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(54) Title:  ALTERNATIVE POWER GENERATOR WITH RECHARGE CAPABILITY

(57) Abstract:  An energy conservator for charging a power source, comprising: a charging unit having an input, a first output and
a second output, the input for receiving direct current electricity from a power source, the first output for sending alternating current
electricity to a load device, the second output for sending direct current electricity to a battery, the charging unit comprising: a
transforming module operatively connected to the input for transforming the direct current electricity to alternating current
electricity, the transformer having an output for outputting the alternating current; a filter module operatively connected to the
transforming module for receiving the alternating current from the output of the transformer, the filter module splitting the alternating
current into a first portion and a second portion, the first portion for sending to the load device through the first output; a regulator
module for receiving as input from the second output the second portion of electricity from the filter module, the regulator module
converting the second portion of electricity from alternating current into direct current and outputting the direct current; and a first
charging circuit operatively connected to the regulator module for receiving the direct current electricity from the regulator module.

FIG. 1
Alternative Power Generator With Recharge Capability

FIELD OF THE INVENTION

[0001] The present invention relates to charging a battery during operation thereof.

BACKGROUND OF THE INVENTION

[0002] Batteries used to power cars, home appliances or other electrical devices are not presently used to their full potential. When an electrical or electro-mechanical load device is powered using a battery, the capacity of the battery can deplete at a faster rate than the charge supplied to the load device. There is therefore a loss of electric charge between the time the battery discharges electricity and the time the load device uses the electricity.

[0003] Furthermore, batteries can be discharged at different rates, depending upon the amount of load connected to them. Therefore, for higher discharge rates, the battery may become depleted sooner than desired.

SUMMARY

[0004] The present invention addresses at least one of the above presented problems.

[0005] There can be a loss of electric charge between the time the battery discharges electricity and the time the load device uses the electricity. Also, batteries can be discharged at different rates, depending upon the amount of load connected to them. Therefore, for higher discharge rates, the battery may become depleted sooner than desired. The present invention can address the loss of electric charge as captured or otherwise conserved by the battery itself.

[0006] According to one aspect of the present invention, disclosed is an energy conservator for charging a power source, comprising: a charging unit having an input, a first output and a second output, the input for receiving direct current electricity from a power source, the first output for sending alternating current electricity to a load device, the second output for sending direct current electricity to a battery, the charging unit comprising: a transforming module operatively connected to the input for transforming the direct current electricity to alternating current electricity, the transformer having an output for outputting the alternating...
current; a filter module operatively connected to the transforming module for receiving the alternating current from the output of the transformer, the filter module splitting the alternating current into a first portion and a second portion, the first portion for sending to the load device through the first output; a regulator module for receiving as input from the second output the second portion of electricity from the filter module, the regulator module converting the second portion of electricity from alternating current into direct current and outputting the direct current; and a first charging circuit operatively connected to the regulator module for receiving the direct current electricity from the regulator module.

[0007] According to another aspect of the present invention, the energy conservator has a charging controller having a memory and a processor, the memory having instructions stored thereon for execution by the processor, the charging controller connected to a first switch for operating the switch between the open and closed state.

[0008] According to another aspect of the present invention, the energy conservator further comprises a first switch connected to the first charging circuit, the switch operable between an open state and a closed state, in the closed state the first switch allows electricity to flow from the regulator module to the first charging circuit, in the open state the first switch prohibits electricity from flowing between the regulator module and the first charging circuit.

[0009] According to another aspect of the present invention, the power source is the same as the battery.

[0010] According to another aspect of the present invention, the charging unit further comprises a second charging circuit operatively connected to the regulator module in parallel with the first charging circuit for receiving electricity from the regulator module; and a second switch connected to the second charging circuit, the second switch operable between an open and a closed state, in the closed state the second switch allows electricity to flow from the regulator module to the second charging circuit, in the open state the second switch prohibits electricity from flowing between the regulator module and the second charging circuit, wherein the charging controller connected to the second switch for operating the second switch between the open and closed state.
According to another aspect of the present invention, the charging unit further comprises: a third charging circuit operatively connected to the regulator module in parallel with the first charging circuit and second charging circuit for receiving electricity from the regulator module; and a third switch connected to the third charging circuit, the third switch operable between an open and a closed state, in the closed state the third switch allows electricity to flow from the regulator module to the third charging circuit, in the open state the third switch prohibits electricity from flowing between the regulator module and the third charging circuit, wherein the charging controller connected to the third switch for operating the third switch between the open and closed state.

