

5501916**BATTERY HAVING A THROUGH-HOLE
AND HEAT DISSIPATING MEANS**

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A battery has a through-hole traversing a battery main body and opened to outside. The battery has a vessel having a central through-hole, and a spiral-shaped electrode, made up of a strip-shaped positive electrode and a strip-shaped negative electrode wound about a cylindrical core a number of times with a separator in-between, is mounted in the battery vessel so that an opening of the cylindrical core is substantially coincident with the through-hole in the battery vessel. The battery vessel is sealed after charging a liquid electrolyte. One or more thin metal plates are inserted and secured in the through-hole, or one or more heat-dissipating fins are radially formed around the opening end of the through-hole. The battery has good heat-dissipating properties and is superior in strength and energy density.

5501918**THERMAL MANAGEMENT OF
RECHARGEABLE BATTERIES**

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assigned to Globe-Union Inc

Thermal management of flat pack rechargeable batteries is accomplished by providing extensions on individual cell housing components, which extensions are connected to provide open air channels between individual cells. In an alternate embodiment of the invention, cells within the stack are filled with a thermally conductive liquid, such as a silica gel, to assist in heat dissipation from adjacent cells.

5504991**APPARATUS AND METHOD FOR
CONNECTING AND SECURING BATTERY
PACKS TO BATTERY POWERED
VEHICLES AND/OR BATTERY
CHARGING DEVICES**

Parmley Daniel W Tempe, AZ, UNITED STATES

The present invention relates to an apparatus that connects and secures a battery pack to a battery powered vehicle and/or a battery charging device. The apparatus eliminates the use of the installer's hands on or near the battery cables or any other current carrying devices. The apparatus is comprised of a frame located around a perimeter portion of the battery pack, a first connector slidably coupled to the frame, a second connector coupled to the first connector and to a battery powered vehicle and/or a battery charging device, and a handle pivotally coupled to the frame and to the first connector for coupling the first connector to the second connector.

5508597**QUICK EXCHANGE BATTERY
APPARATUS FOR BATTERY POWERED
VEHICLES AND METHOD THEREFOR**

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An apparatus for storing and changing battery packs from a battery powered vehicle. The battery powered vehicle drives toward a light source which aligns the battery powered vehicle with the apparatus. The apparatus is moved in a horizontal plane to a position underneath a battery holding location on the battery powered vehicle. An operator moves pneumatic carrier to a position directly underneath a battery pack located in the battery holding location. The apparatus is then moved in a vertical plane so that the pneumatic carrier engages a bottom section of the battery pack. The pneumatic carrier is then activated thereby lifting the battery pack on a cushion of air. This allows the

operator to move the battery pack out of the battery holding location, across a platform deck of the apparatus, and to a storage location. The operator can then use the pneumatic carrier to move a fresh battery pack located in a different storage location to the battery powered vehicle.

5508598

METHOD FOR QUICK CHARGING OF RECHARGEABLE BATTERIES

Al-Abassy Issam Graz, AUSTRIA

A device for quick charging of batteries, whereby the charging current of the battery is directed in constant current impulses. Several charging current strengths of varying strengths, are brought into effect, depending on the respective charging condition of the battery, by clock impulses. Assigned to each charging current strength is a battery-specific zone in the electrochemical voltage gradient $U=f(t)$, whereby the individual zones are indicated by voltage set values. The voltage zone assigned to each charging current strength is so chosen that in passing through this zone, no heating or gassing occurs. Thereby use is made of the fact that the battery at the beginning of the charging can accept a very high current. The charging condition of the battery is measured in each impulse pause, stored and compared with the voltage set value. Where there is a variance, the set-current value assigned to the zone is correspondingly adjusted.

5508599

BATTERY CONDITIONING SYSTEM HAVING COMMUNICATION WITH BATTERY PARAMETER MEMORY MEANS IN CONJUNCTION WITH BATTERY CONDITIONING

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In an exemplary embodiment, a battery conditioning system monitors battery conditioning and includes a

memory for storing data based thereon; for example, data may be stored representative of available battery capacity as measured during a deep discharge cycle. With a microprocessor monitoring battery operation of a portable unit, a measure of remaining battery capacity can be calculated and displayed. Where the microprocessor and battery conditioning system memory are permanently secured to the battery so as to receive operating power therefrom during storage and handling, the performance of a given battery in actual use can be accurately judged since the battery system can itself maintain a count of accumulated hours of use and other relevant parameters. In the case of a non-portable conditioning system, two-way communication may be established with a memory associated with the portable unit so that the portable unit can transmit to the conditioning system information concerning battery parameters (eg, rated battery capacity) and/or battery usage (eg, numbers of shallow discharge and recharge cycles), and after a conditioning operation, the conditioning system can transmit to the portable unit a measured value of battery capacity, for example.

5508600

METHOD FOR DISPLAYING A CHARGE LEVEL OF A BATTERY

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A method for displaying a charge level of a battery includes the steps of (1) displaying the charge level of the battery in a first manner during battery charging, and (2) displaying the charge level of the battery in a second manner which is different than the first manner during battery discharging. The first manner displaying step includes the step of operating a battery charge level indicator in a first mode, and the second manner displaying step includes the step of operating the battery charge level indicator in a second mode which is different than the first mode. In addition, a battery charge level indicator is disclosed and includes a display for indicating a charge level of a battery, and a mechanism for operating the display so as to indicate whether the battery is in a charge state of operation or a discharge state of operation.