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BATTERY CHANGING ADAPTER

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates to an adapter that allows a battery that supplies voltage to an electronic device to be replaced without interrupting the voltage supplied to the electronic device.

(2) Description of the Related Art

Many electronic devices, such as personal computers and programmable circuitry, use a long life battery to either start a boot sequence or retain specific data in memory for the electronic device to perform its control functions. However, a problem arises when the battery needs to be replaced but it cannot be replaced without temporarily disconnecting the old battery and losing the data stored in memory.

One attempt at solving the aforementioned problem is the

battery terminal coupling assembly described in Quat et al. U.S. Patent No. 5,863,218. The assembly shown in Quat et al. comprises a housing having opened ends that enables a supplying battery to be slid out of one open end while a replacement battery is simultaneously slid into the other open end. The supplying battery and replacement battery simultaneously engage electrical contacts within the housing to enable power to be supplied continuously to the electronic device as the supplying battery is slid out of the housing and the replacement battery is slid into the housing. A significant disadvantage of the assembly described in Quat et al. is that it can only be used in electronic devices or equipment that have a physical configuration or design that allows such an assembly to be used. Specifically, the assembly of Quat et al. cannot be used in many commercially available electronic devices because the physical configuration of the electronic device will not permit batteries to be slid into and out from the housing of the assembly of Quat et al.

What is needed is an apparatus that allows a supplying battery to be replaced by a replacement battery without interruption in the supply of power to the electronic device wherein use of the apparatus is not constrained by the physical configuration and design of the electronic device.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an apparatus that allows a battery of an electronic device to be replaced without causing an interruption in the supply of voltage to the electronic device.

It is another object of the present invention to provide an apparatus that allows a supplying battery to be replaced by a replacement battery without interruption in the supply of power to the electronic device wherein use of the apparatus is not constrained by the physical configuration and design of the electronic device.

It is a further object of the present invention that such an apparatus be configured so that it can be retrofitted to existing electronic devices or fabricated directly into newly manufactured electronic devices.

It is yet another object of the present invention that such an apparatus be manufactured at relatively low cost. Other objects and advantages of the present invention will be apparent from the ensuing description.

Thus, the present invention is directed to, in one aspect, an apparatus for allowing a supplying battery of an electronic device to be replaced with a replacement battery without interrupting voltage supplied to the electronic device. In one embodiment, the apparatus comprises a housing configured in the form of an open pocket that has an interior wall. The interior

wall is open at one side to form a mouth and defines an interior region that is sized for receiving a battery. The mouth is sized to allow a battery to be manually inserted into and removed from the interior region. The housing further includes an exterior side. The apparatus further comprises a plurality of battery terminal engagement conductors attached to the housing and located within the interior region for electrical connection to a supplying battery, and a plurality of exterior electrically conductive members attached to the housing and located on the exterior side. Each exterior electrically conductive member is electrically connected to a corresponding one of the battery terminal engagement conductors. The apparatus further comprises a plurality of extending electrically conductive members attached to the housing. Each extending electrically conductive member is electrically connected to a corresponding one of the battery terminal engagement conductors. Each extending electrically conductive member extends from the housing so as to allow an auxiliary power source to be electrically connected to the extending electrically conductive members while the supplying battery is removed from the interior region of the housing and a replacement battery is inserted into the interior region of the housing.

In one embodiment, the plurality of battery terminal engagement conductors comprises a pair of oppositely positioned battery terminal engagement conductors attached to the interior

wall. In one embodiment, one of the pair of battery terminals engagement conductors comprises a ribbon of conductive material rigidly affixed to the interior wall and the other of the pair of battery terminal engagement conductors comprises a spring-loaded tab. In such an embodiment, the pair of battery terminal engagement conductors defines a detent for maintaining the battery immobile within the interior region.

The apparatus further comprises an auxiliary power source for supplying power to the electronic device while the supplying battery is being removed from the interior region of the housing and a replacement battery is being inserted into the interior region. The auxiliary power source includes electrically conductive leads wherein each lead is removably connected to a corresponding extending electrically conductive member.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing features of the present invention will become more readily apparent and may be understood by referring to the following detailed description of an illustrative embodiment of the present invention, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a side elevational view of a battery changing adapter of the present invention.

FIG. 2 is a side elevational view of one type of battery with which the battery changing adapter of the present invention

can be used.

FIG. 3 is a side elevational view of one type of battery compartment with which the battery changing adapter of the present invention can be used.

