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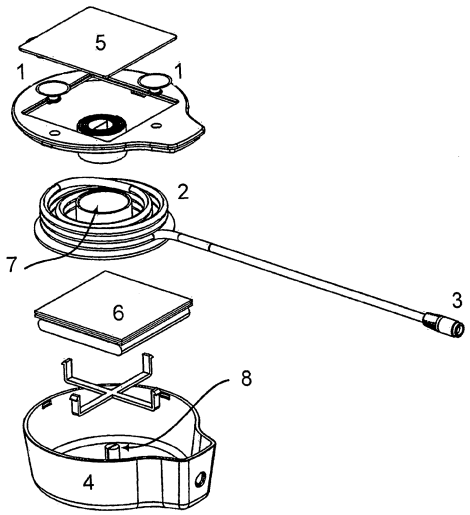
(56) Documents Cited:
WO 2005/008146 A1
JP 060055649 A
JP 020120125 A
JP 2004301558 A
US 4786851 A

(58) Field of Search:
INT CL **H02J**
Other: **WPI, EPODOC, TXTE**

(54) Title of the Invention: **A charge unit for a vehicle**
Abstract Title: **Vehicle windscreen solar charger**

(57) A charge unit for a vehicle has means, such as a suction cup 1, for attaching the unit to the interior of a vehicle windscreen. A photovoltaic panel 5 is arranged on the unit to be exposed to the vehicle exterior. A retractable cable 2 may be provided to allow the unit to charge an external device such as a mobile phone. A battery 6 is typically provided to store charge from the photovoltaic panel 5 until ready for use.