According to another aspect of the present invention, the second charging circuit outputs a higher current than the first charging circuit and at a lower rate than the first charging circuit.

According to another aspect of the present invention, the third charging circuit outputs a higher current than the second charging circuit and at a lower rate than the second charging circuit.

According to another aspect of the present invention, the transforming module of the energy conservator is a step up transformer for stepping up the voltage sent to the output.

According to another aspect of the present invention, the energy conservator further comprises: a relay for receiving electricity from the charging circuits and directing the electricity to the power source, the relay operatively connected to the power source to monitor the voltage in the power source, the relay having a relay switch operable between an open and closed state, in the closed state the relay switch allows electricity to flow from the relay to the power source, in the open state the relay switch prohibits electricity from flowing between a relay and the power source.

According to another aspect of the present invention, the filter of the energy conservator is operatively connected to a plurality of loads for sending electricity to the plurality of loads.
According to another aspect of the present invention, the load device of the energy conservator is one of the load devices selected from a car, a home appliance and an electrical device.

According to another aspect of the present invention, disclosed is a method of conserving energy in a battery, comprising: providing a battery having an input and an output; providing a load device; providing an energy conservator as defined above; attaching the load device to energy conservator; attaching the battery to the energy conservator; and selectivity engaging at least one of the first charging circuit, the second charging circuit and the third charging circuit.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the subject matter may be readily understood, embodiments are illustrated by way of examples in the accompanying drawings, in which:

Figure 1 is a block diagram of an exemplary embodiment of the energy conservator in accordance with the present invention;

Figure 1B is a block diagram of an alternative embodiment of the energy conservator in accordance with the present invention;

Figure 2 is a further block diagram of an exemplary embodiment of the energy conservator in accordance with the present invention;

Figure 3 is a circuit diagram of an exemplary embodiment of a power supply in accordance with the present invention;

Figure 4 is a circuit diagram of the first circuit shown in the block diagram of Figure 1;

Figure 5 is a circuit diagram of the second circuit shown in the block diagram of Figure 1;
Figure 5B is another view of the circuit diagram of the second circuit shown in the block diagram of Figure 1;

Figure 6 is a circuit diagram of the third circuit shown in the block diagram of Figure 1;

Figure 7 is a block diagram showing the charging controller;

Figure 8 is a flowchart showing the logic of the charging controller; and

Figure 9 is a circuit diagram of the energy conservator attached to a battery.

**DETAILED DESCRIPTION**

Disclosed herein is an energy conservator that can be used to conserve energy in a power source such as a direct current ("DC") battery. The battery is connected to the conservator which is in turn, connected to a load device. When the load device requires power, the battery discharges DC power which is then converted to alternating current ("AC") power by the conservator on its way to the load device. A portion of the AC power is converted back into DC power by the conservator and supplies power to three charging circuits.

The three charging circuits operate independently to send DC electricity back into the battery at different levels of current and at different rates and are controlled by a charging controller which has an internal logic (e.g. a timer switch) for controlling the circuits.

As a result of the operation of the energy conservator the discharge of the battery is smoothed out (i.e. charge-usage "spikes" from load devices are less severe) and the battery loses its capacity at a much slower rate, thereby conserving energy stored in the battery.

Referring to Figure 1, the energy conservator environment is shown at 100 and consists of at least three main components. These components include a rechargeable battery 102, a charging unit 104 and an electrical load device 106.
[0035] The rechargeable battery 102 is, for example, a 12 volt DC battery, however other rechargeable DC batteries 102 can be used with the present invention. The rechargeable battery 102 has an input attached to a conductor (e.g. wire) 110 as well as an output attached to a conductor (e.g. wire) 110. When the conservator is operating, the input receives DC electricity along the wire 110 from the charging unit. The battery 102 stores this charge to be used and/or discharged at a later time. When the electricity is discharged it flows through the output along the wire 110 to the conservator and/or load device 106.

