIMS

1. A mirror arrangement, including:
 - a mirror;
 - a solar panel for providing electricity;
 - a light source for receiving the electricity to provide light to the mirror; and
 - an energy storage unit for storing electricity provided by the solar panel, and for providing electricity to the light source;wherein at least a portion of the solar panel is flexible and is configured to follow a shape of a portion of the mirror.
2. The mirror arrangement of claim 1, wherein a periphery of the mirror is substantially circular, and the flexible portion of the solar panel forms a curve along a portion of the periphery.
3. The mirror arrangement of claim 1, wherein the light source is a LED.
4. The mirror arrangement of claim 1, wherein the light source is a LED strip.
5. The mirror arrangement of claim 1, wherein the mirror is a convex mirror.
6. The mirror arrangement of claim 1, further including a mirror shade, wherein the solar panel is positioned on one side of the mirror shade and the light source is positioned on the other side of the mirror shade.
7. The mirror arrangement of claim 6, further including a controller for controlling electricity from the solar panel to the energy storage unit, and from the energy storage unit to the light source.
8. The mirror arrangement of claim 7, wherein the controller turns on the light source when the solar panel is not generating electricity.
9. The mirror arrangement of claim 1, further including a mounting means for mounting the mirror at an intended location.
10. The mirror arrangement of claim 9, wherein the mirror is mounted on a pole.
11. The mirror arrangement of claim 1, wherein the mirror is a safety mirror.
12. A retrofitting kit for a safety mirror, including:

a solar panel for providing electricity;
a light source for receiving the electricity to provide light to the mirror; and
an energy storage unit for storing electricity provided by the solar panel, and for
providing electricity to the light source;

wherein at least a portion of the solar panel is flexible and is configured to follow a shape
of a portion of the safety mirror.

13. The retrofitting kit of claim 12, further including a shade for at least partially shielding the safety mirror from weather effect.
14. The retrofitting kit of claim 12, wherein the light source is a LED or a LED strip.