

**MULTI-SOURCE HYBRID POWER SUPPLY AND DISTRIBUTION
CONTROL SYSTEM OF TRAVEL TRAILER AND CONTROL METHOD
THEREOF**

5 TECHNICAL FIELD

The present invention relates to the field of automobile reconstruction, and more particularly, to a multi-source hybrid power supply and distribution control system of a travel trailer, and belongs to the field of vehicle engineering.

10 BACKGROUND

At present, with popularization of a vehicle-mounted electric appliance, there are more and more electric appliances in a travel trailer, and energy consumption is also increased. A difficulty in supplying electric energy to the vehicle-mounted electric appliance is becoming increasingly prominent, which restricts high-quality
15 development of the travel trailer. Therefore, in the case of multi-source power supply of the travel trailer, it is particularly important to effectively manage and control electric energy.

At present, the travel trailer lacks a power supply and distribution control system, and a power source cannot be scientifically and reasonably arranged to charge and
20 discharge, thus having a low utilization rate of electric energy, and affecting a service life of a storage battery. In the case that multiple power sources may supply power to the travel trailer, a power source type cannot be effectively detected and identified, so that optimal power distribution and supply cannot be realized, and it is easy to waste precious electric energy resources on the travel trailer. A user cannot switch on and off
25 the electric appliance through an operating panel according to an actual energy consumption situation, and the user has a poor travel trailer experience.

At present, according to a domestic travel trailer, a direct current electric appliance is mainly powered through the storage battery directly, while the storage battery is connected with an inverter through a wire to supply power to an alternating
30 current electric appliance. In the case of commercial power and power generation by an external generator, the electric energy needs to be stored in the storage battery first, and the storage battery supplies power to the electric appliances. Alternating current electric signals cannot be directly converted into direct current electric signals to be supplied to the direct current electric appliance to use, and it is impossible to avoid

using the electric energy in the storage battery in the case of an external power source. A push-button integrated panel is used in most of control systems, which cannot interact with the power source, with a low intelligence degree.

As a vehicle with high energy consumption, the travel trailer is limited by a space and a weight, a vehicle-mounted storage battery and a portable generator have a low power, and an available electric quantity of solar energy is limited, so that normal use of the travel trailer cannot be met when the travel trailer leaves a camp or there is no camp. Therefore, a multi-source complementary mode is generally used in the travel trailer to supply power to the travel trailer. However, the power source cannot be scientifically and reasonably arranged to charge and discharge in the mode, and whether an input power source is commercial power or power generation by driving cannot be detected, so that a utilization rate of electric energy of the storage battery is low. Meanwhile, the travel trailer cannot interact with the power source in output control, and an electric appliance with a high power in the travel trailer cannot be monitored in real time, so that safe and reliable energy consumption cannot be guaranteed.

SUMMARY

Objective of the invention: in order to solve the unreasonable disadvantages of a power source supply type of a travel trailer in the prior art, the present invention provides a multi-source hybrid power supply and distribution control system of a travel trailer and a control method thereof.

Technical solution: the present invention provides a multi-source hybrid power supply and distribution control system of a travel trailer, which comprises a power source detection module, a combined logic controller, a PFC controller, an AC/DC converter, a DC/DC converter, an inverter boost circuit and a storage battery, wherein the power source detection module is connected with a power supply terminal and the storage battery, the power supply terminal is used for providing an alternating current and/or a direct current, the power source detection module comprises an alternating current analog signal output terminal and a direct current digital signal output terminal, the alternating current analog signal output terminal is connected with an input terminal of the PFC controller, the direct current digital signal output terminal is connected with an input terminal of the combined logic controller, and an output terminal of the PFC controller is connected with an alternating current electric

appliance and an input terminal of the AC/DC converter; the combined logic controller is connected with the input terminal of the AC/DC converter and the storage battery; an output terminal of the AC/DC converter is connected with an input terminal of the DC/DC converter and an input terminal of the inverter boost circuit; an
5 output terminal of the DC/DC convert is connected with a direct current electric appliance; and the storage battery is connected with the inverter boost circuit, and an output terminal of the inverter boost circuit is connected with the alternating current electric appliance.

