

A Portable High Temperature Heat Storage Device

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Abstract:

Portable high temperature heat storage devices have not found their way into remote communities in poor countries and other places where there is no power grid. Of the three kinds of thermal energy storage sensible heat storage is the most straight forward and is the most commercially available method out there while latent heat and thermochemical heat storage are less developed. This is because inexpensive and safe materials are used as heat storage media in sensible heat storage technologies. However, the problem with this technology is the low thermal conductivity of the heat storage material. In addition sensible heat storage technologies such as underground water tanks, packed rock bed units, and thermos flasks lack adequate heat trap designs to keep in and hold sensible heat for long periods of time for the energy to be extracted at constant temperatures. The fault lies in inadequate design optimization of thermal insulation structure of energy storage tanks in sensible heat storage devices. With these prevailing problems the sensible heat storage technology has not found its way into remote communities in poor countries and to other places where there are no power grids. This paper presents a simple renewable energy charged high temperature heat storage device which performs as a thermos flask but with a wide working temperature window. Duration of energy extraction from this device at constant temperature has been calculated to exceed 24 hours.