WHAT IS CLAIMED IS:

1. A power adapter, comprising:

a first rectification unit, configured to rectify an input alternating current to output a voltage with a first pulsating waveform;

a switch unit, configured to modulate the voltage with the first pulsating waveform according to a control signal;

a transformer, configured to output a voltage with a second pulsating waveform according to the modulated voltage with the first pulsating waveform;

a second rectification unit, configured to rectify the voltage with the second pulsating waveform to output a voltage with a third pulsating waveform;

a first current sampling circuit, configured to sample current outputted from the second rectification unit to obtain a current sampling value, the first current sampling circuit comprising a current detection resistor with an adjustable resistance; and

a control unit, coupled to the first current sampling circuit and the switch unit respectively, and configured to output the control signal to the switch unit, to adjust a resistance of the current detection resistor according to a charging mode, and to adjust a duty ratio of the control signal according to the current sampling value, such that the voltage with the third pulsating waveform meets a charging requirement,

wherein the charging mode comprises a first charging mode and a second charging mode, a charging speed in the first charging mode is faster than that in the second charging mode,

the control unit is further configured to decrease the resistance of the current detection resistor in response to determining to charge a terminal in the first charging mode, and increase the resistance of the current detection resistor in response to determining to charge a terminal in the second mode,

wherein one end of the current detection resistor is coupled to an output end of the second rectification unit, an adjustment end of the current detection resistor is coupled to the control unit, and the first current sampling circuit further comprises:

an operational amplifier;

a second resistor, wherein one end of the second resistor is respectively coupled to the one end of the current detection resistor and the output end of the second rectification unit, another end of the second resistor is coupled to a first input end of the operational amplifier, and the another end of the second resistor is further grounded through a first filter capacitor;

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a third resistor, wherein one end of the third resistor is coupled to another end of the current detection resistor, another end of the third resistor is coupled to a second input end of the operational amplifier, and the another end of the third resistor is further grounded through a second filter capacitor.

2. The power adapter according to claim 1, wherein the control unit is further configured to adjust a frequency of the control signal according to the current sampling value.

3. The power adapter according to claim 1 or 2, further comprising:

a first charging interface, coupled to the second rectification unit and configured to apply the voltage with the third pulsating waveform to a battery of a terminal via a second charging interface of the terminal when the first charging interface is coupled to the second charging interface, wherein the second charging interface is coupled to the battery.

4. The power adapter according to claim 3, wherein the first charging interface comprises a power wire and a data wire, the power wire is configured to charge the battery, the data wire is configured to communicate with the terminal, and the control unit is configured to communicate with the terminal via the first charging interface to determine the charging mode.

5. The power adapter according to claim 4, wherein

the control unit is configured to decrease the resistance of the current detection resistor when the control unit performs a bidirectional communication with the terminal via the data wire of the first charging interface to determine to charge the terminal in the first charging mode;

the control unit is configured to increase the resistance of the current detection resistor when the control unit performs the bidirectional communication with the terminal via the data wire of the first charging interface to determine to charge the terminal in the second charging mode.

6. The power adapter according to claim 4, wherein when the control unit performs a bidirectional communication with the terminal via the data wire of the first charging interface to determine to charge the terminal in the first charging mode,

the control unit is configured to send a first instruction to the terminal, the first instruction being configured to query the terminal whether to start the first charging mode; and

the control unit is configured to receive a reply instruction of the first instruction from

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the terminal, the reply instruction of the first instruction being configured to indicate that the terminal agrees to start the first charging mode.

7. The power adapter according to claim 6, wherein, before the control unit sends the first instruction to the terminal, the power adapter is configured to, charge the terminal in the second charging mode, and the control unit is configured to send the first instruction to the terminal when determining that a charging duration in the second charging mode is longer than a predetermined threshold.

8. The power adapter according to claim 6, wherein the control unit is further configured to control the power adapter to adjust a charging current to a charging current corresponding to the first charging mode by controlling the switch unit, and the control unit is configured to, before the power adapter charges the terminal with the charging current corresponding to the first charging mode, perform the bidirectional communication with the terminal via the data wire of the first charging interface to determine a charging voltage corresponding to the first charging mode, and to control the power adapter to adjust a charging voltage to the charging voltage corresponding to the first charging mode,

wherein when the control unit performs the bidirectional communication with the terminal via the data wire of the first charging interface to determine the charging voltage corresponding to the first charging mode,

the control unit is configured to send a second instruction to the terminal, the second instruction being configured to query whether a current output voltage of the power adapter is suitable for being used as the charging voltage corresponding to the first charging mode;

the control unit is configured to receive a reply instruction of the second instruction sent by the terminal, the reply instruction of the second instruction being configured to indicate that the current output voltage of the power adapter is higher, equal or lower than a required voltage; and

the control unit is configured to determine the charging voltage corresponding to the first charging mode according to the reply instruction of the second instruction.