FIG. 4 is a side elevational view showing the battery changing adapter of FIG. 1 disposed within the battery compartment of FIG. 3 and the battery of FIG. 2 disposed within the interior region of the battery changing adapter of FIG. 1.

FIG. 5 is a partial cross-sectional view of a battery compartment of an electronic device in accordance with another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown one embodiment of the battery changing adapter of the present invention. Battery changing adapter 10 allows a supplying battery of an electronic device 11 (see FIG. 3) to be replaced with a replacement battery without interrupting voltage supplied to the electronic device and regardless of the physical configuration and design of the electronic device. As used herein, the term "electronic device" is defined as any device that is powered by a battery, e.g. computer, clock, microprocessor, electronic thermostat, digitally tuned radios, etc. As shown in FIG. 1, battery changing adapter 10 of the present invention comprises housing 12 that is in the form of an open pocket that has an interior wall 14. The

interior wall 14 is open at one side to form a mouth 15 and defines an interior region 16 that is sized for receiving battery 20 (see FIG. 2). Housing 12 further includes exterior surface 18.

Battery 20 can be configured as almost any type of battery used in the industry to power electronic devices. For example, battery 20 can be configured as an AA, AAA, B, C or D size battery. Such battery sizes are well known in the industry. However, it is to be understood that adapter 10 of the present invention can be configured in size and shape to accommodate other types of batteries.

Referring to FIG. 3, adapter 10 of the present invention is sized to be nested or positioned within a battery compartment or case 22 of electronic device 11. Compartment 22 may be in the form of a pocket that is open at one side forming a mouth 23 as shown. Electronic device 11 includes a first polarity electrically conductive member 24 and a second polarity electrically conductive member 26 which cooperate to form a supply voltage input of electrical device 11. Conductive member 24 may be in the form of a ribbon of conductive material in rigidly affixed relation to one side of the pocket and conductive member 26 may be in the form of a spring-loaded tab anchored to the opposed side of the pocket as shown. In this embodiment, members 24 and 28 serve as a detent which retains battery changing adapter in a fixed position until manually withdrawn

through mouth 23.

Referring to FIG. 1, adapter 10 of the present invention includes electrically conductive member 28 attached to the exterior surface 18 for contact with first polarity electrically conductive member 24 of electronic device 11. Adapter 10 of the present invention further includes electrically conductive member 30 attached to the exterior surface 18 for contact with second polarity electrically conductive member 26 of the electronic device 11. As shown in FIG. 1, adapter 10 further comprises electrically conductive members 32 and 34 within interior region 16 and which are electrically connected to electrically conductive members 28 and 30, respectively. Electrically conductive members 32 and 34 electrically contact electrically conductive ends 36 and 38, respectively, of battery 20. Conductive member 32 may be in the form of a ribbon of conductive material in rigidly affixed relation to one side of the pocket and conductive member 36 may be a spring-loaded tab anchored to the opposed side of the pocket as shown. In this embodiment, members 34 and 36 serve as a detent which retains battery 20 in a fixed position until manually withdrawn through mouth 15. In accordance with the present invention, adapter 10 of the present invention includes extending or protruding electrically conductive terminals 40 and 42 that are electrically connected to electrically conductive members 32 and 34, respectively. Extending terminals 40 and 42 extend from interior region 16.

Each extending terminal 40 and 42 has a predetermined length which may be varied depending upon the particular application.

Referring to FIG. 4, adapter 10 is disposed within battery compartment 22 of electronic device 11 such that conductive members 28 and 30 of adapter 10 contact conductive members 24 and 26, respectively, of electronic device 11. Battery 20 is disposed within interior region 16 of housing 12 such that conductive ends 36 and 38 of battery 20 contact conductive members 32 and 34, respectively, of adapter 10. Extending or protruding conductive members 40 and 42 extend from adapter 10 and electronic device 11 so as to allow auxiliary power source 50 to be connected to conductive members 40 and 42 and provide a voltage to electronic device 11 while battery 20 is still within compartment 22. This voltage is applied in parallel to battery 20. As a result of such a configuration, battery 20 can be removed and replaced by a new or replacement battery while auxiliary power source 50 remains connected to extending conductive members 40 and 42. Thus, battery 20 can be replaced without causing an interruption in voltage to electronic device 11. The auxiliary power source 50 is provided with leads 51A, 51B that have attached thereto suitable conductive releasable clasp members 52A, 52B, respectively, for applying its opposite polarity output to conductive members 40 and 42. In one embodiment, each lead 51A, 51B is configured as a flexible lead and each clasp member 52A, 52B comprises an alligator clip

connector. These alligator clip connectors are attached to members 40 and 42 during battery changing. Once battery 20 is replaced by a new battery, auxiliary power source 50 can be disconnected from extending conductive members 40 and 42.