[0036] The load device 106 may be any electrical or electro-mechanical load device that is at least partially receptive to electricity (i.e. partially operable by electricity). The load device 106 has an input attached to a wire 110. The input receives the electricity discharged from the battery along the wire 110 in order to (at least partially) power the load device 106. The electricity received into the input of the load device 106 from the wire 110 is preferably AC electricity. For example, the input may be a 110 to 220 AC volt pure sine wave as may be suitable for electrical devices or home appliances.

[0037] The charging unit 104 shown in Figure 1 and Figure 2 consists of an inverter 212, a transformer and filter regulator 210, three charging circuits 204, 206, 208 a charger regulator 214, a charging controller 216 and a relay circuit 220.

[0038] The inverter 212 is preferably a metal-oxide-semiconductor field-effect transistor ("MOSFET") with complementary metal-oxide-semiconductor ("CMOS") circuit logic. The inverter 212 receives the DC electricity as input and transforms the current into AC electricity. The inverter 212 then outputs the AC electricity downstream along a wire 110 (i.e. in the direction of arrow 222). The output from the inverter 212 may, for example, be a 110 to 220 AC volt square wave (i.e. non-sinusoidal waveform) output as shown in Figure 1.

[0039] The non-sinusoidal waveform output of the inverter 212 is then applied to a transformer and filter regulator 210. The transformer and filter regulator 210 steps up and adjusts the output to an AC sine waveform rate at 110 volts or 220 volts root mean squared. A person of ordinary skill in the art would understand that this rate of voltage is suitable for operating most conventional household appliances and electronics equipment. However, it is recognized that incorporating different types of transformer and filter regulators 210 can result in different rates of voltage as may be required by different load devices.
A portion of this AC electricity supplies the charger regulator 214. This portion of AC electricity is received at the charger regulator 214 and is converted (or rectified) back into DC voltage and is output as such by the charger regulator 214. This DC electricity is output to one or more of the three charging circuits 204, 206, 208, for example.

The AC electricity output also supplies the load device 106. The load device 106 is connected via the wire 110 to the charging unit 104. A switch 118 is located on the wire 110 between the charging unit 104 and the load device 106. The switch 118 is operatively connected to the charging unit 104 to supply power to the load device 106.

Three charging circuits 204, 206, 208 can receive DC electricity from the charger regulator 214. The three charging circuits 204, 206, 208 are located in parallel downstream of the charger regulator 214.

The charger regulator 214 has three outputs connecting to conductive wires 110. The DC electricity resulting from the conversion (or rectification) performed by the charger regulator 214 is output into the three wires 110. Each wire 110 extending downstream from the charger regulator 214 connects to the input of a separate charging circuit 204, 206, 208. Single switches 218 are located on each of the three wires extending from the output of the charger regulator 214. These three switches 218 may be operated (i.e. opened or closed) independently of each other such that when any one (or more) switch 218 is closed electricity flows from the charger regulator 214 to the respective charging circuit along the wire on which the switch 218 is closed.

Each of the three charging circuits 204, 206, 208 has a separate output connected to a wire 110 which in turns leads to an input connection of the charging controller 216.

The charging controller 216 controls the operation of the switches 218 and therefore controls the flow of electricity from the charging unit 104 back to the battery 102. For example, the charging controller 216 sends a signal to any one or more of the switches 218 instructing the switch to open (or close) to prevent (or allow) electricity to flow along the respective wire 110 between the charger regulator 214 and the respective charging circuit.
The first charging circuit 204 has an input that receives one corresponding wire 110 from the charger regulator 214. When the switch 218 on the corresponding wire 110 is closed, DC electricity flows from the charger regulator 214 to the first charging circuit 204. The second charging circuit 206 has an input that receives another corresponding wire 110 from the charger regulator 214. When the switch 218 on the corresponding wire 110 is closed, DC electricity flows from the charger regulator 214 to the second charging circuit 206. Similarly, the third charging circuit 208 also has an input that receives a corresponding wire 110 from the charger regulator 214. When the switch 218 on the corresponding wire 110 is closed, DC electricity flows from the charger regulator 214 to the third charging circuit 208.

