battery having battery cells in which the environment thereof is a gas environment of hydrogen gas or a hydrogen-inert gas mixture.

COMPONENTS AND/OR CHARGERS

5633573

BATTERY PACK HAVING A PROCESSOR CONTROLLED BATTERY OPERATING SYSTEM

van Phuoc Duong; Wieczorek Rudi; Zeising Elmar; Hruska Louis W; Hull Matthew P; Taylor Alwyn H; Friel Daniel D Eching, GERMANY assigned to Duracell Inc

A battery pack and a method of operating a battery system. The battery pack includes a rechargeable battery and a processor for monitoring the battery during charging and discharging. The processor receives data values representing the battery voltage, temperature and current, and the processor performs a series of calculations using those data values. The processor has normal, standby and sleep modes. In the normal mode, the processor performs the series of calculations at first regular cycles, and in the standby mode, the processor performs the series of calculations at second regular cycles, which are longer than the first cycles. Preferably, the processor enters the standby mode when the battery current falls below a predetermined current level, and the processor enters the sleep mode when the battery voltage falls below a first predetermined voltage level. Also, the processor exits the sleep mode when the battery voltage rises above a second predetermined voltage level higher than the first predetermined voltage level.

5633574

PULSE-CHARGE BATTERY CHARGER

Sage George E Redmond, WA, UNITED STATES

This pulse-charge battery charger charges Nickel-Cadmium and Nickel-metal hydride batteries having one or more cells and used with cellular telephones and camcorders. A battery is lowered into a finger accessible receiving volume and held by a magnetic force. Charging automatically commences and automatically stops, as controlled by utilizing a U1 controller and other combined circuits. Charging status is indicated by colored lights: yellow-charging; green-battery is charged; orange-battery is overheated and cooling; and red-battery is defective. Other combined circuits are: power supply circuit to receive either 12.6 volt AC or DC voltage power, and to produce both a full wave rectified unregulated DC volt power source, and a regulated 5 DC volt power source; battery installed detector circuit; a reset circuit; a timing control circuit; ready light circuit; no battery then no light circuit; over temperature detection circuit; normalize circuit to accommodate battery cell arrangements; constant current source circuit; discharge control circuit; thermistor sensor control circuit; battery being charged circuit operating when a battery has an internal temperature sensor; and a battery being charged circuit operating when a battery has no temperature sensor, and the charger's external temperature sensor is relied upon. The following cycle, for example, is repeated until a battery is fully charged: 1000 milliseconds of charging; 2 milliseconds of no charging; 5 milliseconds of discharging; 10 milliseconds for a second no charging period.

5633575

BATTERY RECLAIMER AND CHARGER

Gali Carl Tucson, AZ, UNITED STATES

The invention is to a battery reclaimer, charger and maintainer circuit for removing current blocking deposits from plates of batteries utilizing liquid and jell electrolytes. The circuit includes an output circuit including at least one battery. A D.C. voltage source providing a D.C. voltage for charging said battery connected to said output circuit. An oscillator circuit for producing fast rise time voltage pulses is close coupled to an rf transformer, connecting the oscillator circuit to the output circuit in parallel with the D.C. voltage

source. A rectifier circuit is connected between the transformer and the output circuit, the rectifier circuit including a two diode rectifying circuit for producing a full wave voltage output positive pulse having an RF content.

5633576

BATTERY CHARGING METHOD WITH STEPPED CURRENT PROFILE WITH OPERATING PARAMETER COMPENSATION AND ASSOCIATED CHARGER

Rose Stephen D; Cates Joseph A; Rose Jeffrey A Irvine, KY, UNITED STATES assigned to Premier Engineered Products Inc

A method and apparatus is provided to charge a battery including a DC charge current supply having a variable output. The charging current is varied in accordance with several sensed parameters in the circuit so that battery voltage is accurately controlled. Initially, constant charging current is applied, and upon detecting that battery voltage increases to the gassing voltage, an incremental step reduction in charging current is triggered. The step reduction causes a decrease in battery voltage, dropping it below the gassing voltage. The step reduced charging current is then applied to increase battery voltage back up to the gassing voltage, thereby triggering another step reduction in charging current. This process is repeated multiple times providing a stepped current profile, i.e., each battery voltage increase to the gassing voltage triggering a step reduction in charging current, and in turn a corresponding voltage reduction. The battery voltage, with the alternating increases and decreases, is thus defined by a saw-tooth profile with peaks at the gassing voltage. When the charging current is finally reduced to a minimum level, the sensed battery voltage triggers a termination of the stepped current reduction. Upon the battery reaching full charge, the application of charging current is terminated. In the alternative embodiment, the slope of the voltage curve is detected and analyzed to control a step up profile of the current during the initial phase of charging. The rising temperature of the battery controls a decrease in the gassing or target voltage.

5635813

ELECTRONIC APPARATUS, BATTERY MANAGEMENT SYSTEM, AND BATTERY MANAGEMENT METHOD

Shiga Masaak; Kikuchi Kiyoak; Kumagai Masahiko; Takahira Yoshiaki; Suzuki Hiroshige Kanagawa, JAPAN assigned to Mitsubishi Denki Kabushiki Kaisha

Methods and apparatus to enable electronic apparatuses to display the remaining power of exchangeable batteries at any given time. A battery pack having a battery and an ID generator is attached to an electronic apparatus. The accumulated consumption hours of the battery is stored in a battery information memory for each battery ID. A remaining power detector determines the remaining battery power on the basis of the accumulated consumption hours and displays it on a display unit. Because the remaining battery power is determined based on the consumption hours of a battery, the running hours of a battery can be displayed at any given time.

5635816

METHOD AND APPARATUS FOR CONTROLLING BATTERY CHARGING CURRENT

Welsh Daniel; Gerken Kenneth F Solana Beach, CA, UNITED STATES assigned to Morningstar Corporation

An automatic photovoltaic controller provides a fixed frequency, pulse width modulated charging current to charge and regulate a battery, the duty cycle of the charging current being controlled by the difference between the sensed battery voltage and a desired regulated voltage. Modulation is achieved by controlling the on and off states of plural parallel-connected FET switches placed in series between the photovoltaic array and the battery. The duty cycle is adjustable in discrete steps over the entire range of 0% to 100% and is updated numerous times per second with new battery voltage measurements to provide highly accurate regulation. The charge current pulse rise time is selected to match the response time of the photovoltaic array. The fixed frequency of the charge current is within the preferred range of 100 Hz to 600 Hz to provide sufficient time for the chemical reaction within the battery cells to be