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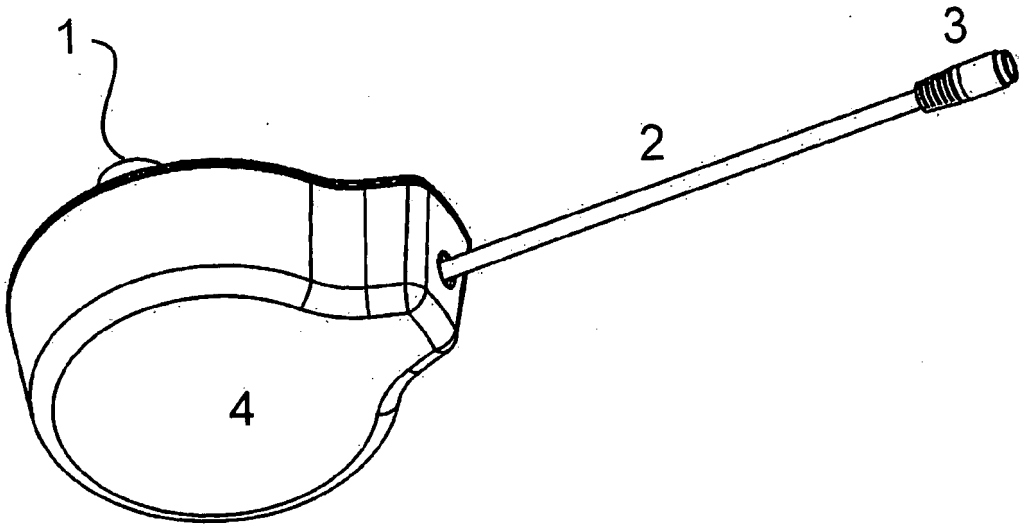
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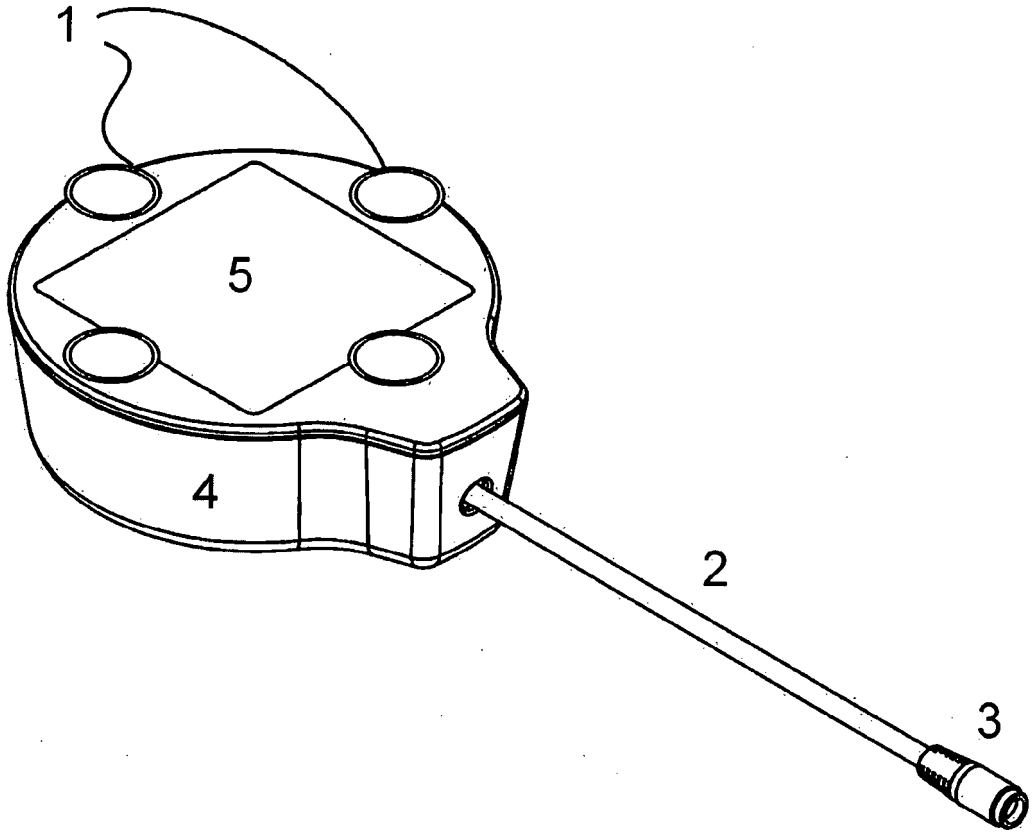
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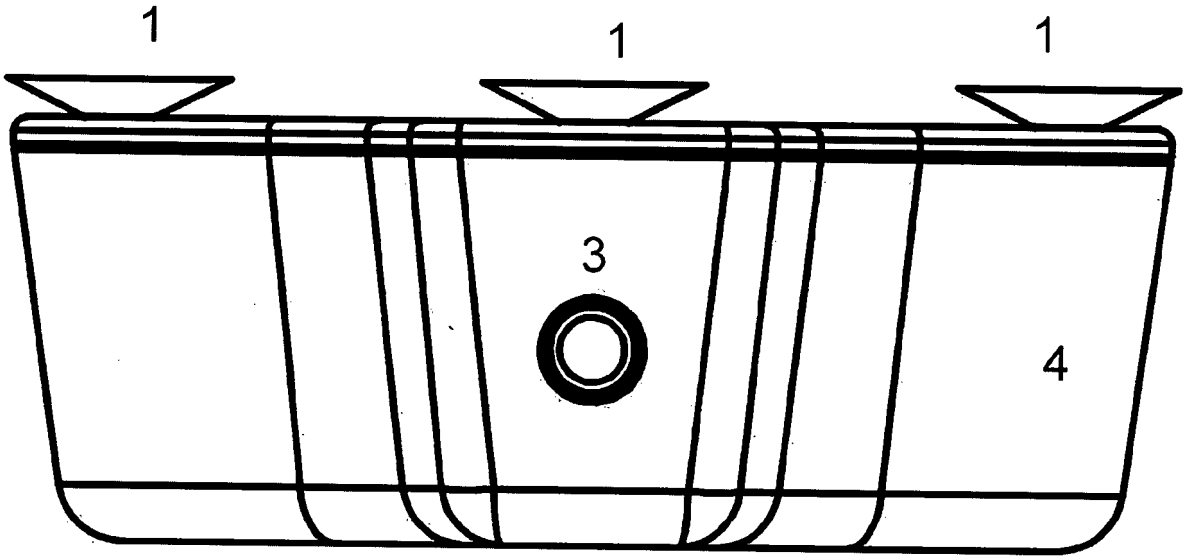