Further, the power source detection module comprises a capacitor, a transformer,
10 a diode, a resistor, a Hall voltage sensor, a transmitter, a rectifier and an AD converter, the capacitor is connected with an alternating current output terminal of the power supply terminal, a primary side of the transformer is connected with the capacitor, a secondary side of the transformer is connected with the diode and the resistor, an output terminal of the resistor is connected with the Hall voltage sensor, an output
15 terminal of the Hall voltage sensor is connected with the transmitter, the transmitter comprises a first output terminal and a second output terminal, and the first output terminal is connected with the PFC controller; and the second output terminal is outputted to the combined logic controller through the rectifier and an analog-digital converter in sequence.

20 Further, a direct current output terminal of the power supply terminal is directly connected with the storage battery.

Further, the multi-source hybrid power supply and distribution control system of the travel trailer further comprises a system control module, wherein the system control module comprises a user operating terminal, a single-chip micro-controller, a
25 voltage stabilizing circuit, a photoelectric coupler and a first relay, the user operating terminal is connected with the single-chip micro-controller, an output terminal of the single-chip micro-controller is connected with the voltage stabilizing circuit, an output terminal of the voltage stabilizing circuit is connected with the photoelectric coupler, an output terminal of the photoelectric coupler is connected with the first relay, and
30 the first relay is used for controlling on-off of the alternating current electric appliance and/or the direct current electric appliance; and the single-chip micro-controller is used for sending an instruction signal for controlling on-off of the electric appliance according to an operation signal inputted at the user operating terminal.

Further, the storage battery comprises an original storage battery of the travel

trailer and a storage battery for daily use.

Further, the multi-source hybrid power supply and distribution control system of the travel trailer further comprises an auxiliary power source, wherein the auxiliary power source is connected with the storage battery, and the auxiliary power source is a solar panel.

Further, the multi-source hybrid power supply and distribution control system of the travel trailer further comprises a fault detection and identification control module, wherein the fault detection and identification control module comprises a current sensor, a PLC controller, a second relay and an LED display lamp, the current sensor is connected with the combined logic controller, an output terminal of the current sensor is connected with an input terminal of the PLC controller, an output terminal of the PLC controller is connected with the second relay and the resistor, the second relay is used for controlling the storage battery to discharge, and the resistor is connected with the LED display lamp.

A multi-source hybrid power supply and distribution control method of a travel trailer comprises the following steps of:

(1) detecting and identifying whether power is supplied at a power supply terminal through commercial power or an external generator, if yes, controlling a storage battery to charge, supplying power to an alternating current electric appliance and a direct current electric appliance, and controlling the storage battery not to discharge; and if no power is supplied through the commercial power or the external generator, executing step (2);

(2) detecting whether power is supplied through an auxiliary power source, if yes, charging the storage battery through the auxiliary power source, and supplying power to the alternating current appliance and the direct current appliance through the storage battery; and if no, executing step (3); and

(3) detecting whether power is supplied through power generation by driving, if yes, charging the storage battery through the power generation by driving, and supplying power to the alternating current appliance and the direct current appliance through the storage battery; and if no, supplying power to the alternating current appliance and the direct current appliance through the storage battery.

Further, in the step (3), when an electric quantity of the storage battery is low, an original storage battery of the travel trailer is controlled to supply power to maintain basic lighting and an electric appliance with low energy consumption in the travel

trailer, and a storage battery for daily use is controlled to supply power to an electric appliance with high energy consumption.

Further, during charging of the storage battery, a charging state of the storage battery is detected, and if the storage battery is fully charged, the charging of the storage battery is stopped.

Beneficial effect: compared with the prior art, the multi-source hybrid power supply and distribution control system of the travel trailer and the control method thereof provided by the present invention have the following advantages:

(1) identification and detection may be carried out in the case of multi-source hybrid power supply;

(2) power supply and distribution are more reasonable and efficient, and a utilization rate of electric energy is improved;

(3) a service life of the storage battery for daily use is prolonged;

(4) fault detection may be carried out on a key component area in a power supply circuit, and a maintenance efficiency is improved; and

(5) the present invention has a wide application and development space.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic structural diagram of a power source detection module;

FIG. 2 is a structural block diagram of a multi-source hybrid power supply and distribution control system of a travel trailer;

FIG. 3 is a schematic diagram of a system control module;

FIG. 4 is a schematic diagram of a fault detection and identification control module; and

FIG. 5 is a logic block diagram of a multi-source hybrid power supply and distribution control method of a travel trailer.

