sampling resistance, a second end of the first sampling resistance is connected with a second end of the second sampling resistance, a first voltage signal input of the first chip is connected with the first end of the first sampling resistance, a second voltage signal input of the first chip is connected with the second end of the first sampling resistance, a reference voltage terminal of the first chip is grounded, and a voltage signal output of the first chip is connected with the first end of the tenth resistance, and the second end of the tenth resistance is the output of the sampling unit.

Furthermore, each of the first switching transistor, the second switching transistor, the third switching transistor and the fourth switching transistor is a triode, an MOS transistor or an IGBT transistor.

Furthermore, each of the first switching transistor, the second switching transistor, the third switching transistor, and the fourth switching transistor is an IGBT transistor having a body diode.

Another objective of the present invention is to provide a power control system which includes a storage battery, the power control system further includes a power connection device as mentioned above.

ADVANTAGEOUS EFFECTS

The present invention provides a power connection device which includes a plurality of battery slots configured to be connected with a storage battery, each battery slot is provided therein with a control circuit, an input of the control circuit is connected with a power terminal of the storage battery, and an output of the control circuit is connected with a load, the control circuit includes a filtering module, a voltage dropping module and a current equalizing module; where the current equalizing module includes a plurality of inputs; when the storage battery is connected in at least two battery slots, the direct current as output by the corresponding storage battery is filtered by the filtering module in each control circuit, and the first direct current is output to the voltage dropping module, a voltage dropping processing is performed on the first direct current by the voltage dropping module and the second direct current is output to the

current equalizing module, the target voltage is generated by the current equalizing module in each control circuit according to the second direct currents in all control circuits, and the output voltage is adjusted by the current equalizing module in each control circuit according to the target voltage, so that the same supply current is output to the load. In this way, the output power of the power supply can be controlled by increasing or decreasing the number of the storage batteries on the power connection device when power consuming products with different power are provided with power supply, so that the research and development cycle of the product is further reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to explain the embodiments of the present invention more clearly, a brief introduction regarding the accompanying drawings that need to be used for describing the embodiments of the present invention or the related art is given below; it is obvious that the accompanying drawings described as follows are only some embodiments of the present invention, for the person of ordinary skill in the art, other drawings may also be obtained according to the current drawings on the premise of paying no creative labor.

FIG. 1 depicts a schematic structural block diagram of a power connection device provided by an embodiment of the present invention;

FIG. 2 depicts a detailed circuit diagram of a filtering module in the power connection device provided by the embodiment of the present invention;

FIG. 3 depicts a detailed circuit diagram of a voltage dropping module in the power connection device provided by the embodiment of the present invention;

FIG. 4 depicts a detailed circuit diagram of a sampling unit in the power connection device provided by the embodiment of the present invention; and

FIG. 5 depicts a schematic structural block diagram of a power control system provided by an embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

In order to make the purpose, the technical solution and the advantages of the present

module 10 in each control circuit 110 filters an output direct current of the corresponding storage battery 200 and outputs a first direct current to the voltage dropping module 20, the voltage dropping module 20 performs a voltage dropping processing on the first direct current and outputs a second direct current to the current equalizing module 30, the current equalizing module 30 in each control circuit 110 generates a target voltage according to the second direct current in each control circuit 110 and adjusts an output voltage according to the target voltage so as to output the same supply current to the load 300.

It needs to be noted that, the control circuits 110 refer to the corresponding control circuits 110 in the plurality of battery slots which are connected with the storage batteries 200. The first direct current is the output direct current of the storage battery 200 filtered by the filtering module 10, the voltage dropping module 20 drops the voltage of the first direct current and outputs the second direct current to the current equalizing module 30. The current equalizing module 30 includes a plurality of inputs, where the first input of the current equalizing module 30 is connected with an output of the voltage dropping module 20, and other inputs of the current equalizing module 30 are configured to sample the second direct current in other control circuits 110.

The current equalizing module 30 obtains the target voltage by comparing the second direct current in each control circuit 110, and the target voltage is the voltage of the second direct current with the largest voltage value in all control circuits 110.

Further, as shown in FIG. 1, the voltage dropping module 20 in this embodiment includes a control unit 23 and a voltage dropping unit 22.

A power terminal of the voltage dropping unit 22 is connected with a voltage input of the control unit 23, a first controlled terminal and a second controlled terminal of the voltage dropping unit 22 are respectively connected with a first control output and a second control output of the control unit 23, an input of the voltage dropping unit 22 is the input of the voltage dropping module 20, and an output of the voltage dropping unit 22 is the output of the voltage dropping module 20.

As shown in FIG. 1, the current equalizing module 30 includes a sampling unit 31 and an

adjustment and output unit 32; where the adjustment and output unit 32 includes a first input and a second input;

An input of the sampling unit 31 is the first input of the current equalizing module 30, an output of the sampling unit 31 is connected with the first input of the adjustment and output unit 32, the second input of the adjustment and output unit 32 is the second input of the current equalizing module 30.

