

It is an object of at least one aspect of the present invention to provide a thermal storage system having integral means for predicting the charge state of batteries within an assembly.

It is an object of at least one aspect of the present invention to provide a thermal storage system having integral means for determination of relative energy levels within batteries within an assembly.

It is an object of at least one aspect of the present invention to provide a thermal storage system having integral means for protection of batteries within an assembly against over pressurisation. The Applicant has developed a novel and inventive thermal storage system comprising heat batteries having internal heat exchangers and PCMs wherein said system includes integral means for providing a variety of control measures including: overall system energy efficiency measures; measures of battery charging efficiency; determination of relative energy levels within batteries; and wherein said system provides protection of said batteries against over pressurisation.

Summary of the Invention

The Applicant has developed novel and inventive thermal storage system comprising heat batteries having internal heat exchangers and PCMs.

Accordingly to the first aspect of the present invention provides a thermal storage system comprising a thermal energy store containing a single or a plurality of battery casings having internal heat exchangers and phase change materials and means for controlling the operation of said thermal energy store,

wherein each of said battery casing independently contains a battery comprising one or more heat exchangers anchored within said casing, a phase change material and means for protection against over pressurisation of said battery, and

wherein said controlling means is provided by a one or a plurality of sensors for the measurement of temperature, and/or pressure, and/or power at one or multiple points within the system.

The controlling means may be an integral system controller.

The controlling means may be adapted to provide measurements of the charging and discharging circuit flow rates of said system via one or more power sensors.

The controlling means may be adapted to provide means for efficient charging of the individual batteries within the assembly via one or more input temperature sensors and one or more diverter valves.

The controlling means may be adapted to provide measurements of the energy stored within, and the power input of individual batteries within said system, and of the overall battery assembly via said one or more input temperature sensors.

The controlling means may be adapted to provide measurements of the energy delivered by each battery within the assembly and the residual energy in each of said batteries during discharging via one or more output temperature sensors.

The phase change materials within the system may be protected from contact with external contaminants or degrading components via the provision of sealed battery casings.