DETAILED DESCRIPTION

The present invention is further explained and described hereinafter with reference to the accompanying drawings and the specific embodiments.

As shown in FIG. 3, a multi-source hybrid power supply and distribution control system of a travel trailer comprises a power source detection module, a combined logic controller, a PFC controller, an AC/DC converter, a DC/DC converter, an inverter boost circuit and a storage battery. The combined logic controller, the PFC

controller, the AC/DC converter, the DC/DC converter, and the inverter boost circuit are functional processing modules. The power source detection module is connected with a power supply terminal and the storage battery, and the power supply terminal is used for providing an alternating current and/or a direct current. The power source
5 detection module comprises an alternating current analog signal output terminal and a direct current digital signal output terminal, the alternating current analog signal output terminal is connected with an input terminal of the PFC controller, the direct current digital signal output terminal is connected with an input terminal of the combined logic controller, and an output terminal of the PFC controller is connected
10 with an alternating current electric appliance and an input terminal of the AC/DC converter. The combined logic controller is connected with the input terminal of the AC/DC converter and the storage battery. An output terminal of the AC/DC converter is connected with an input terminal of the DC/DC converter and an input terminal of the inverter boost circuit. An output terminal of the DC/DC convert is connected with
15 a direct current electric appliance. The storage battery is connected with the inverter boost circuit, and an output terminal of the inverter boost circuit is connected with the alternating current electric appliance.

The power supply terminal comprises an alternating current output terminal and a direct current output terminal. When power is supplied through commercial power
20 or an external generator, the alternating current output terminal provides the alternating current. When power is supplied through power generation by driving, the direct current output terminal provides the direct current.

The storage battery comprises an original storage battery of the travel trailer and a storage battery for daily use. In addition to the storage battery, a hybrid power
25 source module also has an auxiliary power source, and the auxiliary power source is a solar panel.

FIG. 1 is a diagram of the power source detection module. The power source detection module is composed of a detection circuit, and the detection circuit is composed of a capacitor 1, a transformer 2, a diode 3, a resistor 4, a Hall voltage
30 sensor 5, a transmitter 6, a rectifier 7 and an A/D converter 8. The capacitor 1 and the transformer 2 are used for suppressing common-mode interference, the diode 3 and the resistor 4 are used for protecting a circuit, the Hall voltage sensor 5 is used for detecting alternating current electric signals, and the transmitter 6 outputs a first output terminal for outputting standard alternating current analog signals for the PFC

controller to use on one hand, and is connected with the rectifier 7 on the other hand. The rectifier 7 is used for converting the alternating current electric signals into direct current electric signals, and the A/D converter 8 is used for converting direct current analog signals into direct current digital signals. The A/D converter 8 outputs a second
5 output terminal for being connected with the following combined logic control circuit.

The power source detection module is used for detecting the alternating current electric signals. When the travel trailer is externally connected with the power supply terminal of the commercial power or the power generation by the external generator, the power source detection module receives the alternating current electric signals to
10 start to respond. The alternating current electric signals are processed and transformed by the power source detection module and then transmitted to the combined logic controller and the PFC controller. In case of the power generation by driving, the direct current electric signals are outputted through the power generation by driving, cannot make the power source detection module respond, and directly charge an
15 original storage battery of the travel trailer and a storage battery for daily use through a wire.

Elements in the power source detection module are all connected through the wire, and an alternating current output port of the power supply terminal is connected with the capacitor 1 through the wire. An output terminal of the capacitor is connected
20 with a primary side of the transformer 2, a secondary side of the transformer 2 is connected with the diode 3, an output terminal of the diode 3 is connected with the resistor 4, an output terminal of the resistor 4 is connected with the Hall voltage sensor 5, an output terminal of the Hall voltage sensor 5 is connected with the transmitter 6, an output terminal of the transmitter 6 is connected with the rectifier 7
25 and the PFC controller, an output terminal of the rectifier 7 is connected with the A/D converter 8, and an output terminal of the A/D converter 8 is connected with the combined logic controller.