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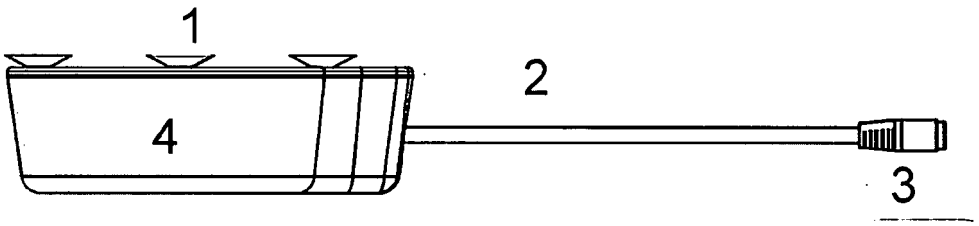
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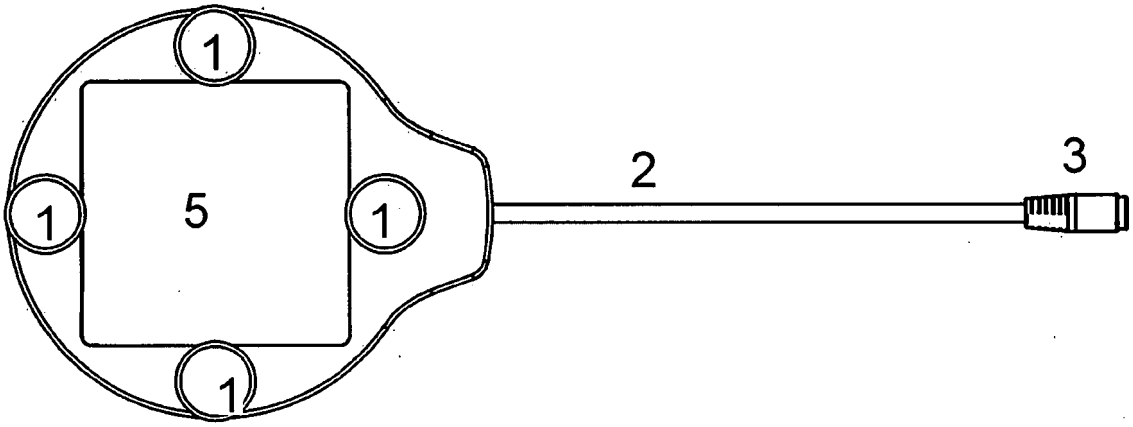