It needs to be noted that, a voltage as input by the storage battery 200 is filtered by the filtering module 10, the first direct current is sent to the voltage dropping unit 22, the voltage dropping unit 22 is controlled by the control unit 23 to perform a voltage dropping process on the first direct current, the first direct current after voltage dropping is sampled and amplified by the sampling unit 31, a second direct current is obtained and is sent to the adjustment and output unit 32, the second direct currents in all control circuits 110 are sampled and compared by the adjustment and output unit 32 through a second input thereof, and then the target voltage is obtained.

FIG. 2 depicts a specific circuit diagram of the filtering module 10 in a power connection device according to an embodiment of the present invention, as shown in FIG. 2, the filtering module 10 includes a first capacitor C1, a second capacitor C2, a third capacitor C3, a fourth capacitor C4, a fifth capacitor C5 and a first inductance L1.

A first end of the first capacitor C1 and a first end of the second capacitor C2 are commonly connected with a first end of the third capacitor c3 so as to constitute the first end of the filtering module 10, a first end of the first inductance L1 is connected with a first end of the third capacitor C3, a second end of the first capacitor C1, a second end of the second capacitor C2 and a second end of the third capacitor C2 are commonly connected with a second end of the first inductance L1, a first end of the fourth capacitor C4 and a first end of the fifth capacitor C5 are commonly connected with a third end of the first inductance L1, the third end of the first inductance L1 is the third end of the filtering module 10, a second end of the fourth capacitor C4 and a second end of the fifth capacitor C5 are commonly connected with a fourth end of the first inductance L1, and the fourth end of the first inductance L1 is the second end of the filtering module 10.

It needs to be noted that, the first capacitor C1, the second capacitor C2, the third capacitor C3, the fourth capacitor C4 and the fifth capacitor C5 are used for differential mode rejection, and the first inductance L1 is used for common mode rejection.

FIG. 3 depicts a specific circuit diagram of a voltage dropping module in a power connection device provided by the embodiment of the present invention, as shown in FIG. 3, the voltage dropping unit 22 includes a sixth capacitor C6, a seventh capacitor C7, an eighth capacitor C8 and a ninth capacitor C9, a tenth capacitor C10, a first resistor R1, a second resistor R2 and a third resistor R3, a fourth resistor R4, a fifth resistor R5 and a sixth resistor R6, a seventh resistor R7, an eighth resistor R8, a ninth resistor R9, a second inductance L2, a first diode D1, a second diode D2, a third diode D3, a first switching transistor Q1, a second switching transistor Q2, a third switching transistor Q3 and a fourth switching transistor Q4.

a first end of the sixth capacitor C6 and a first end of the first diode D1 are commonly connected with a high potential side of the first switching transistor Q1, a second end of the sixth capacitor C6 is connected with a first end of the first resistance R1, a second end of the first resistance R1 and the second end of the first diode D1 are commonly connected with a low potential side of the first switching transistor Q1, the high potential side of the first switching transistor Q1, a high potential side of the second switching transistor Q2 and a first end of the second diode D2 are commonly connected with a first end of the seventh capacitor C7, and the first end of the seventh capacitor C7 is the input of the voltage dropping unit 22, a second end of the seventh capacitor C7 is grounded, a second end of the second diode D2 is connected with a first end of the fourth resistance R4, a second end of the fourth resistance R4 is connected with a first end of the eighth capacitor C7, and a second end of the eighth capacitor C8 is grounded, the first end of the eighth capacitor C8 is the power terminal of the voltage dropping unit 22, the low potential side of the first switching transistor Q1 and a low potential side of the second switching transistor Q2 are commonly connected with a high potential side of the third switching transistor Q3, a controlled terminal of the first switching transistor Q1 is connected with a first end of the third resistance R3, and a controlled terminal of the second switching transistor Q2 is connected with a first end of the second resistance R2, a second end of the second resistance R2 is

terminal of the third switching transistor Q3 and a controlled terminal of the fourth switching transistor Q4, respectively; the emitting electrodes of these triodes (Q1, Q2, Q3, Q4) are a low potential side of the first switching transistor Q1, a low potential side of the second switching transistor Q2, a low potential side of the third switching transistor Q3 and a low potential side of the fourth switching transistor Q4, respectively; the collection triodes of these triodes (Q1, Q2, Q3, Q4) are a high potential side of the first switching transistor Q1, a high potential side of the second switching transistor Q2, a high potential side of the third switching transistor Q3 and a high potential side of the fourth switching transistor Q4, respectively.