The combined logic controller receives the direct current digital signals transmitted by the A/D converter 8, controls the AC/DC converter to charge the
30 storage battery, and may detect a charging state of the storage battery for daily use at the same time. When the storage battery for daily use is fully charged, the combined logic controller controls the AC/DC converter to not supply power to the storage battery for daily use, thus preventing the storage battery for daily use from being overcharged, and achieving an objective of protecting the storage battery for daily use.

The PFC controller is used for receiving the alternating current electric signals transmitted by the transmitter in the power source detection module, carrying out phase adjustment on the alternating current electric signals, and improving a utilization rate of electric energy. The AC/DC converter is used for converting the alternating current electric signals into the direct current electric signals, so that the storage battery stores electric energy. The DC/DC converter is used for converting the direct current electric signals into fixed direct current electric signals, so that the fixed direct current electric signals are supplied to the direct current electric appliance to use. The inverter boost circuit is used for processing the direct current electric signals, changing the direct current electric signals into the alternating current electric signals and boosting a voltage value, so that the alternating current electric signals are supplied to the alternating current electric appliance to use. The functional processing module is used for processing the alternating current electric signals, supplying the alternating current electric signals to the alternating current electric appliance and the direct current electric appliance to use, and charging the storage battery for daily use.

Elements of the functional processing module are all connected through the wire, the A/D converter 8 of the power source detection module is connected with the combined logic controller through the wire, and the combined logic controller is connected with the AC/DC converter and the storage battery for daily use through the wire. The PFC controller is connected with the AC/DC converter and the alternating current electric appliance, the AC/DC converter is connected with the DC/DC converter, the inverter boost circuit and the storage battery through the wire, the DC/DC converter is connected with the direct current electric appliance through the wire, and the inverter boost circuit is connected with the alternating current electric appliance through the wire.

In the case of the commercial power or the power generation by the external generator, the power source detection module carries out detection and identification, and transmits the alternating current electric signals to the alternating current electric appliance, the direct current electric appliance and the storage battery for daily use through the functional processing module.

The multi-source hybrid power supply and distribution control system of the travel trailer further comprises a system control module, and as shown in FIG. 3, the system control module comprises a user operating terminal 9, a single-chip micro-controller 10, a voltage stabilizing circuit 11, a photoelectric coupler 12 and a

first relay 13. The user operating terminal 9 is connected with the single-chip micro-controller 10, an output terminal of the single-chip micro-controller 10 is connected with the voltage stabilizing circuit 11, an output terminal of the voltage stabilizing circuit 11 is connected with the photoelectric coupler 12, an output terminal of the photoelectric coupler 12 is connected with the first relay 13, and the first relay 13 is used for controlling on-off of the alternating current electric appliance and/or the direct current electric appliance. The single-chip micro-controller 10 is used for sending an instruction signal for controlling on-off of the electric appliance according to an operation signal inputted at the user operating terminal 9. The user operating terminal 9 is compiled in a computer program language, which may identify an operation behavior of a user and transmit relevant data information to the single-chip micro-controller. The single-chip micro-controller 10 may receive the data information transmitted by the user operating terminal and send out an electric signal instruction after coding. The voltage stabilizing circuit 11 may stabilize a voltage of a circuit, the photoelectric coupler 12 controls transmission and isolation of the electric signals, and the first relay 13 controls on-off of the electric appliance. In the case of limited electric quantity, the system control module may let the user control the electric appliance independently according to needs of the user, so as to achieve an objective of saving electric energy and improving travel trailer experience of the user.

The hybrid power source module comprises an original storage battery of the travel trailer, a storage battery for daily use, and an auxiliary power source. The auxiliary power source is a solar panel, and the hybrid power source module is a central portion of the power supply and distribution system. The power generation by driving may charge the original storage battery of the travel trailer and the storage battery for daily use. The electric energy of the commercial power or the external generator is stored in the storage battery for daily use after being processed by the functional processing module. The solar panel can convert light energy into electric energy, and may charge the original storage battery of the travel trailer and the storage battery for daily use.