When a particular switch 218 is closed, thus allowing electricity to flow along the wire 110 on the circuit, and when the battery is discharging electrical energy onto the wire 110 of the circuit, the corresponding charging circuit (i.e. 204, 206 or 208) is considered to be in charging mode. A charging circuit (i.e. 204, 206 or 208) is said to be "engaged" when its respective switch 218 is closed and "disengaged" when its respective switch 218 is open.

The first charging circuit 204 is a relatively low current rapid charging circuit and is normally in charging mode during operation of the conservator. For example, the first charging circuit 204 is the only charging circuit that always supplies a charge back to the battery 102 when the conservator is in charging mode (i.e. when the battery 102 is discharging electricity for the load device 106).

The second charging circuit 206 is a relatively high current slow charging circuit and is also normally in charging mode. The first charging circuit 204 therefore supplies a lower current charge at a faster rate as compared to the second charging circuit 206. Similarly, the second charging circuit 206 supplies a higher current charge at a slower rate as compared to the first charging circuit 204. The second charging circuit 206 is also shown in Figures 5 and 5B.

The function of the second charging circuit 206 is to at least partially compensate for the immediate loss of charge on the battery 102 when a load device 106 is receiving charge from the battery 102. When the load required by the load device 106 spikes, or has a relatively sharp load-demand increase for example, the second charging circuit 106 is engaged to at least partially compensate for the spike in the load. The result is that the spike in battery 102 usage is smoothed out. Such a spike in battery 102 charge usage may, for example, result from
additional load devices 106 being connected to the battery 102 with the additional load devices 106 being charged from the battery 102. The second charging circuit 106 may be disconnected, for example, when the loss of charge from the battery 102 is at least partially replenished.

[0051] In a situation in which load devices 106 are connected or disconnected dynamically, the second charging circuit 206 is preferably engaged and disengaged as the load devices 106 are connected and disconnected, respectively. The second charging circuit 206 may therefore be used repeatedly but is not always providing a charge back to the battery 102.

[0052] The third charging circuit 208 provides electricity with a higher voltage than the other two charging circuits 204, 206. The third charging circuit 208 is preferably only used when additional load devices 106 are connected to the battery 102 so as to be charged by the battery 102. For example, there may be a threshold battery charge level, below which the third charging circuit 208 is engaged to supply charge back to the battery 102.

[0053] The three charging circuits 204, 206, 208 may be engaged or disengaged independently and if more than one charging circuit is engaged the resulting currents will simultaneously flow back to the battery 102.

[0054] Figure 7 is a block diagram showing the operative connections and components of the charging controller 216. The charging controller 216 has a memory 702 for storing data and instructions (e.g. computer code, circuit logic). A processor 700 is integrated with the charging controller 216 and is able to execute instructions stored on memory 702. The charging controller 216 is operatively connected to each of the circuit switches 218 as well as to a timer switch 704 in order to operate the switches. The main output switch 704 is located downstream from the charger controller. When the main output switch 704 is disengaged (i.e. the main output switch 704 is open) then no current can flow from the charging circuits 204, 206, 208 along the wire 110. When the main output switch 704 is engaged (i.e. the main output switch 704 is closed) then electric current is able to flow from the charging circuits 204, 206, 208 along the wire 110 to the battery 102 depending on whether the switches 218 are engaged. The instructions stored on memory 702 may dictate when the switches 218, 704 are to be closed and/or opened. The processor 700 then executes these instructions, closing and/or opening the switches 218, 704 when required by the instructions. The memory 702 also stores the threshold battery charge level for determining the charge below which the third charging circuit 208 will be engaged.
[0055] A battery monitor 706 and/or a load monitor 708 can be connected to the charging controller 216. The battery monitor 706 is connected to the battery 102 and monitors the charge remaining on the battery 102. The battery monitor 706 relays this information to the charging controller 216. Similarly, the load monitor 708 monitors the electricity usage and requirements of the load device 106 and relays this information to the charging controller 216. The charging controller 216 uses the inputs gathered from the load monitor 708 and battery monitor 706 together with the instructions stored on memory 702 to operate the switches 218, 704 in order to provide electrical charge to the battery 102.