When the first switching transistor Q1 and the second switching transistor Q2, the third switching transistor Q3 and the fourth switching transistor Q4 are all MOS transistors (Q1, Q2, Q3, Q4), the gate electrodes of the MOS transistors (Q1, Q2, Q3, Q4) are the control terminal of the first switching transistor Q1, the control terminal of the second switching transistor Q2, the controlled terminal of the third switching transistor Q3 and the controlled terminal of the fourth switching transistor Q4, respectively; the source electrodes of these MOS transistors (Q1, Q2, Q3, Q4) are a low potential side of the first switching transistor Q1, a low potential side of the second switching transistor Q2, a low potential side of the third switching transistor Q3 and a low potential side of the fourth switching transistor Q4, respectively; the drain electrodes of these MOS transistors (Q1, Q2, Q3, Q4) are a high potential side of the first switching transistor Q1, a high potential side of the second switching transistor Q2, a high potential side of the third switching transistor Q3 and a high potential side of the fourth switching transistor Q4, respectively.

When the first switching transistor Q1 and the second switching transistor Q2, the third switching transistor Q3 and the fourth switching transistor Q4 are all IGBT transistors (Q1, Q2, Q3, Q4), the gate electrodes of the IGBT transistors (Q1, Q2, Q3, Q4) are the control terminal of the first switching transistor Q1, the control terminal of the second switching transistor Q2, the controlled terminal of the third switching transistor Q3 and the controlled terminal of the fourth switching transistor Q4, respectively; the source electrodes of these MOS transistors (Q1, Q2, Q3, Q4) are a low potential side of the first switching transistor Q1, a low potential side of the

second switching transistor Q2, a low potential side of the third switching transistor Q3 and a low potential side of the fourth switching transistor Q4, respectively; the collection electrodes of these MOS transistors (Q1, Q2, Q3, Q4) are a high potential side of the first switching transistor Q1, a high potential side of the second switching transistor Q2, a high potential side of the third switching transistor Q3 and a high potential side of the fourth switching transistor Q4, respectively. Further, the first switching transistor Q1, the second switching transistor Q2, the third switching transistor Q3 and the fourth switching transistor Q4 can all be IGBT transistors having body diodes.

FIG. 4 depicts a specific circuit diagram of a sampling unit 31 in a power connection device provided by the embodiment of the present invention, as shown in FIG. 4, the sampling unit 31 includes a first sampling resistor R11, a second sampling resistor R12 and a first chip U1.

A first end of the first sampling resistance R11 is connected with a first end of the second sampling resistance R12, a second end of the first sampling resistance R11 is connected with a second end of the second sampling resistance R12, a first voltage signal input IN+ of the first chip U1 is connected with the first end of the first sampling resistance R11, a second voltage signal input IN- of the first chip U1 is connected with the second end of the first sampling resistance R11, a reference voltage terminal VREF of the first chip U1 is grounded, and a voltage signal output VO of the first chip is connected with the first end of the tenth resistance R10, and the second end of the tenth resistance R10 is the output of the sampling unit 31.

The working principle of the power connection device of the present invention is described with reference to FIGS. 1-4. When the storage battery 200 is connected in at least two battery slots, the direct current output by the corresponding storage battery 200 is filtered by the filtering module 10 in each control circuit 110. As shown in FIG. 2, the first capacitor network composed of the first capacitor C1, the second capacitor C2 and the third capacitor C3, and a second capacitor network composed of the fourth capacitor C4 and the fifth capacitor C5 in the filtering module 10 has a differential mode rejection effect on the output voltage of the storage battery 200 collectively. The first inductance L1 is connected between the first capacitor network and the second capacitor network, and has a common mode rejection effect on the direct current as output

the third diode, the second end of the ninth capacitor is connected with the first end of the ninth resistance, and a second end of the ninth resistance is grounded, a second end of the second inductance is connected with a first end of the tenth capacitor so as to constitute the output of the voltage dropping unit, and a second end of the tenth capacitor is grounded.

6. The power connection device according to claim 3, characterized in that, the sampling unit comprises a first sampling resistance, a second sampling resistance and a first chip;

wherein a first end of the first sampling resistance is connected with a first end of the second sampling resistance, a second end of the first sampling resistance is connected with a second end of the second sampling resistance, a first voltage signal input of the first chip is connected with the first end of the first sampling resistance, a second voltage signal input of the first chip is connected with the second end of the first sampling resistance, a reference voltage terminal of the first chip is grounded, and a voltage signal output of the first chip is connected with the first end of the tenth resistance, and the second end of the tenth resistance is the output of the sampling unit.

7. The power connection device according to claim 5, characterized in that, each of the first switching transistor, the second switching transistor, the third switching transistor and the fourth switching transistor is a triode, an MOS transistor or an IGBT transistor.

8. The power connection device according to claim 7, characterized in that, each of the first switching transistor, the second switching transistor, the third switching transistor, and the fourth switching transistor is an IGBT transistor having a body diode.

9. A power control system which comprises a storage battery, characterized in that, the power control system further comprises a power connection device according to any one of claims 1 to 8.

ABSTRACT