The multi-source hybrid power supply and distribution control system of the travel trailer further comprises a fault detection and identification control module, and the fault detection and identification control module comprises a current sensor, a PLC controller, a second relay and an LED display lamp. FIG. 4 is a diagram of the fault detection and identification control module. The current sensor is connected with

the combined logic controller through the wire, and the PLC controller is connected with the current sensor through the wire. The PLC controller receives analog electric signals transmitted by the current sensor, the analog electric signals are interpreted and processed in the PLC controller, and the analog electric signals are outputted. A part of the analog electric signals are transmitted to the LED display lamp through the resistor, and a part of the analog electric signals are transmitted to the second relay. The LED display lamp is operated due to passing of the electric signals, and a lighting state is displayed. In the case of the commercial power or the power generation by the external generator, the second relay is used for controlling the storage battery for daily use to prohibit discharging, and the second relay receives the electric signals transmitted by the PLC controller to operate. A discharging circuit of the storage battery for daily use is disconnected, thus achieving an objective of prohibiting the storage battery for daily use from discharging.

As shown in FIG. 5, a multi-source hybrid power supply and distribution control method of a travel trailer comprises the following steps of:

(1) detecting and identifying whether power is supplied at a power supply terminal through commercial power or an external generator, if yes, controlling a storage battery to charge, supplying power to an alternating current electric appliance and a direct current electric appliance, and controlling the storage battery not to discharge; and if no power is supplied through the commercial power or the external generator, executing step (2);

(2) detecting whether power is supplied through an auxiliary power source, if yes, charging the storage battery through the auxiliary power source, and supplying power to the alternating current appliance and the direct current appliance through the storage battery; and if no, executing step (3); and

(3) detecting whether power is supplied through power generation by driving, if yes, charging the storage battery through the power generation by driving, and supplying power to the alternating current appliance and the direct current appliance through the storage battery; and if no, supplying power to the alternating current appliance and the direct current appliance through the storage battery.

In the case that multiple hybrid power sources may supply electric energy to the travel trailer, the system may preferentially use the commercial power or the power generation by the external generator, supply power to the direct current electric appliance and the alternating current electric appliance, and charge the storage battery

for daily use at the same time, and the storage battery for daily use is ensured to not discharge, thus achieving an objective of saving limited energy in the travel trailer. In the case of power supply by the power generation by driving or the auxiliary power source only, the original storage battery of the travel trailer and the storage battery for daily use may be charged. In the case of limited electric energy, the original storage battery of the travel trailer is used for maintaining basic lighting and an electric appliance with low energy consumption in the travel trailer, and the storage battery for daily use is used for supplying power to an electric appliance with high energy consumption, thus providing more comfortable living conditions.

In the case of the commercial power or the power generation by the external generator, the alternating current electric signals are identified by the power source detection module. Specifically, the capacitor and the transformer suppress common-mode interference of the alternating current electric signals to form the alternating current electric signals which are beneficial for transmission. The alternating current electric signals are detected and identified by the Hall voltage sensor after passing through the diode and the resistor with a function of protecting a circuit, and the alternating current electric signals are transmitted to the transmitter and the rectifier through the wire. The transmitter converts a part of the alternating current electric signals into standard alternating current electric signals and then transmits the standard alternating current electric signals to the PFC controller of functional processing module, and the other part of the alternating current electric signals pass through the rectifier and the A/D converter, and then the direct current electric signals are transmitted to the combined logic controller. The combined logic controller controls the AC/DC converter to supply power to the storage battery for daily use, and may detect a charging state of the storage battery for daily use. When the storage battery for daily use is fully charged, the combined logic controller controls the AC/DC converter to not supply power to the storage battery for daily use, thus preventing the storage battery for daily use from being overcharged, and achieving an objective of protecting the storage battery for daily use. The PFC controller can change a phase of the alternating current electric signals and reduce power loss. A part of the alternating current electric signals outputted by PFC are transmitted to the alternating current electric appliance, and a part of the alternating current electric signals are transmitted to the AC/DC converter, which may convert the alternating current electric signals into the direct current electric signals, thus

charging the storage battery for daily use. Meanwhile, the signals may be transmitted to the DC/DC converter, and the DC/DC converter may convert the direct current electric signals into electric signals available for the direct current electric appliance, so that the electric signals are used by the direct current electric appliance.