[0056] Alternatively, there may be no load monitor 708 so that the only monitor connected to the charging controller 218 is a battery monitor 706. In such a situation, the charging controller 216 uses the input gathered from the battery monitor 706 together with the instructions stored on memory 702 to operate the switches 218, 704 in order to provide electrical charge to the battery 102.

[0057] The charging controller 216 monitors the battery charge using the battery monitor 706 and by operating the switches 218, 704, provides that 15% (or some other predefined charge portion) of the battery charge is continuously routed through at least one of the circuits 204, 206, 208 back into the battery.

[0058] The first circuit 204 is continuously on or closed (i.e. allowing electricity to flow through the circuit 204 back to the battery) in order to address the loss of the electricity on the line or wire 110.

[0059] The memory 702 maintains two or more threshold values to assist the charging controller 216 with the operation of the circuits 204, 206, 208. The threshold values may be one of the following values: voltage of the battery, current of the battery, load draw, rate of change of voltage of the battery, rate of change of current of the battery, rate of change of load draw, or any combination of the above. The battery monitor 706 and/or load monitor 708 measures these same metrics and relays them to the charging controller 216, which compares the monitored measures with the threshold values.

[0060] If the monitored value is greater than the first threshold value stored in memory 702 then the second circuit 206 is engaged (i.e. electricity flows through the second circuit to the
battery). If the monitored value is greater than the second threshold value stored in memory 702 then the third circuit 208 is engaged (i.e. electricity flows through the third circuit to the battery).

[0061] It is recognized that the charging controller 216 may be software, hardware, firmware or a combination of the three.

[0062] A relay 220 receives at its input the electrical charge that is output from the charging controller 216. The relay 220 is operatively connected to the terminals of the battery 102 so that it can monitor the terminal voltage of the battery. If the terminal voltage of the battery 102 is lower than a threshold voltage maintained by the relay 220 then the output from the charging controller 216 is relayed to the battery 102 so that the battery 102 may be charged. However, if the terminal voltage of the battery 102 is higher than the threshold voltage then the relay disengages the charging process by disengaging the switch 108 (see Figure 2). Similarly, when the battery is in an overcharged state or when only small loads are connected and charging is not desired, then the relay disengages the charging process. The relay 220, therefore, automatically determines whether the battery 102 is overcharged and if so the relay 220 prohibits electricity to flow from the charging circuits 204, 206, 208 to the battery 102.

[0063] The rechargeable battery 102 is attached to relay 220 (and thus the charging unit 104) via a conductive wire 110, forming a closed circuit (as shown in Figure 2). The conductive wire 110 may, for example be a copper wire or electrical wiring or may be constructed from other suitable conductive material including aluminum.

[0064] The three charging circuits 204, 206, 208 provide different functions and are independently controlled by the charging controller 216. The second charging circuit 206 supplies a high current charge at a slower rate as compared to the first charging circuit 204 to compensate for the immediate loss of charge on the battery when there is at least one load device 106 connected to the conservator. The third charging circuit 208 provides the highest voltage which may be needed as a back-up to boost the charging process when additional loads are connected to the conservator.

[0065] The logic of the charging controller 216 (including instructions that may be stored on memory 702) will now be described in more detail with reference to Figure 8.
First, at step 802, the charging controller 216 is turned on and the battery monitor 706 reads the voltage of the battery. At step 804 the first charging circuit 204 is engaged. The first charging circuit 204 addresses charge lost due to internal losses on the battery itself, the inverter, and the voltage regulator. At step 806, the load is connected to the conservator. A load monitor 708 may be connected to the load device 106 in order to monitor the charge required by the load device 106. If an additional load device 106 is attached to the battery 102 and/or conservator then the charging controller 216 may receives further information from the load monitor 708 regarding the second load device 106.