In a preferred embodiment, auxiliary power source 50 is configured as a variable power source which can provide voltage and current of varying magnitudes depending upon the requirements of the electronic device.

In an alternate embodiment, extending or protruding conductive members 40 and 42 are positioned adjacent to exterior surface 18 and electrically connected to electrically conductive members 28 and 30, respectively.

Referring to FIG. 5, there is shown another embodiment of the present invention. Electronic device 60 comprises battery pocket or compartment 62 which has a mouth 62A for receiving a battery (not shown). Compartment 62 is defined by interior wall 63. Electronic device 60 includes electrically conductive battery engagement terminals 64 and 66 for connection to a battery. Similar to the conductive metal elements of adapter 10, conductive element 64 may be a ribbon and conductive element 66 may be a spring-loaded tab so as to function as a detent. Electronic device 60 further comprises extending or protruding conductive members 68 and 70 that are electrically connected to conductive members 64 and 66, respectively. Extending or protruding conductive members 68 and 70 are attached to the inner

wall 63 of compartment 62. Extending or protruding conductive members 68 and 70 have the same function as extending or protruding conductive members 40 and 42 described in the foregoing description.

In one embodiment, the battery changing adapter of the present invention further comprises a releasable securing device (not shown) for further securing the supplying battery within the interior region 16 of adapter 10. In such an embodiment, the releasable securing device is attached to the housing.

The size and dimensions of adapter 10 of the present invention can be varied to accommodate batteries and/or battery compartments of different sizes. Furthermore, although the foregoing description is in terms of adapter 10 being used with a single battery, it is to be understood that adapter 10 can be configured to be used with more than one battery. Additionally, the present invention can be implemented as a retrofit to existing electronic devices or a part of a newly manufactured electronic device.

Thus, the adapter of the present invention provides a convenient technique for replacing batteries in electronic devices without interrupting the supply voltage to the electronic circuitry and components of the electronic device that require a constant input voltage in order to retain electronic data. Furthermore, use of the battery changing adapter of the present invention is not constrained by the physical configuration or

design of the electronic device.

The principles, preferred embodiments and modes of operation of the present invention have been described in the foregoing specification. The invention which is intended to be protected herein should not, however, be construed as limited to the particular forms disclosed, as these are to be regarded as illustrative rather than restrictive. Variations in changes may be made by those skilled in the art without departing from the spirit of the invention. Accordingly, the foregoing detailed description should be considered exemplary in nature and not limiting the scope and spirit of the invention as set forth in the attached claims.

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BATTERY CHANGING ADAPTER

ABSTRACT OF DISCLOSURE

An apparatus for allowing a supplying battery of an electronic device to be replaced with a replacement battery without interrupting voltage supplied to the electronic device. The apparatus comprises a housing configured in the form of an open pocket that has an interior wall that is open at one side to form a mouth and defines an interior region sized for receiving a battery. The mouth is sized to allow a battery to be manually inserted into and removed from the interior region. A plurality of extending electrically conductive members are attached to and extend from the housing to allow an auxiliary power source to apply a voltage in parallel with the supplying battery while the supplying battery is being removed from the interior region and a replacement battery is being inserted into the interior region.

