FORM 2

THE PATENT ACT 1970

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The Patents Rules, 2003

COMPLETE SPECIFICATION

(See section 10 and M.13)

DESIGN OF SMART BALANCED BATTERY SYSTEM

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DESIGN OF SMART BALANCED BATTERY SYSTEM

FIELD OF INVENTION

This invention pertains to battery system during balanced mode.

BACKGROUND OF INVENTION

Ensuring uniform charge levels across all cells in a battery pack is essential for maximizing performance and extending the lifespan of battery-powered devices and energy storage systems. Variations in cell characteristics, manufacturing tolerances, and usage patterns can cause cells to develop uneven charge levels, which can lead to decreased energy efficiency, shortened battery life, and potential safety hazards. To tackle this issue, battery balancers are designed to equalize charge levels by redistributing excess energy from overcharged cells to undercharged ones. This process keeps each cell within its optimal range, reducing the risks of overcharging and undercharging and enhancing overall battery performance and longevity.

SUMMARY OF INVENTION

In this invention, is to design and develop a straightforward battery balancer that achieves uniform charge levels across all cells in a battery pack. This involves creating a cost-effective and easily implementable circuit that enhances the battery pack's efficiency and prolongs its lifespan. This invention focuses on developing a simple, cost-effective, and efficient battery balancer for small-scale applications, such as DIY electronics and portable devices. The aim is to create a balancer that is affordable, easy to assemble, and effective at maintaining consistent charge levels across all cells. By addressing charge imbalance, this balancer will improve battery pack efficiency, safety, and durability, offering a practical solution for users seeking reliable and long-lasting battery performance.

OBJECTS OF THE INVENTION

This invention aims to design a simple, cost-effective battery balancer that keeps all cells in a battery.

DETAIL DESCRIPTION

The battery charging circuit utilizes LM317 regulators, a TL431 Zener diode, and a PNP transistor with diodes to achieve efficient and reliable charging. The LM317 regulator is set up in voltage control mode to maintain a stable output voltage of 4.2V, regardless of fluctuations in the input voltage. This stable voltage is essential for proper battery charging. The TL431 Zener diode is employed to establish the charging threshold voltage. By adjusting the potentiometer, the reference voltage can be set to around 4.16V, slightly below the maximum of 4.2V. When the battery voltage surpasses this threshold, the TL431 activates and pulls the base of the PNP transistor to the ground, turning on the transistor. This action redirects the current through the diodes and bypasses the battery, thus preventing overcharging. During operation, when a discharged battery (e.g., 3.8V) is connected to the circuit powered at 4.2V, it begins to charge while the LED indicator stays off. As the battery voltage rises and nears 4.16V, the LED lights up, indicating that charging is complete. At this point, the current flows through the diodes and transistors, which protects the battery from overvoltage. Note that while the circuit effectively provides overvoltage protection, the current limit is fixed by the resistor in the current control LM317 and must be manually adjusted if changes are required.

DETAIL DESCRIPTION ABOUT DRAWING

In the following detailed description represents a system designed for charging a 3.7V battery 1. It employs a constant current charging method. Here's a breakdown of the circuit's components: LM317 voltage regulator 2 that ensures a steady and adjustable voltage supply to the charging system; 10k Resistors 3 are employed in the feedback loop of the LM317 and play a key role in determining the charging current; TL431 4 acts as a precise voltage reference, effectively setting the voltage at which the battery will be charged; BD140 transistor 5 functions as a switch, regulating the flow of charging current; D1, D2, D3, D4 diodes 6 are used for voltage reduction and to safeguard the LED[330 Resistor is to limits the current flowing through the LED 7. The LED 7 illuminates when the charging process 8 is active, providing a visual indicator 9.