9. The power adapter according to claim 8, wherein, the control unit is further configured, before controlling the power adapter to adjust the charging current to the charging current corresponding to the first charging mode, to perform the bidirectional communication with the terminal via the data wire of the first charging interface to determine the charging current corresponding to the first charging mode,

wherein, when the control unit performs the bidirectional communication with the

terminal via the data wire of the first charging interface to determine the charging current corresponding to the first charging mode,

the control unit is configured to send a third instruction to the terminal, the third instruction being configured to query a maximum charging current supported currently by the terminal;

the control unit is configured to receive a reply instruction of the third instruction sent by the terminal, the reply instruction of the third instruction being configured to indicate the maximum charging current supported currently by the terminal; and

the control unit is configured to determine the charging current corresponding to the first charging mode according to the reply instruction of the third instruction.

10. The power adapter according to claim 6, wherein the control unit is further configured to, during a process that the power adapter charges the terminal in the first charging mode, perform the bidirectional communication with the terminal via the data wire of the first charging interface, to continuously adjust a charging current outputted to the battery from the power adapter by controlling the switch unit.,

wherein, when the control unit performs the bidirectional communication with the terminal via the data wire of the first charging interface to continuously adjust the charging current outputted to the battery from the power adapter by controlling the switch unit,

the control unit is configured to send a fourth instruction to the terminal, the fourth instruction being configured to query a current voltage of the battery in the terminal;

the control unit is configured to receive a reply instruction of the fourth instruction sent by the terminal, the reply instruction of the fourth instruction being configured to indicate the current voltage of the battery in the terminal; and

the control unit is configured to adjust the charging current by controlling the switch unit according to the current voltage of the battery.

11. The power adapter according to claim 10, wherein the control unit is configured to adjust the charging current outputted to the battery from the power adapter to a charging current value corresponding to the current voltage of the battery by controlling the switch unit according to the current voltage of the battery and a predetermined correspondence between battery voltage values and charging current values.

12. The power adapter according to claim 11,

wherein the control unit is further configured to, during the process that the power adapter charges the terminal in the first charging mode, determine whether the first charging

interface is poor contacted with the second charging interface by performing the bidirectional communication with the terminal via the data wire of the first charging interface,

wherein the control unit is configured, when determining that the first charging interface is poor contacted with the second charging interface, to control the power adapter to quit the first charging mode,

wherein the control unit is further configured, before determining whether the first charging interface is poor contacted with the second charging interface, to receive information indicating a path impedance of the terminal from the terminal, wherein

the control unit is configured to send a fourth instruction to the terminal, the fourth instruction being configured to query a voltage of the battery in the terminal;

the control unit is configured to receive a reply instruction of the fourth instruction sent from the terminal, the reply instruction of the fourth instruction being configured to indicate the voltage of the battery in the terminal;

the control unit is configured to determine a path impedance from the power adapter to the battery according to an output voltage of the power adapter and the voltage of the battery; and

the control unit is configured to determine whether the first charging interface is poor contacted with the second charging interface according to the path impedance from the power adapter to the battery, the path impedance of the terminal, and a path impedance of a charging wire between the power adapter and the terminal.

13. The power adapter according to claim 12, wherein the control unit is further configured to, before the power adapter quits the first charging mode, send a fifth instruction to the terminal, the fifth instruction being configured to indicate that the first charging interface is poor contacted with the second charging interface.

