FUEL CELL ADAPTOR

The present invention relates to fuel cells as an alternative supply of power to devices normally powered by a mains power supply.

Many people now routinely carry a number of portable electronic devices with them, such as a mobile telephone, a personal music player, a portable computer, a personal gaming device and the like. These devices routinely require connection to a mains power supply for extended operation of the device or for recharging the device. As a consequence, it is often necessary to carry one or more mains power adaptors for converting a mains power supply to the required low voltage supply of the portable electronic device.

A problem often encountered when travelling is that there may be no convenient access to a mains power supply so that a conventional mains adaptor is then of no assistance and the use of a portable electronic device becomes limited by its internal battery life.

It is an object of the present invention to provide a convenient alternative to a mains power supply for powering portable electronic devices when a mains power supply is not available.

According to one aspect, the present invention provides a mains power adaptor comprising: electrical pins configured to connect with a mains power supply socket; a power converter circuit having an input coupled to the electrical pins for converting mains power to a lower voltage supply; an electrical output of the lower voltage supply; and a fuel cell switchably coupled to said electrical output;

~~The adaptor may include~~ a fluid connection port for coupling a fluid fuel outlet of a fuel cartridge to a fuel inlet of the fuel cell, ~~The~~ in which the fluid connection port ~~may be~~ is disposed in a face of the adaptor from which the electrical pins extend.

The fluid connection port may be disposed between the electrical pins. The adaptor may include a receptacle for engaging with a fuel cartridge and enabling coupling of the fluid connection port to the fuel outlet of the fuel cartridge. The electrical output may include a data connection. The adaptor may include a data processor for communicating with a device coupled to the electrical output and for transmitting usage data thereto. The

usage data may comprise data relating to any of: fuel supply remaining in a fuel cartridge coupled to the adaptor, status or condition of the fuel cell within the adaptor; power usage data. The electrical pins may be detachable, interchangeable or reconfigurable. The processor may be configured to determine an amount of fuel remaining in a cartridge coupled thereto by any one or more of: sensing absolute fuel pressure; sensing the response of fuel pressure to flow change; sensing the response of fuel pressure to temperature change (ambient and / or cartridge temperature); sensing the response of fuel pressure to ambient pressure change; operation of an algorithm based on fuel usage and / or flow from the cartridge. The electrical pins may be formed on a pin plate detachable from a housing of the adaptor, the pin plate having an interface configured to physically and electrically couple the electrical pins to the housing of the adaptor, the housing of the adaptor having a face plate configured to engage with the pin plate interface. The adaptor may include a fuel cartridge having an interface configured to physically engage with the face plate as an alternative to the pin plate. The face plate may include a fluid connection port for coupling a fluid fuel outlet of the fuel cartridge to a fuel inlet of the fuel cell.

According to another aspect, the present invention provides a fuel cartridge for a fuel cell, comprising: a fuel chamber; a fuel outlet for releasing fuel from the cartridge, the fuel outlet including a switchable valve; and a pin-receiving interface configured to receive and engage with the electrical pins of a domestic electrical plug, the fuel outlet and the pin-receiving interface each disposed on a mating face of the fuel cartridge.

The switchable valve of the fuel outlet may be inhibited from opening unless electrical pins of a mains power adaptor are engaged with the pin-receiving interface and the fuel outlet is coupled to the fluid connection port of the power adaptor. The fuel cartridge may include a data processor configured to communicate data relating the status of the cartridge to an adaptor coupled thereto. The data processor may be configured to communicate data to an adaptor when coupled thereto using the electrical pins of the adaptor engaged with the pin-receiving interface. The fuel outlet may be disposed between pin sockets of the pin-receiving interface.

According to another aspect, the invention provides an interface unit for interfacing between a mains power adaptor as described above and a fuel cartridge, the interface unit comprising: a pin-receiving interface configured to receive and engage with the electrical pins of the mains power adaptor described above; a receptacle for engaging with a fuel cartridge; a fluid conduit extending through the interface unit configured to

CLAIMS

1. A mains power adaptor comprising:

electrical pins configured to connect with a mains power supply socket;

a power converter circuit having an input coupled to the electrical pins for converting mains power to a lower voltage supply;

an electrical output of the lower voltage supply;

a fuel cell switchably coupled to said electrical output.