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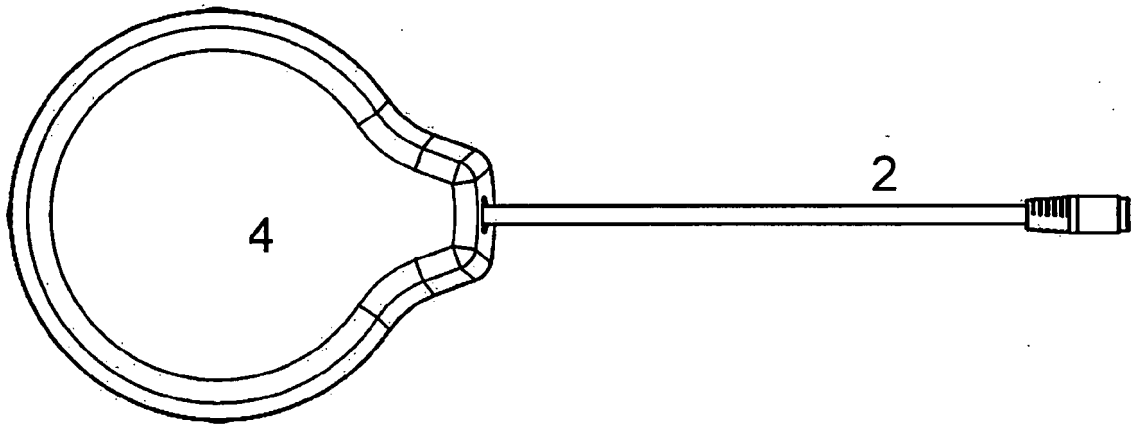
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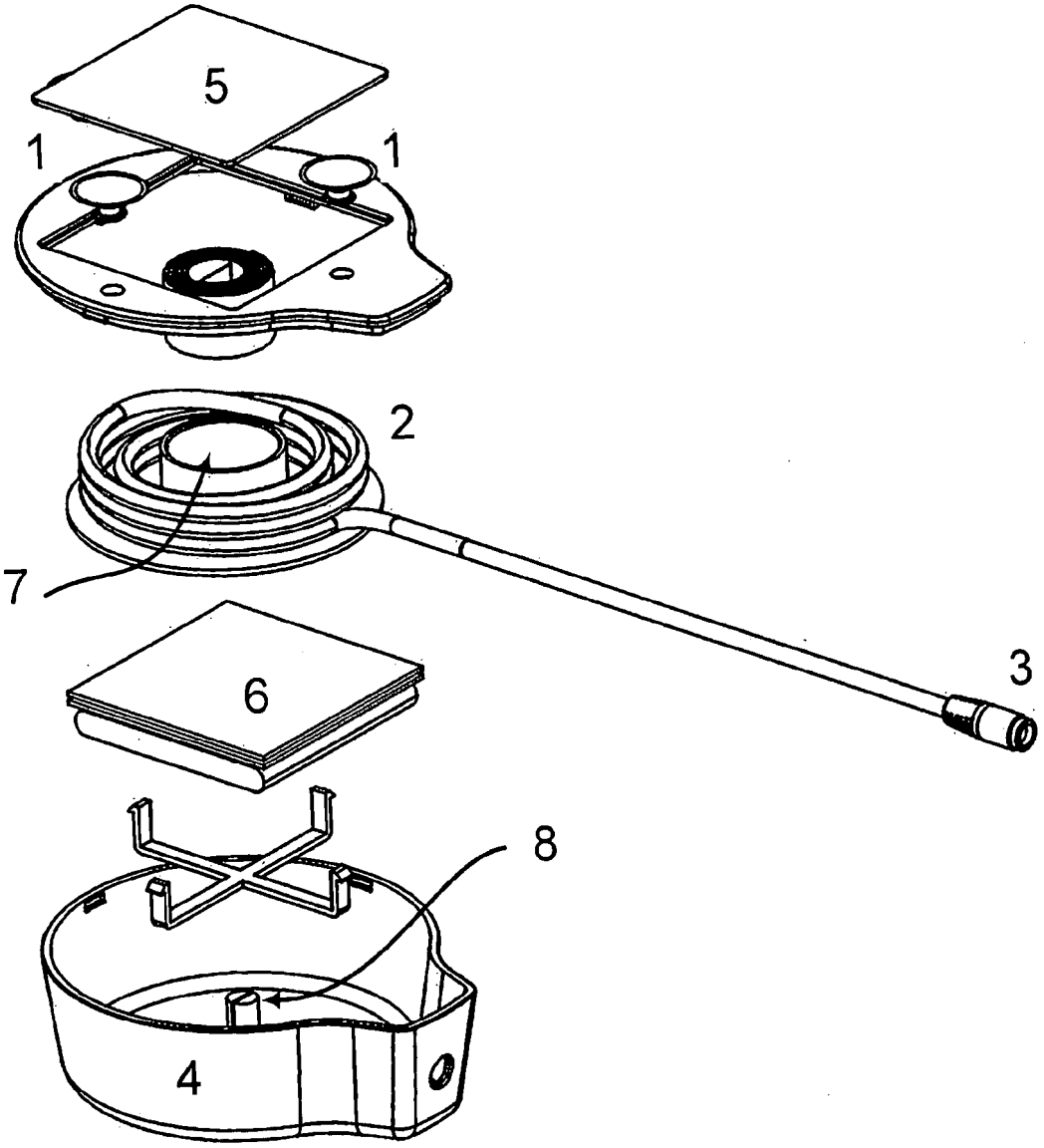
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A CHARGE UNIT FOR A VEHICLE