5 In the case of the power generation by driving or the auxiliary power source without the commercial power or the power generation by the external generator, the direct current electric signals generated by the power generation by driving or the auxiliary power source cannot drive the power source detection module to respond, and the direct current electric signals are directly stored in the original storage battery
10 of the travel trailer and the storage battery for daily use through the wire. The storage battery for daily use may supply power to the alternating current electric appliance through the inverter boost circuit, and the direct current electric appliance may be powered through the DC/DC converter. As reserve energy, the original storage battery of the travel trailer only supplies power for basic lighting and an electric appliance
15 with low energy consumption in the travel trailer to ensure that electric energy is always available in the travel trailer, thus providing travel trailer experience of the user.

The system control module enables the user to switch on and off the electric appliance independently, and the user may switch on and off the electric appliance
20 through the user operating system according a use condition of the storage battery. Specifically, the user operating system is compiled in a computer program language, which may identify an operation behavior of the user and transmit relevant data information to the single-chip micro-controller. The single-chip micro-controller may receive the data information transmitted by the user operating system and send out an
25 electric signal instruction after coding. The relay is operated through the voltage stabilizing circuit and the photoelectric coupler, so as to control on-off of the electric appliance. In the case of limited electric quantity, the system control module may let the user control the electric device independently according to needs of the user, so as to achieve an objective of saving electric energy.

30 The fault detection and identification control module may detect some areas of the functional processing module, and may prohibit the storage battery for daily use from discharging in the case of the commercial power or the power generation by the external generator. Specifically, the current sensor receives the analog electric signals transmitted by the combined logic control. The PLC controller receives the analog

electric signals transmitted by the current sensor, the analog electric signals are interpreted and processed in the PLC controller, and the analog electric signals are outputted. A part of the electric signals are transmitted to the LED display lamp through the resistor, and a part of the electric signals are transmitted to the relay. The

5 LED display lamp is operated due to the electric signals, the circuit is normal, and a lighting state is displayed without a fault. The relay is used for prohibiting the storage battery for daily use from discharging during charging, and the relay receives the electric signals transmitted by the PLC controller to operate. A discharging circuit for daily use is disconnected, thus achieving an objective of prohibiting the storage

10 battery for daily use from discharging in the case of the commercial power or the power generation by the external generator. In the case that the LED display lamp displays normally while the alternating current electric appliance has no power, the PFC controller has a fault. In the case that the LED display lamp displays normally while the storage battery for daily use cannot be charged, the AC/DC converter has a

15 fault. Therefore, fault detection of main positions in the power supply circuit is realized, thus improving a maintenance efficiency.

CLAIMS

1. A multi-source hybrid power supply and distribution control system of a travel trailer, comprising a power source detection module, a combined logic controller, a PFC controller, an AC/DC converter, a DC/DC converter, an inverter boost circuit and a storage battery, wherein the power source detection module is connected with a power supply terminal and the storage battery, the power supply terminal is used for providing an alternating current and/or a direct current, the power source detection module comprises an alternating current analog signal output terminal and a direct current digital signal output terminal, the alternating current analog signal output terminal is connected with an input terminal of the PFC controller, the direct current digital signal output terminal is connected with an input terminal of the combined logic controller, and an output terminal of the PFC controller is connected with an alternating current electric appliance and an input terminal of the AC/DC converter; the combined logic controller is connected with the input terminal of the AC/DC converter and the storage battery; an output terminal of the AC/DC converter is connected with an input terminal of the DC/DC converter and an input terminal of the inverter boost circuit; an output terminal of the DC/DC convert is connected with a direct current electric appliance; and the storage battery is connected with the inverter boost circuit, and an output terminal of the inverter boost circuit is connected with the alternating current electric appliance.
2. The multi-source hybrid power supply and distribution control system of the travel trailer according to claim 1, wherein the power source detection module comprises a capacitor, a transformer, a diode, a resistor, a Hall voltage sensor, a transmitter, a rectifier and an AD converter, the capacitor is connected with an alternating current output terminal of the power supply terminal, a primary side of the transformer is connected with the capacitor, a secondary side of the transformer is connected with the diode and the resistor, an output terminal of the resistor is connected with the Hall voltage sensor, an output terminal of the Hall voltage sensor is connected with the transmitter, the transmitter comprises a first output terminal and a second output terminal, and the first output terminal is connected with the PFC controller; and the second output terminal is outputted to the combined logic controller through the rectifier and an analog-digital converter in sequence.