2. The adaptor of claim 1 further including a fluid connection port for coupling a fluid fuel outlet of a fuel cartridge to a fuel inlet of the fuel cell.

3. The adaptor of claim 2 in which the fluid connection port is disposed in a face of the adaptor from which the electrical pins extend.

4. The adaptor of claim 3 in which the fluid connection port is disposed between the electrical pins.

5. The adaptor of claim 2 further including a receptacle for engaging with a fuel cartridge and enabling coupling of the fluid connection port to the fuel outlet of the fuel cartridge.

6. The adaptor of claim 1 in which the electrical output includes a data connection.

7. The adaptor of claim 6 further including a data processor for communicating with a device coupled to the electrical output and for transmitting usage data thereto.

8. The adaptor of claim 7 in which the usage data comprises data relating to any of: fuel supply remaining in a fuel cartridge coupled to the adaptor; status or condition of the fuel cell within the adaptor; power usage data.

9. The adaptor of claim 1 in which the electrical pins are detachable, interchangeable or reconfigurable.

10. The adaptor of claim 8 in which the processor is configured to determine an amount of fuel remaining in a cartridge coupled thereto by any one or more of: sensing absolute fuel pressure; sensing the response of fuel pressure to flow change; sensing the response of fuel pressure to temperature change (ambient and / or cartridge temperature); sensing the response of fuel pressure to ambient pressure change; operation of an algorithm based on fuel usage and / or flow from the cartridge.

11. The adaptor of claim 9 in which the electrical pins are formed on a pin plate detachable from a housing of the adaptor, the pin plate having an interface configured to physically and electrically couple the electrical pins to the housing of the adaptor, the housing of the adaptor having a face plate configured to engage with the pin plate interface.

12. The adaptor of claim 11 further including a fuel cartridge, the fuel cartridge having an interface configured to physically engage with the face plate as an alternative to the pin plate.

13. The adaptor of claim 12 in which the face plate further includes a fluid connection port for coupling a fluid fuel outlet of the fuel cartridge to a fuel inlet of the fuel cell.

14. A fuel cartridge for a fuel cell, comprising:

a fuel chamber;

a fuel outlet for releasing fuel from the cartridge, the fuel outlet including a switchable valve;

a pin-receiving interface configured to receive and engage with the electrical pins of a domestic electrical plug.

15. The fuel cartridge of claim 14 in which the switchable valve of the fuel outlet is inhibited from opening unless electrical pins of a mains power adaptor according to claim 2 are engaged with the pin-receiving interface and the fuel outlet is coupled to the fluid connection port of the power adaptor.

16. The fuel cartridge of claim 15 further including a data processor configured to communicate data relating the status of the cartridge to an adaptor coupled thereto.

17. The fuel cartridge of claim 16 in which the data processor is configured to communicate data to an adaptor when coupled thereto using the electrical pins of the adaptor engaged with the pin-receiving interface.

18. An interface unit for interfacing between a mains power adaptor according to claim 2 and a fuel cartridge, the interface unit comprising:

a pin-receiving interface configured to receive and engage with the electrical pins of the mains power adaptor of claim 2;

a receptacle for engaging with a fuel cartridge;

a fluid conduit extending through the interface unit configured to couple to the fluid connection port of the power adaptor of claim 2 and to a fuel cartridge when engaged with the receptacle.

19. The interface unit of claim 18 further including a control mechanism configured to actuate fuel flow from a fuel cartridge when connected to the interface unit, the control mechanism being configured to inhibit fuel flow unless the electrical pins of the mains power adaptor are engaged with the pin-receiving interface.

20. The interface unit of claim 19 further configured to communicate data between the mains power adaptor and fuel cartridge.