At step 810 the processor compares the voltage of the battery (as provided by the battery monitor 706) to the first threshold level 818. If the voltage of the battery is lower than the first threshold level 818 then the second circuit 206 is engaged 812 and the second circuit switch is engaged 816 allowing electricity to flow back to the battery from the second circuit 206. Otherwise the second circuit switch is disengaged 814.

Similarly, at step 818 the processor compares the voltage of the battery (as provided by the battery monitor 706) to the second threshold level 818. If the voltage of the battery is lower than the second threshold level 818 then the third circuit 208 is engaged and the third circuit switch is engaged 822 allowing electricity to flow back to the battery from the third circuit 208. Otherwise the third circuit switch is disengaged 820.

At step 824 the relay 220 determines whether the battery 102 is overcharged and if so 828, the switch 108 is disengaged (i.e. disengaging the conservator); if not 826 then the switch 108 is engaged (i.e. allowing electricity to flow to the battery 102 from the any engaged charging circuits 204, 206, 208)

For example, in the table below, if we have a load of 100 amps, the AVR with a turn ration of 10 will draw 10 amps. In turn the inverter will draw 10 amps also from the battery, hence the battery will need 10 amps for recharging which will be supplied by the charging circuits once detected by the relay circuit. The transformerless power supply will only need 100 milliamps to operate the charging system. The charging circuits will only supply the needed amperes lost by the battery, in this case 10 amps. The below example is based on load only, without considering the power loss on both the inverter and the AVR.
<table>
<thead>
<tr>
<th>Battery</th>
<th>Inverter</th>
<th>AVR</th>
<th>Load, Amperes</th>
<th>Charger</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>50</td>
<td>5</td>
</tr>
</tbody>
</table>

[0071] It is recognized that other batteries having different voltages can be connected and used with the energy conservator in the manner described above.

[0072] In one embodiment, the energy conservator is be connected to a separate power source providing electrical input to the charging unit 104 to be sent to the load device 106. The output of the charging unit 104 (i.e. the "conserved electricity") is then sent from the charging unit 104 to a separate battery 102 for recharging.

[0073] Although specific embodiments of the invention have been described herein, it will be understood by those skilled in the art that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.
WHAT IS CLAIMED IS:

1. An energy conservator for charging a power source, comprising:

   a charging unit having an input, a first output and a second output, the input for receiving direct current electricity from a power source, the first output for sending alternating current electricity to a load device, the second output for sending direct current electricity to a battery, the charging unit comprising:

   a transforming module operatively connected to the input for transforming the direct current electricity to alternating current electricity, the transformer having an output for outputting the alternating current;

   a filter module operatively connected to the transforming module for receiving the alternating current from the output of the transformer, the filter module splitting the alternating current into a first portion and a second portion, the first portion for sending to the load device via the first output;

   a regulator module for receiving as input from the second output the second portion of electricity from the filter module, the regulator module converting the second portion of electricity from alternating current into direct current and outputting the direct current; and

   a first charging circuit operatively connected to the regulator module for receiving the direct current electricity from the regulator module.

2. The energy conservator of claim 1, further comprising a charging controller having a memory and a processor, the memory having instructions stored thereon for execution by the processor, the charging controller connected to the first switch for operating the switch between the open and closed state and a first switch connected to the first charging circuit, the switch operable between an open state and a closed state, in the closed state the first switch allows electricity to flow from the regulator module to the first charging circuit, in the open state the first switch prohibits electricity from flowing between the regulator module and the first charging circuit.
3. The energy conservator of claim 1, the power source being the same as the battery.

4. The energy conservator of claim 2, the charging unit further comprising:
   
a second charging circuit operatively connected to the regulator module in parallel with the first charging circuit for receiving electricity from the regulator module; and

   a second switch connected to the second charging circuit, the second switch operable between an open and a closed state, in the closed state the second switch allows electricity to flow from the regulator module to the second charging circuit, in the open state the second switch prohibits electricity from flowing between the regulator module and the second charging circuit,

   wherein the charging controller connected to the second switch for operating the second switch between the open and closed state.