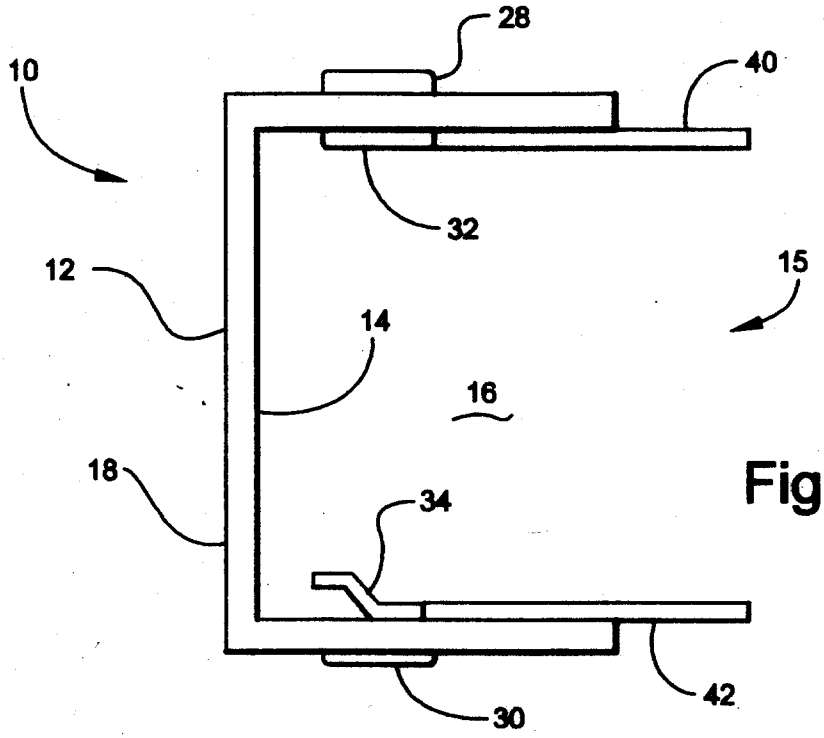

Fig. 1

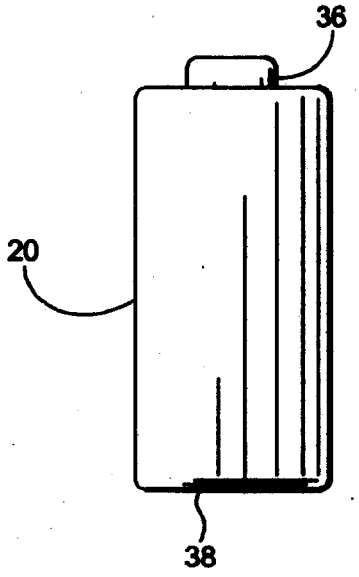

Fig. 2

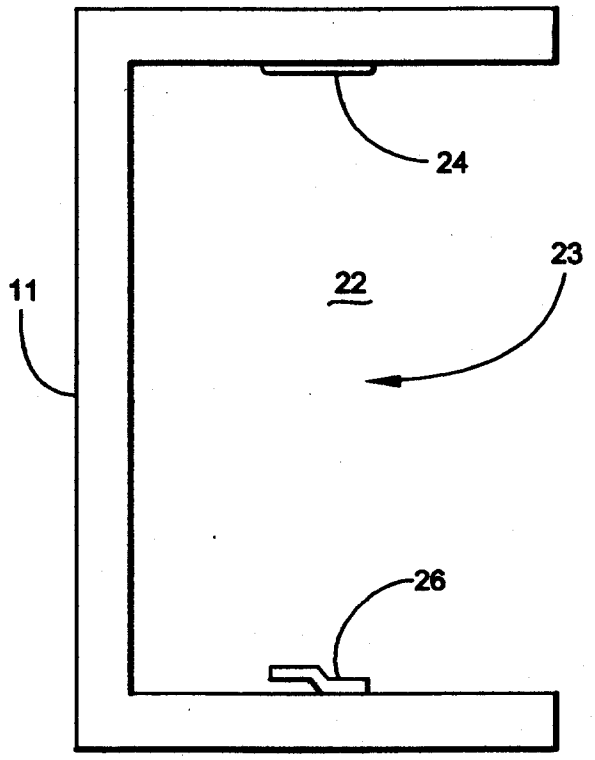

Fig. 3