14. A charging method, comprising:

performing primary rectification on an input alternating current to output a voltage with a first pulsating waveform when a first charging interface of a power adapter is coupled to a second charging interface of a terminal;

modulating the voltage with the first pulsating waveform by controlling a switch unit, and outputting a voltage with a second pulsating waveform via a transformation of a transformer;

performing secondary rectification on the voltage with the second pulsating waveform to output a voltage with a third pulsating waveform, and applying the voltage with the third

pulsating waveform to a battery of the terminal via the second charging interface;

sampling current after the secondary rectification by a first current sampling circuit to obtain a current sampling value, the first current sampling circuit comprising a current detection resistor with an adjustable resistance, wherein one end of the current detection resistor is coupled to an output end of the second rectification unit, an adjustment end of the current detection resistor is coupled to the control unit, and the first current sampling circuit further comprises: an operational amplifier; a second resistor, wherein one end of the second resistor is respectively coupled to the one end of the current detection resistor and the output end of the second rectification unit, another end of the second resistor is coupled to a first input end of the operational amplifier, and the another end of the second resistor is further grounded through a first filter capacitor; a third resistor, wherein one end of the third resistor is coupled to another end of the current detection resistor, another end of the third resistor is coupled to a second input end of the operational amplifier, and the another end of the third resistor is further grounded through a second filter capacitor;

adjusting a resistance of the current detection resistor according to a charging mode and adjusting a duty ratio of a control signal outputted to the switch unit according to the current sampling value, such that the voltage with the third pulsating waveform meets a charging requirement,

wherein the charging mode comprises a first charging mode and a second charging mode, a charging speed in the first charging mode is faster than that in the second charging mode,

adjusting the resistance of the current detection resistor according to the charging mode comprises: decreasing the resistance of the current detection resistor in response to determining to charge a terminal in the first charging mode, and increasing the resistance of the current detection resistor in response to determining to charge a terminal in the second mode.

15. The charging method according to claim 14, further comprising:

adjusting a frequency of the control signal according to the current sampling value.

16. The charging method according to claim 14, further comprising:

communicating with the terminal via the first charging interface to determine the charging mode.

17. The charging method according to claim 16, further comprising:

decreasing the resistance of the current detection resistor when performing a bidirectional communication with the terminal via the data wire of the first charging interface

to determine to charge the terminal in the first charging mode;

increasing the resistance of the current detection resistor when performing the bidirectional communication with the terminal via the data wire of the first charging interface to determine to charge the terminal in the second charging mode.

18. The charging method according to claim 16, wherein when the power adapter performs a bidirectional communication with the terminal via the first charging interface to determine to charge the terminal in the first charging mode, the method comprises:

sending by the power adapter a first instruction to the terminal, the first instruction being configured to query the terminal whether to start the first charging mode; and

receiving by the power adapter a reply instruction of the first instruction sent by the terminal, the reply instruction of the first instruction being configured to indicate that the terminal agrees to start the first charging mode.

19. The charging method according to claim 18, wherein, before the power adapter sends the first instruction to the terminal, the power adapter charges the terminal in the second charging mode, and when the power adapter determines that a charging duration in the second charging mode is longer than a predetermined threshold, the power adapter sends the first instruction to the terminal.

20. The charging method according to claim 18, further comprising: controlling the power adapter to adjust a charging current to a charging current corresponding to the first charging mode by controlling the switch unit, wherein before the power adapter charges the terminal with the charging current corresponding to the first charging mode, the method further comprises:

performing the bidirectional communication with the terminal via the first charging interface to determine a charging voltage corresponding to the first charging mode, and controlling the power adapter to adjust a charging voltage to the charging voltage corresponding to the first charging mode,

wherein performing the bidirectional communication with the terminal via the first charging interface to determine the charging voltage corresponding to the first charging mode, comprises:

sending by the power adapter a second instruction to the terminal, the second instruction being configured to query whether a current output voltage of the power adapter is suitable for being used as the charging voltage corresponding to the first charging mode;

receiving by the power adapter a reply instruction of the second instruction sent by the

terminal, the reply instruction of the second instruction being configured to indicate that the current output voltage of the power adapter is higher, equal or lower than a required voltage; and

determining by the power adapter the charging voltage corresponding to the first charging mode according to the reply instruction of the second instruction.

21. The charging method according to claim 20, further comprising: performing the bidirectional communication with the terminal via the first charging interface to determine the charging current corresponding to the first charging mode, before controlling the power adapter to adjust the charging current to the charging current corresponding to the first charging mode,

wherein performing the bidirectional communication with the terminal via the first charging interface to determine the charging current corresponding to the first charging mode, comprises:

sending by the power adapter a third instruction to the terminal, the third instruction being configured to query a maximum charging current supported currently by the terminal;

receiving by the power adapter a reply instruction of the third instruction sent by the terminal, the reply instruction of the third instruction being configured to indicate the maximum charging current supported currently by the terminal; and

determining by the power adapter the charging current corresponding to the first charging mode according to the reply instruction of the third instruction.