Field of the Invention

The present inventions relates to a charge unit for a vehicle, more particularly but not exclusively a photovoltaic charge unit.

Background

There are many devices that require charging on a regular basis and in particular whilst away from the home, for example when travelling in a vehicle.

Typically in these situations charging cables may be adapted to be accepted to the vehicle, for example by the cigarette lighter in order to charge a device whilst travelling. However this preferably requires the vehicle to be running so as not to drain the vehicle battery and can lead to the dashboard becoming cluttered with devices and cables.

Other means of power generation such as solar power generation have been adapted to provide a means of powering some devices for example a mobile phone may include solar panels to generate power in order to charge the phone. However this may be provided integrated with the device or only be designed for use with a particular phone and therefore a separate means would be required for a second device such as a satellite navigation screen.

Prior Art

Accordingly a number of patent applications have been filed in an attempt to resolve the problem or similar, including the following:

United States patent application US 5 905 356 (WELLS) discloses a light energy powered charging system for recharging portable units such as battery powered hand tools and cellular telephones, said charging system comprising: a solar collection assembly having at least one light energy receiving panel, said collection assembly being mountable to a carrying vehicle; a multi-position connector coupled

to said receiving panel for facilitating the positioning of said panel toward a light source such as the sun or vehicle headlights; a power receiver electrically connected to said receiving panel for accepting electricity generated at said solar collection assembly; and said power receiver having a docking station for releasably receiving a battery powered portable unit such as a powered hand tool or a cellular telephone requiring recharging.

United States patent application US 4 539 516 (THOMPSON) discloses a battery energizer comprising: solar cell means for generating a small current when light impacts thereon; terminal means for releasably receiving a button battery therein and, comprising: a first conductive plate physically mounted so that it is stationary with respect to said solar cell means; and a generally L-shaped second conductive plate, including a cantilevered spring portion, said second plate mounted so that said cantilevered spring portion is generally parallel to, and spaced from, said first terminal plate; said first and second terminal plates being electrically connected only when a button battery is disposed between said cantilevered spring portion of said second plate and said first plate; and means for allowing passage of current from said solar cell means to a button battery received by said terminal means, but not vice versa.

Granted United Kingdom patent GB 2 045 181 (FUJIKUBO et al) discloses an apparatus for recharging an automotive vehicle battery provided in an automotive vehicle comprising: a first solar battery being secured on a rear view mirror support provided inside of a vehicle compartment adjacent a front windshield, a universal joint means interpositioned between said rear view mirror support and said solar battery for permitting adjustment of direction of said solar battery toward sunlight; and a recharging current control means for feeding recharging current obtained from said solar battery to said vehicle battery.

Summary of the Invention

According to the present invention there is provided a charge unit for a vehicle comprising a means for attachment of the unit to a vehicle windscreen interior, said means arranged in use to allow at least one photovoltaic panel to be exposed to the vehicle exterior, a facility for receiving, storing and outputting electricity generated by said panel, and an extendable charging wire arranged in use for connection to an

independently provided device so as to transfer electricity from said facility to said device.

Preferably the unit is attached temporarily or semipermanently to the windscreen wherein ideally a user may be able to remove the unit when leaving the vehicle unguarded and/or for any length of time to avoid theft. In preferred embodiments the means is temporary and easily reversible.

For example in some embodiments the means may comprise at least one suction pad. Ideally a plurality of suction pads may be utilised, surrounding the panel(s).

In some embodiments the unit may comprise a housing, said housing covering, protecting and encompassing the facility. Preferably the housing may further provide secondary surfaces for at least one further panel.