5. The energy conservator of claim 4, the charging unit further comprising:

   a third charging circuit operatively connected to the regulator module in parallel with the first charging circuit and second charging circuit for receiving electricity from the regulator module; and

   a third switch connected to the third charging circuit, the third switch operable between an open and a closed state, in the closed state the third switch allows electricity to flow from the regulator module to the third charging circuit, in the open state the third switch prohibits electricity from flowing between the regulator module and the third charging circuit,

   wherein the charging controller connected to the third switch for operating the third switch between the open and closed state.

6. The energy conservator of claim 5, wherein:

   the second charging circuit outputs a higher current than the first charging circuit and at a lower rate than the first charging circuit.

7. The energy conservator of claim 6, wherein:
the third charging circuit outputs a higher current than the second charging circuit and at a lower rate than the second charging circuit.

8. The energy conservator of claim 7, the transforming module being a step up transformer for stepping up the voltage sent to the output.

9. The energy conservator of claim 8 further comprising:

   a relay for receiving electricity from the charging circuits and directing the electricity to the power source, the relay operatively connected to the power source to monitor the voltage in the power source, the relay having a relay switch operable between an open and closed state, in the closed state the relay switch allows electricity to flow from the relay to the power source, in the open state the relay switch prohibits electricity from flowing between a relay and the power source.

10. The energy conservator of claim 9 wherein the filter is operatively connected to a plurality of loads for sending electricity to the plurality of loads.

11. The energy conservator of claim 9 wherein the load device is one of the load devices selected from a car, a home appliance and an electrical device.

12. A method of conserving energy in a battery, comprising:

   providing a battery having an input and an output;

   providing a load device;

   providing an energy conservator as defined by claim 7;

   attaching the load device to energy conservator;

   attaching the battery to the energy conservator; and

   selectivity engaging at least one of the first charging circuit, the second charging circuit and the third charging circuit.
FIG. 1
FIG. 1B

BLOCK DIAGRAM OF A SELF CHARGING ENERGY CONSERVATOR.
FIG. 3
FIG. 7
START CONSERVATOR.
READ BATTERY VOLTAGE (t) 802

OPEN FIRST CIRCUIT SWITCH 804

CONNECT LOAD 806

COMPARE VOLT (t) WITH FIRST THRESHOLD 810

SECOND CIRCUIT REQUIRED? 812

CLOSE SWITCH 814

COMPARISON VOLT (t) WITH SECOND THRESHOLD. THIRD CIRCUIT REQUIRED? 818

OPEN SECOND CIRCUIT SWITCH 816

ENGAGE MAIN SWITCH 826

DISENGAGE MAIN SWITCH 828

BATTERY OVERCHARGED? 822

OPEN THIRD SWITCH 820

CLOSE THIRD SWITCH 824
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC: H02J 7/00 (2006.01), H02J 7/02 (2006.01), H02M 3/22 (2006.01), H02M 7/42 (2006.01)
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)

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<th>IPC</th>
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

Databases searched: Canadian Patent Database, TotalPatent, European Patent Database (EPOQUE), Abstracts of Japan, US Patent Database, WIPO-PCT Publications (Full text) and IEEE publications: (Keywords Only):

charg+, unit or circuit, first output, second output, transform+, filter, regulator, energy, direct current.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>A</td>
<td>EP2,058,921A1 (Nishimura et al.), 13 May 2005 (13-05-2005); see abstract; see fig. 1; see whole document.</td>
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<td>A</td>
<td>US4,860,185A (Brewer et al.), 22 August 1989 (22-08-1989); see abstract; see figs. 1 &amp; 5; see whole document.</td>
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<td>US5,656,925A (Schie et al.), 12 August 1997 (12-08-1997); see abstract; see fig. 1; see whole document.</td>
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Further documents are listed in the continuation of Box C.

[X] See patent family annex.

Date of the actual completion of the international search
03 May 2010 (03-05-2010)

Date of mailing of the international search report
11 May 2010 (11-05-2010)

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50 Victoria Street
Gatineau, Quebec K1A 0C9
Facsimile No.: 001-819-953-2476

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Rajiv Agarwal
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<table>
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<th>Patent Document Cited in Search Report</th>
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<td>US5847550A</td>
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