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I/WE CLAIM

1. A smart battery balanced device (100) comprising:
    i. BD140 PNP Transistor (1);
    ii. TL431 Zenner reference (2);
    iii. 1N4007 Diode (3);
    iv. Potentiometer (4);
    v. LM317 (5);
    vi. Li-ion cell 3.7 V (6);
    vii. Bread board (7);
    viii. Resistors (1,330,10k) (8); and
    ix. LED (9);
2. A smart battery balanced device (100), as claimed in Claim 1, wherein the said invention is to charging circuit worked well, charging a battery from 3.8V to 4.11V;
3. A smart battery balanced device (100) as claimed in Claim 1, wherein the said invention is circuit kept a steady 4.2V output, and when the battery reached 4.16V, the LED lit up, indicating that charging was almost done;
4. A smart battery balanced device (100) as claimed in Claim 1, wherein the said the invention, the circuit automatically stopped sending power to the battery, preventing overcharging.

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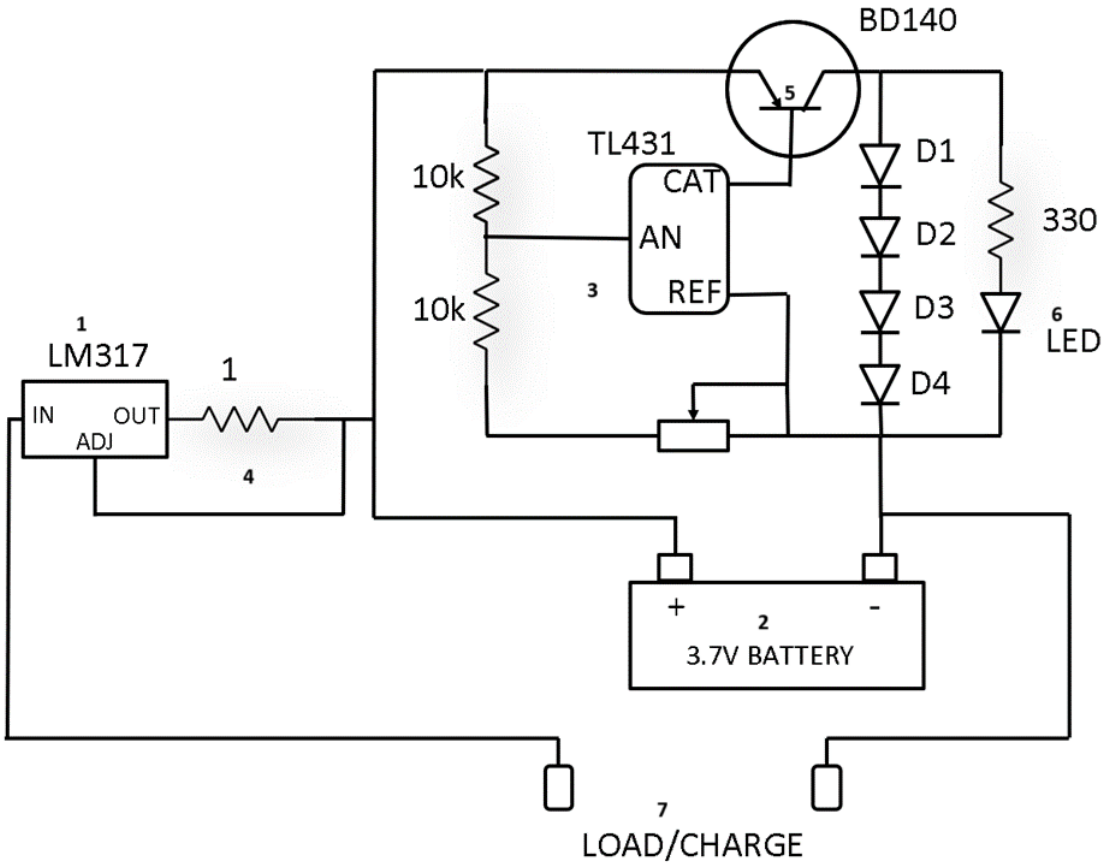

Fig 1.