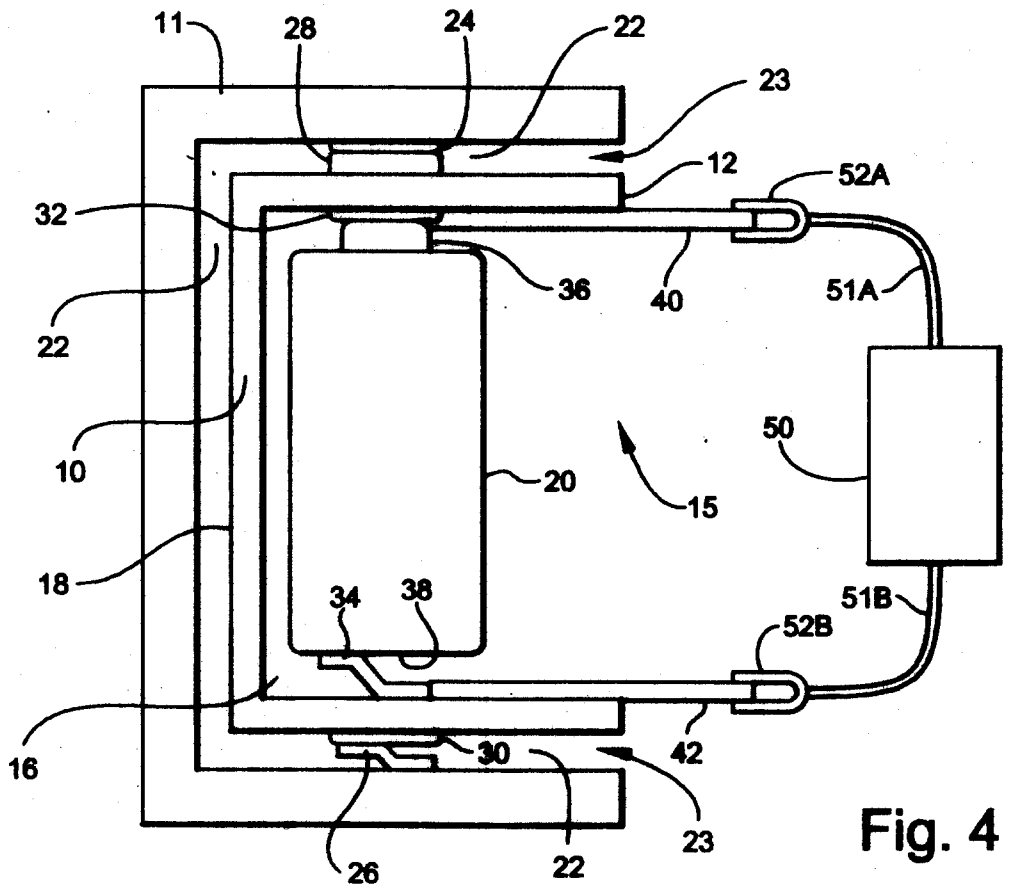
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Fig. 4

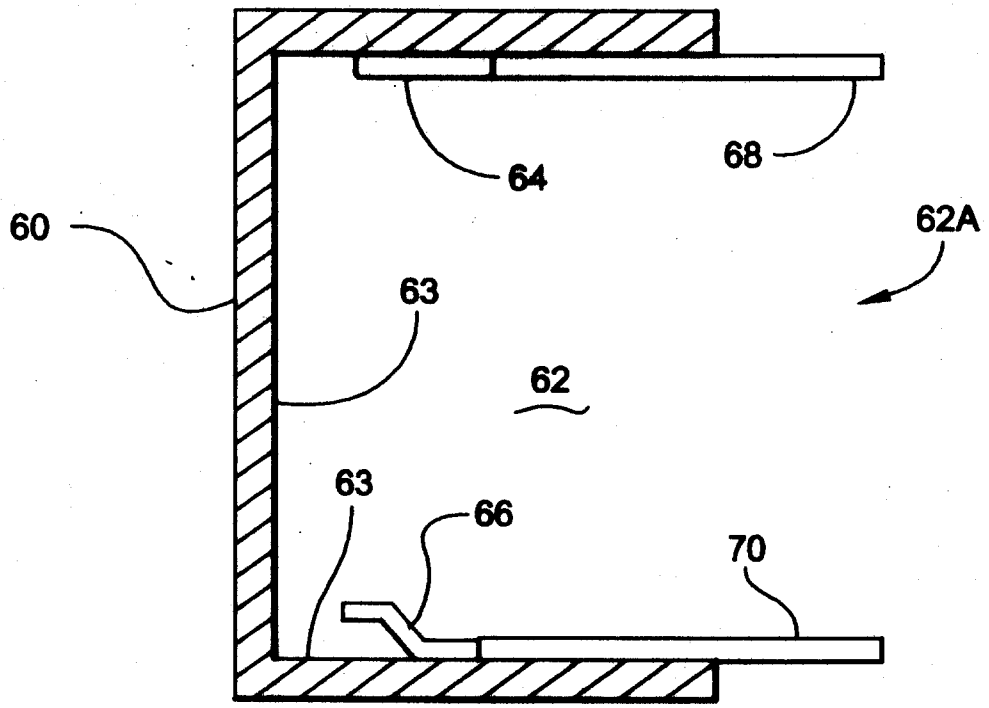

Fig. 5