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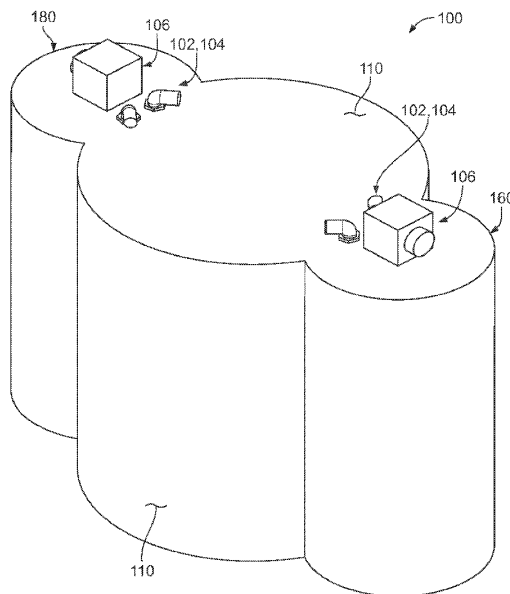


FIG. 1

(57) **Abstract:** Heat energy storage systems described herein can be used for long-term storage of large amounts of thermal energy. In some cases, such systems receive electrical energy from renewable energy sources such as solar or wind. Using novel techniques, the heat energy storage systems convert the electrical energy to thermal energy that is stored in hot materials such as molten silicon or any other material that can store large amounts of heat. The heat energy storage systems incorporate extremely good thermal insulation of the thermal energy storage tank that contains the hot materials. The systems are also configured to release thermal energy in an efficient manner to one or more electricity-producing steam turbines and/or to one or more industrial heating systems of manufacturing plants, using novel heat exchanger systems and techniques described herein. The energy storage systems described herein have higher overall real-world efficiencies than energy storage systems currently available.

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