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Sheet: 2

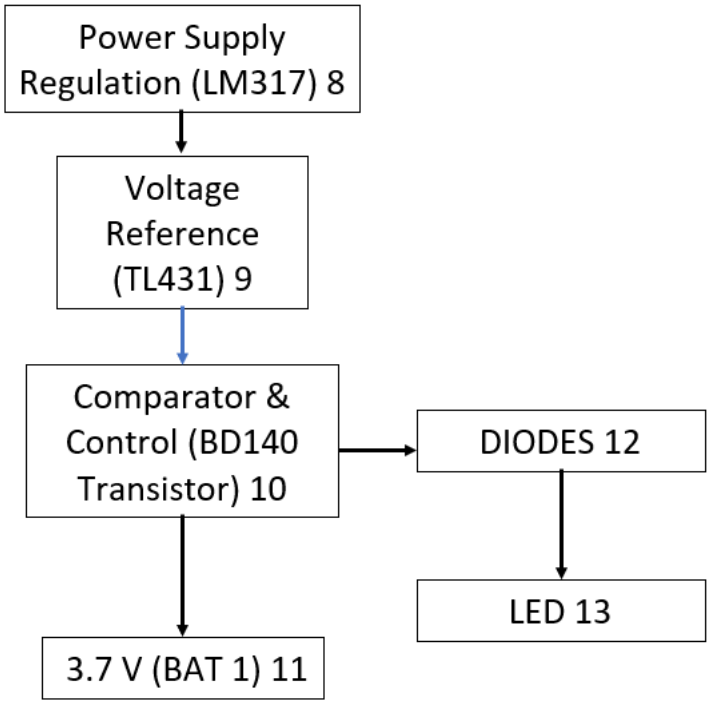

Fig 2.

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ABSTRACT OF THE INVENTION

This invention designed for charging a 3.7V battery 1. It employs a constant current charging method. Here's a breakdown of the circuit's components: LM317 voltage regulator 2 that ensures a steady and adjustable voltage supply to the charging system; 10k Resistors 3 are employed in the feedback loop of the LM317 and play a key role in determining the charging current; TL431 4 acts as a precise voltage reference, effectively setting the voltage at which the battery will be charged; BD140 transistor 10 functions as a switch, regulating the flow of charging current; D1, D2, D3, D4 diodes 8 are used for voltage reduction and to safeguard the LED[330 Resistor is to limits the current flowing through the LED 13. The LED 13 illuminates when the charging process 9 is active, providing a visual indicator 10.

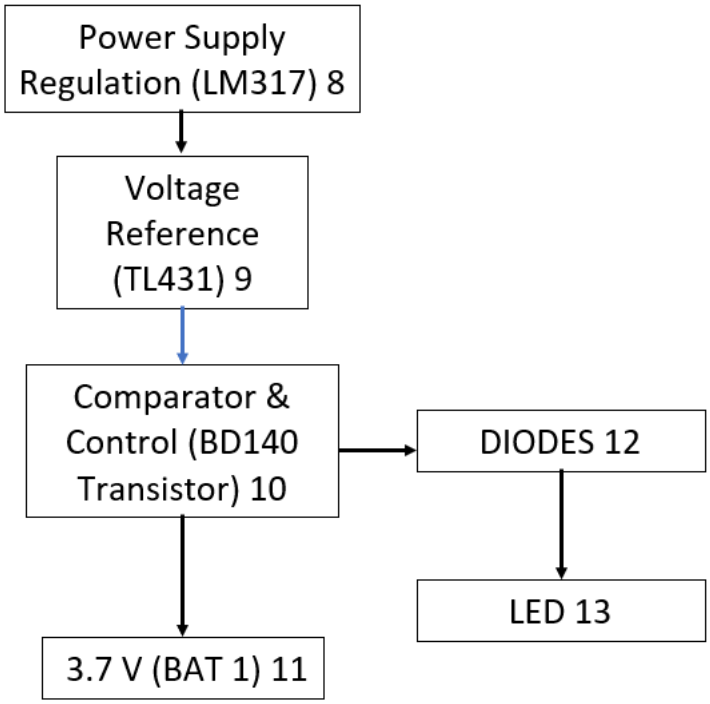

Fig.1.

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