CLAIMS

1. A mains power adaptor comprising:

electrical pins configured to connect with a mains power supply socket;

a power converter circuit having an input coupled to the electrical pins for converting mains power to a lower voltage supply;

an electrical output of the lower voltage supply;

a fuel cell switchably coupled to said electrical output;

a fluid connection port for coupling a fluid fuel outlet of a fuel cartridge to a fuel inlet of the fuel cell in which the fluid connection port is disposed in a face of the adaptor from which the electrical pins extend.

2. The adaptor of claim 1 in which the fluid connection port is disposed between the electrical pins.

3. The adaptor of claim 1 further including a receptacle for engaging with a fuel cartridge and enabling coupling of the fluid connection port to the fuel outlet of the fuel cartridge.

4. The adaptor of claim 1 in which the electrical output includes a data connection.

5. The adaptor of claim 4 further including a data processor for communicating with a device coupled to the electrical output and for transmitting usage data thereto.

6. The adaptor of claim 5 in which the usage data comprises data relating to any of: fuel supply remaining in a fuel cartridge coupled to the adaptor; status or condition of the fuel cell within the adaptor; power usage data.

7. The adaptor of claim 1 in which the electrical pins are detachable, interchangeable or reconfigurable.

8. The adaptor of claim 7 in which the processor is configured to determine an amount of fuel remaining in a cartridge coupled thereto by any one or more of: sensing absolute fuel pressure; sensing the response of fuel pressure to flow change; sensing the response of fuel pressure to temperature change (ambient and / or cartridge

temperature); sensing the response of fuel pressure to ambient pressure change; operation of an algorithm based on fuel usage and / or flow from the cartridge.

9. The adaptor of claim 7 in which the electrical pins are formed on a pin plate detachable from a housing of the adaptor, the pin plate having an interface configured to physically and electrically couple the electrical pins to the housing of the adaptor, the housing of the adaptor having a face plate configured to engage with the pin plate interface.

10. The adaptor of claim 9 further including a fuel cartridge, the fuel cartridge having an interface configured to physically engage with the face plate as an alternative to the pin plate.

11. The adaptor of claim 10 in which the face plate further includes a fluid connection port for coupling a fluid fuel outlet of the fuel cartridge to a fuel inlet of the fuel cell.

12. A fuel cartridge for a fuel cell, comprising:

a fuel chamber;

a fuel outlet for releasing fuel from the cartridge, the fuel outlet including a switchable valve;

a pin-receiving interface configured to receive and engage with the electrical pins of a domestic electrical plug,

the fuel outlet and the pin-receiving interface each disposed on a mating face of the fuel cartridge.

13. The fuel cartridge of claim 12 in which the switchable valve of the fuel outlet is inhibited from opening unless electrical pins of a mains power adaptor according to claim 1 are engaged with the pin-receiving interface and the fuel outlet is coupled to the fluid connection port of the power adaptor.

14. The fuel cartridge of claim 13 further including a data processor configured to communicate data relating the status of the cartridge to an adaptor coupled thereto.

15. The fuel cartridge of claim 14 in which the data processor is configured to communicate data to an adaptor when coupled thereto using the electrical pins of the adaptor engaged with the pin-receiving interface.

16. The fuel cartridge of claim 12 in which the fuel outlet is disposed between pin sockets of the pin-receiving interface.

17. An interface unit for interfacing between a mains power adaptor according to claim 1 and a fuel cartridge, the interface unit comprising:

a pin-receiving interface configured to receive and engage with the electrical pins of the mains power adaptor of claim 1;

a receptacle for engaging with a fuel cartridge;

a fluid conduit extending through the interface unit configured to couple to the fluid connection port of the power adaptor of claim 1 and to a fuel cartridge when engaged with the receptacle.

18. The interface unit of claim 17 further including a control mechanism configured to actuate fuel flow from a fuel cartridge when connected to the interface unit, the control mechanism being configured to inhibit fuel flow unless the electrical pins of the mains power adaptor are engaged with the pin-receiving interface.

19. The interface unit of claim 18 further configured to communicate data between the mains power adaptor and fuel cartridge.