In some embodiments the housing may comprise a mechanism to allow readjustment of the panel(s) wherein for example the panel(s) may be redirected or reoriented in use, for example in order that in night-time driving the panel(s) may be directed towards approaching headlights in order to maximise collection of light rays.

In this way typically there is provided a solar powered charging unit comprising: a housing which encloses a retractable cable that is capable of accepting a variety of interchangeable adaptors, wherein the housing houses at least one photovoltaic panel and the housing includes a means of attaching the unit to a surface so that the panel is exposed to a light source.

Ideally the headlights from approaching vehicles comprise a light source able to charge the unit in use.

In this way the solar powered charging device is able to be positioned on a window such as a windscreen wherein the retractable cable is extended in order to plug into a device such as a mobile phone in order to charge it using power generated from the photovoltaic panel.

Advantageously the unit is secured in position in use to ensure maximal exposure to the light source, typically daylight, at all times and therefore most effective as a means of providing power for charging.

Furthermore the unit may be readily moved to another window such as side windows or rear windows to be exposed to better light sources as conditions/location changes.

Additionally the unit does not clutter a dashboard as it is typically mounted on the window and does not require wiring for power, only having the cable to supply power generated from the photovoltaic panel on the unit to devices to be charged. For example if the unit is used to charge a windscreen mounted satellite navigation screen there will be no wires or cables on the dashboard and the unit and screen may be positioned close to one another anywhere on the screen with no limitations due to cable length which may occur when connected to standard power supplies.

Preferably the housing is formed from two parts, a top and a bottom, which together form a cavity in which the retractable cable is located. Ideally the cavity is arranged to accept a spool so that the retractable cable may be wound around the spool when not in use and readily unwound from the spool when required. Typically the spool is sprung so as to retract the cable when not in use.

Ideally the housing is formed from a lightweight, durable material such as synthetic plastic, for example acrylonitrile butadiene styrene (ABS).

Accordingly the housing includes at least one opening dimensioned to allow the cable to pass from inside the housing to outside of the housing. Typically the cable head in use is maintained fully or partially external to the housing so as to be readily assessable to the user so that they may grasp and pull the cable in order to extend it from the spool.

Preferably the head is capable of accepting a plurality of interchangeable adaptors so as to be compatible with various devices. For example the head may accept a universal serial bus (USB).

In preferred embodiments the housing includes at least one flat face arranged in use to be accepted onto the surface where the unit is secured such as the window.

Typically the face which is accepted to the surface includes the means of attachment wherein the means of attachment may be at least one suction pad so as to removably secure the unit to the surface.

Preferably a plurality of suction pads may be used to secure the unit to the surface so as to removably connect the unit to the surface and to ensure the unit does not fall off in use. Ideally the face also houses the photovoltaic panel therefore enabling the unit to be positioned on the surface that receives light, for example on the inside of the windscreen so that the photovoltaic panel faces out of the vehicle to the light source.

In this way ideally the suction pads are positioned around the panel so as not to interfere with the panel. Furthermore the suction pads are preferably transparent so as not to limit exposure of the panel to the light source.

In preferred embodiments the suction pads may be integrated with the housing so as not be detached from the unit.

In some embodiments other means of attachment may be used such as magnets, a fixing bracket, or the unit may be integrated with the window.

Ideally the photovoltaic panel is housed by the housing so as to be flush with the housing wherein the panel is inlaid to the housing or face. Typically the panel is connected to a battery within the housing so that residual energy generated may be stored until use. Preferably the cavity also includes a printed circuit board (PCB) to connect the panel, cable and battery wherein all parts may be joined together or supported by a lightweight clasp to prevent movement in use. For example the clasp may be formed from polypropylene and be used to used to hold the before mentioned components together so as not to be interfere with the spool.

It may be envisaged that power may be drawn from; the battery, the panel or both at any one time dependant on the power requirement, battery and photovoltaic panel status. For example if the photovoltaic panel is not operable due to lack of light, power may be drawn from the battery.