22. The charging method according to claim 18, further comprising:

during a process that the power adapter charges the terminal in the first charging mode, performing the bidirectional communication with the terminal via the first charging interface to continuously adjust a charging current outputted to the battery from the power adapter by controlling the switch unit.

wherein performing the bidirectional communication with the terminal via the first charging interface to continuously adjust the charging current outputted to the battery from the power adapter by controlling the switch unit comprises:

sending by the power adapter a fourth instruction to the terminal, the fourth instruction being configured to query a current voltage of the battery in the terminal;

receiving by the power adapter a reply instruction of the fourth instruction sent by the terminal, the reply instruction of the fourth instruction being configured to indicate the current voltage of the battery in the terminal; and

adjusting the charging current by controlling the switch unit according to the current voltage of the battery,

wherein adjusting the charging current by controlling the switch unit according to the current voltage of the battery comprises:

adjusting the charging current outputted to the battery from the power adapter to a charging current value corresponding to the current voltage of the battery by controlling the switch unit according to the current voltage of the battery and a predetermined correspondence between battery voltage values and charging current values.

23. The charging method according to claim 22, further comprising: determining the first charging interface is poor contacted with the second charging interface by performing the bidirectional communication with the terminal via the first charging interface, during the process that the power adapter charges the terminal in the first charging mode, wherein

when determining that the first charging interface is poor contacted with the second charging interface, the method further comprises: controlling the power adapter to quit the first charging mode,

wherein, before determining whether the first charging interface is poor contacted with the second charging interface, the power adapter receives information indicating a path impedance of the terminal from the terminal; the method further comprises:

sending by the power adapter a fourth instruction to the terminal, the fourth instruction being configured to query a voltage of the battery in the terminal,

receiving by the power adapter a reply instruction of the fourth instruction sent by the terminal, the reply instruction of the fourth instruction being configured to indicate the voltage of the battery in the terminal;

determining by the power adapter a path impedance from the power adapter to the battery according to an output voltage of the power adapter and the voltage of the battery; and

determining by the power adapter whether the first charging interface is poor contacted with the second charging interface according to the path impedance from the power adapter to the battery, the path impedance of the terminal, and a path impedance of a charging wire between the power adapter and the terminal.

24. A charging system, comprising:

a battery;

a first rectification unit, configured to rectify an input alternating current to output a voltage with a first pulsating waveform;

a switch unit, configured to modulate the voltage with the first pulsating waveform according to a control signal;

a transformer, configured to output a voltage with a second pulsating waveform according to the modulated voltage with the first pulsating waveform;

a second rectification unit, configured to rectify the voltage with the second pulsating waveform to output a voltage with a third pulsating waveform to the battery;

a first current sampling circuit, configured to sample current outputted from the second rectification unit to obtain a current sampling value, the first current sampling circuit comprising a current detection resistor with an adjustable resistance; and

a control unit, coupled to the first current sampling circuit and the switch unit respectively, and configured to output the control signal to the switch unit, to adjust a resistance of the current detection resistor according to a charging mode, and to adjust a duty ratio of the control signal according to the current sampling value, such that the voltage with the third pulsating waveform meets a charging requirement,

wherein the charging mode comprises a first charging mode and a second charging mode, a charging speed in the first charging mode is faster than that in the second charging mode,

the control unit is further configured to decrease the resistance of the current detection resistor in response to determining to charge a terminal in the first charging mode, and increase the resistance of the current detection resistor in response to determining to charge a terminal in the second mode,

wherein one end of the current detection resistor is coupled to an output end of the second rectification unit, an adjustment end of the current detection resistor is coupled to the control unit, and the first current sampling circuit further comprises:

an operational amplifier;

a second resistor, wherein one end of the second resistor is respectively coupled to the one end of the current detection resistor and the output end of the second rectification unit, another end of the second resistor is coupled to a first input end of the operational amplifier, and the another end of the second resistor is further grounded through a first filter capacitor;

a third resistor, wherein one end of the third resistor is coupled to another end of the current detection resistor, another end of the third resistor is coupled to a second input end of the operational amplifier, and the another end of the third resistor is further grounded through a second filter capacitor.