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(54) Title: SMART BATTERY SWITCH FOR AUTOMATIC CHARGING AND EQUALIZATION DURING OFF-MODE

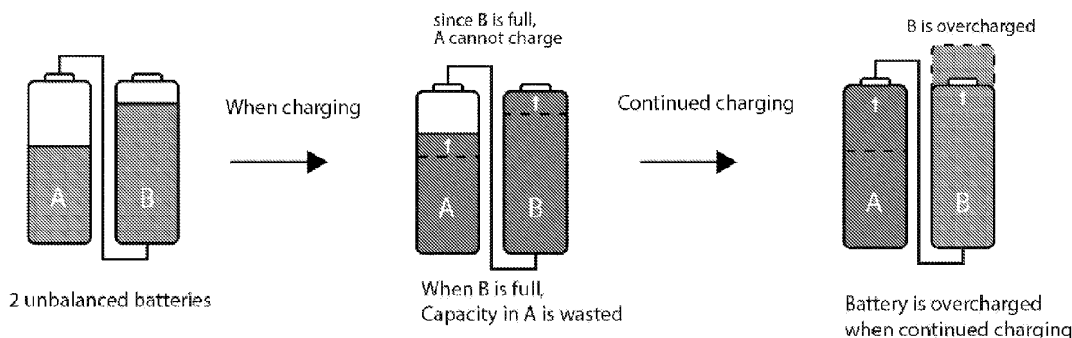


Fig. 1A illustrates problem faced by series-connected batteries during charging

(57) **Abstract:** An innovative smart battery switch enhances the affordability and reliability of sustainable energy. The core of this system is a smart switch capable of alternating between series and parallel modes. In the parallel off-mode, it automatically enables battery charging and cell equalization, thereby replacing complex and expensive battery management systems. This feature, coupled with the system's low voltage charging capability, significantly extends battery lifespan by minimizing cell stress. The integrated kinematic charger optimizes solar photovoltaic (PV) energy utilization, adapting efficiently to varying solar conditions. This charger not only improves solar energy conversion efficiency but also reduces the solar panel size requirement, making sustainable energy solutions more accessible. The system's adaptability, including variable voltage outputs and IoT compatibility, extends its applications to a range of devices, from LED lighting to electric vehicles, offering a cost-effective, sustainable approach to energy management.