CLAIMS

3. The multi-source hybrid power supply and distribution control system of the travel trailer according to claim 1 or 2, wherein a direct current output terminal of the power supply terminal is directly connected with the storage battery.
- 5 4. The multi-source hybrid power supply and distribution control system of the travel trailer according to claim 1 or 2, further comprising a system control module, wherein the system control module comprises a user operating terminal, a single-chip micro-controller, a voltage stabilizing circuit, a photoelectric coupler and a first relay, the user operating terminal is connected with the single-chip micro-controller, an
10 output terminal of the single-chip micro-controller is connected with the voltage stabilizing circuit, an output terminal of the voltage stabilizing circuit is connected with the photoelectric coupler, an output terminal of the photoelectric coupler is connected with the first relay, and the first relay is used for controlling on-off of the alternating current electric appliance and/or the direct current electric appliance; and
15 the single-chip micro-controller is used for sending an instruction signal for controlling on-off of the electric appliance according to an operation signal inputted at the user operating terminal.
- 20 5. The multi-source hybrid power supply and distribution control system of the travel trailer according to claim 1 or 2, wherein the storage battery comprises an original storage battery of the travel trailer and a storage battery for daily use.
- 25 6. The multi-source hybrid power supply and distribution control system of the travel trailer according to claim 1 or 2, further comprising an auxiliary power source, wherein the auxiliary power source is connected with the storage battery, and the auxiliary power source is a solar panel.
- 30 7. The multi-source hybrid power supply and distribution control system of the travel trailer according to claim 1 or 2, further comprising a fault detection and identification control module, wherein the fault detection and identification control module comprises a current sensor, a PLC controller, a second relay and an LED display lamp, the current sensor is connected with the combined logic controller, an output terminal of the current sensor is connected with an input terminal of the PLC controller, an output terminal of the PLC controller is connected with the second relay and the

CLAIMS

resistor, the second relay is used for controlling the storage battery to discharge, and the resistor is connected with the LED display lamp.

8. A multi-source hybrid power supply and distribution control method of a travel
5 trailer, comprising the following steps of:

(1) detecting and identifying whether power is supplied at a power supply
terminal through commercial power or an external generator, if yes, controlling a
storage battery to charge, supplying power to an alternating current electric appliance
and a direct current electric appliance, and controlling the storage battery not to
10 discharge; and if no power is supplied through the commercial power or the external
generator, executing step (2);

(2) detecting whether power is supplied through an auxiliary power source, if yes,
charging the storage battery through the auxiliary power source, and supplying power
to the alternating current appliance and the direct current appliance through the
15 storage battery; and if no, executing step (3); and

(3) detecting whether power is supplied through power generation by driving, if
yes, charging the storage battery through the power generation by driving, and
supplying power to the alternating current appliance and the direct current appliance
through the storage battery; and if no, supplying power to the alternating current
20 appliance and the direct current appliance through the storage battery.

9. The multi-source hybrid power supply and distribution control method of the travel
trailer according to claim 8, wherein in the step (3), when an electric quantity of the
storage battery is low, an original storage battery of the travel trailer is controlled to
25 supply power to maintain basic lighting and an electric appliance with low energy
consumption in the travel trailer, and a storage battery for daily use is controlled to
supply power to an electric appliance with high energy consumption.

10. The multi-source hybrid power supply and distribution control method of the
30 travel trailer according to claim 8 or 9, wherein during charging of the storage battery,
a charging state of the storage battery is detected, and if the storage battery is fully
charged, the charging of the storage battery is stopped.