produced in accordance with the charging limit time, and a battery charging member.

5635842

METHOD OF ESTIMATING RESIDUAL CAPACITY OF BATTERY

Yokoo Masahide; Nagano Masao; Takemoto Hideharu Saitama ken, JAPAN assigned to Honda Giken Kogyo Kabushiki Kaisha

In estimating the residual capacity of a battery according to the maximum output estimating process, a reference point is established in advance at the intersection of a plurality of current/voltage characteristic linear curves corresponding to various residual capacities of the battery or in an area in the vicinity of the intersections of the curves. A current/voltage characteristic linear curve is determined so as to pass through the reference point and a measured operating point of the battery which corresponds to the present discharging current and output voltage values measured when the battery is discharged. Then, a maximum transfer power value of the battery is determined from the current/voltage characteristic linear curve thus determined, and the present residual capacity of the battery is estimated from the maximum transfer power value.

5637979

RECHARGEABLE BATTERY CHARGING METHOD AND APPARATUS

Tamai Mikitak; Ohira Takahar Sumoto, JAPAN assigned to Sanyo Electric Co Ltd

A plurality of series connected rechargeable batteries are charged by detecting battery voltages and controlling charging current. Normal charging is performed until any one battery voltage reaches a prescribed voltage. After any one battery voltage reaches the prescribed voltage, all batteries are charged such that a charging current is controlled to keep each battery voltage from exceeding the prescribed voltage.

5637980

BATTERY CHARGING/DISCHARGING SWITCHING CONTROL PROTECTIVE CIRCUIT

Wu Jimmy Hsin Chu, CHINA (TAIWAN)

A battery charging/discharging switching control protective circuit including a charging discharging loop, a constant current control circuit connected to the input terminal of the charging discharging loop,a microprocessor control circuit, a time series control circuit with its input terminal connected to the microprocessor control circuit and its output terminal connected to the switch of the charging discharging loop and the switches of the constant current control circuit, the time series control circuit being controlled by the microprocessor control circuit to control the transistor of the charging discharging loop in charging or discharging the battery at a constant current value, and to control the switches of the charging discharging loop in turning off the transistor at the beginning or the end of the charging or discharging operation, so as to prevent the occurrence of electric arc, sparks, transient electric current and voltage during the switching of the switches of the charging discharging loop.

5637981

METHOD FOR CHARGING A SECONDARY BATTERY AND CHARGER USED THEREFOR USING CONSTANT CURRENT AND CONSTANT VOLTAGE

Nagai Tamimi; Akiho Hitoshi Kanagawa, JAPAN assigned to Sony Corporation

A secondary battery charging method and a charger used therefor, in which the method uses a constant current and a constant voltage such that the secondary battery is first charged with the constant current until the terminal voltage of the battery becomes a reference voltage higher than the full charging voltage for the battery and then further charged with the constant voltage which is equal to the full charging voltage. These two charging operations are switched by using various kinds of detection and control circuits, so that the secondary battery is properly charged in a short time. Further, the

charger of the present invention is provided with a circuit for charging a plurality of battery cells simultaneously or separately.

5637982

METHOD AND SYSTEM FOR DETECTING FULL CHARGE OF A RECHARGEABLE BATTERY IN A PORTABLE COMPUTER SYSTEM

Nanno Nobuyuk; Maeda Mayumi Tokyo, JAPAN assigned to Kabushiki Kaisha Toshiba

When the display rate of a plasma display reaches a display rate exceeding the rated maximum electric power of the plasma display, the display mode of the plasma display is switched from a high brightness display mode to a normal brightness display mode. An item for selecting whether or not a battery recharge operation is enabled is provided to a setup menu screen. A user arbitrarily selects a charge mode (a battery charge operation is enabled in the normal brightness display mode) or a non-charge mode (the battery charge operation is disabled in the high brightness display mode). When the charge mode is selected, an electric power value obtained by subtracting electric power necessary for recharging the battery from the rated maximum electric power of the plasma display is set as a reference value, and when the display rate requires electric power exceeding the reference value, the display mode is switched from the high brightness display mode to the normal brightness display mode.

5640077

BATTERY RECHARGING APPARATUS

Gillissen Eduard E A; Van Beek Johann R G C M; Hannen Gerardus E M Heerlen, NETHERLANDS assigned to U S Philips Corporation

Apparatus for recharging a battery includes a compartment for accommodating the battery in a manner such that its electrical terminals are in contact with a pair of electrodes. The electrodes are connectable to respective poles of a controllable source of electrical energy. A strain gauge is positioned so as to make contact with a wall of the battery when the battery is in place in the compartment. The strain gauge includes a foil which carries a resistive element, each of the two extremities of the resistive element being connected to an electrical device via a separate contact wire, whereby the coefficient of thermal expansion of the strain gauge is substantially equal to that of the wall of the battery. The material of one of the contact wires, at its juncture with the resistive element, has a different Seebeck coefficient to the material of the other contact wire at its juncture with the respective element. The battery temperature can be monitored by measuring the DC voltage difference between the contact wires, whereas the mechanical deformation of the battery can be monitored by measuring the AC impedance of the resistive element, both of which measurements are independently conducted using the electrical device.

5640078

METHOD AND APPARATUS FOR AUTOMATICALLY SWITCHING AND CHARGING MULTIPLE BATTERIES

Kou Abraham; Wiley Robert A Redmond, WA, UNITED STATES assigned to Physio-Control Corporation

A battery selecting and charging system forms part of a portable electronic device, preferably a portable medical device. When the device is powered up, a selecting circuit selects one of two rechargeable batteries to power the device until it is depleted, and then automatically switches to the other battery. When the second battery is depleted, both batteries are selected to power the device. When the device is powered down, a battery charging circuit, having both a high and low charge section, provides a high charge to the battery having the greatest terminal voltage. Thereafter, the high charge is applied to the other battery, the low charge is applied to the first battery, and then the low charge is applied to the second battery. The battery charging circuit monitors the terminal voltage to prevent any damage to the batteries or the device.