In some further embodiments the unit may be connected in use to the vehicle's battery, wherein when charge is not available locally charge may be drawn from the

vehicle battery. In such embodiments a charge time or quantity limit may be imposed for drawing from the vehicle battery.

In preferred embodiments the housing may be substantially disc shaped so as to match the spool and being easy to handle whilst positioning on the window. It may be envisaged that in some embodiments a larger unit is provided in order to generate more power for devices that require greater power such as a laptop computer.

In other embodiments the housing may be square, rectangular, ovaloid, hemispherical or other multi angled shapes.

Ideally the housing opening may be dimensioned to form a projection from the housing which serves to protect the cable and also defines a channel for the cable to be extended from. It may be envisaged that this projection protrudes at least 5mm from the housing and ideally no greater than 20mm from the housing.

Typically the projection may be moulded from the housing so as to be rigid. In some other embodiments the projection may be flexible so as to allow the cable to be readily deployed in different orientations depending upon the location of the device to be charged.

In some embodiments the unit may include a visual indicator to reveal to the user when the unit is charging. For example the housing may house a light such as a light emitting diode (LED) which is turned on or flashes when active or when no power is being generated.

Brief Description of Figures

Figure 1 shows an isometric view of a preferred embodiment of the unit from below;

Figure 2 shows an isometric view of the embodiment shown in Figure 1 from above;

Figure 3 shows an end view of the embodiment shown in Figure 1;

Figure 4 shows a side view of the embodiment shown in Figure 1;

Figure 5 shows a top view of the embodiment shown in Figure 1;

Figure 6 shows a bottom view of the embodiment shown in Figure 1;

And

Figure 7 shows an exploded isometric view of the embodiment shown in Figure 1.

Detailed Description of Figures

With reference to the figures the unit comprises a housing 4 with extending cable 2 and attachment means comprised of suction pads 1, wherein said cable 2 includes a adaptor 3.

The housing 4 includes a photovoltaic panel 5.

Preferably the unit may be at least 30mm deep, at least 80mm diameter housing the photovoltaic panel of at least 50mm x 50mm.

The cable 2 is mounted on a reel 7, mounted in turn on a pin 8 comprised in the housing 4, and wherein said mounting is dismountable to access a battery 6.

The invention has been described by way of examples only and it will be appreciated that variation may be made to the above-mentioned embodiments without departing from the scope of invention.

With respect to the above description then, it is to be realised that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

Claims

1. A charge unit for a vehicle comprising a means for attachment of the unit to a vehicle windscreen interior, said means arranged in use to allow at least one photovoltaic panel to be exposed to the vehicle exterior, a facility for receiving, storing and outputting electricity generated by said panel, and an extendable charging wire arranged in use for connection to an independently provided device so as to transfer electricity from said facility to said device.

2. A unit according to claim 1, in which said charge unit is arranged in use to be located within a windscreen.

3. A unit according to claim 1 wherein the means comprises at least one suction pad.

4. A unit according to claim 1, 2 or 3 comprising a mechanism to allow reorientation of the panel(s).

5. A unit with reference to the figures.

Application No:	GB1301232.3	**Examiner:**	Peter Keefe
Claims searched:	1-4	**Date of search:**	30 July 2013

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X,Y	X: 1; Y: 4	US4786851 A (FUJI et al.) figure 1, 7; column 3 lines 21-33; column 5 lines 60-64; column 8 lines 9-16
X,Y	X: 1, 3; Y: 4	JP02120125 A (MONA SEIKI KK) see abstracts and figures
X,Y	X: 1, 3; Y: 4	JP06055649 A (MATSUSHITA ELECTRIC IND CO LTD) see abstracts and figures
X,Y	X: 1, 3; Y: 4	WO2005/008146 A1 (ICP GLOBAL TECHNOLOGIES INC) para 004; figure 1, 2, 3
Y	4	JP2004301558 A (KOMUTEKKU KK) see abstracts and figures

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

H02J

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, TXTE

International Classification:

Subclass	Subgroup	Valid From
H02J	0007/35	01/01/2006