Patents on compressed air energy storage

TES also has another key advantage: the cost. Ma has calculated sand is the cheapest option for energy storage when compared to four rival technologies, including compressed air energy storage (CAES), pumped ...

A compressed air energy storage (CAES) system is disclosed for the generation of power. The system may include a compressor configured to receive inlet air and output compressed air to ...

A hybrid compressed air energy storage system is provided. A heat exchanger 114 extracts thermal energy from a compressed air to generate a cooled compressed air stored in an air storage reservoir 120, e.g., a cavern. A heat exchanger 124 transfers thermal energy generated by a carbon-neutral thermal energy source 130 to cooled compressed air conveyed from ...

Energy storage technology is a key technology to solve the problems of small capacity and large load fluctuations in distributed energy systems, and it is of great significance for the development and improvement of power grid energy storage structure. [0003] Compressed air energy storage system is an energy storage technology widely used at ...

An adiabatic Compressed Air Energy Storage (CAES) system includes a low pressure compressor structure (14) to provide compressed air; a first heat exchanger (26) to extract ...

@article{osti_1531732, title = {High-efficiency liquid heat exchange in compressed-gas energy storage systems}, author = {Bollinger, Benjamin and Magari, Patrick and McBride, Troy O.}, abstractNote = {In various embodiments, efficiency of energy storage and recovery systems employing compressed air and liquid heat exchange is improved via control of the ...

A compressed air energy storage, regenerative technology, applied in engine functions, gas turbine devices, liquid variable capacity machinery, etc., can solve the problems of slow ...

technical field [0001] The invention belongs to the technical field of energy storage, and in particular relates to a gravity compressed air energy storage system and a working method thereof. Background technique [0002] In recent ...

The number of SCI literature and public patents (search by the US, European, and Chinese patent databases) ... compressed air energy storage and suspended weight gravity energy storage. 4th International Conference on Power, Energy and Mechanical Engineering (ICPEME 2020) (2020) Google Scholar [25] A. Emrani, A. Berrada, M. Bakhouya.

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In Germany, a patent for the storage of electrical energy via compressed air was issued in 1956 whereby "energy is used for the isothermal compression of air; the compressed air is stored and transmitted long distances to generate mechanical energy at remote locations by converting heat energy into mechanical energy." [5].The patent holder, Bozidar Djordjevitch, is ...

@misc{osti_1532111, author = {McBride, Troy O. and Bollinger, Benjamin R. and Bessette, Jon and Bell, Alexander and Kepshire, Dax and La Ven, Arne and Rauwerdink, Adam}, title = {Systems and methods for efficient two-phase heat transfer in compressed-air energy storage systems}, annote = {In various embodiments, foam is compressed to store energy ...

The present invention provides a compressed air energy storage power generation device including: an electric compressor configured to compress air using electric power; a pressure...

A compressed-air energy storage system according to embodiments of the present invention comprises a reversible mechanism to compress and expand air, one or more compressed air storage tanks, a control system, one or more heat exchangers, and, in certain embodiments of the invention, a motor-generator.The reversible air compressor-expander ...

Compressed air energy storage (CAES) is one of the many energy storage options that can store electric energy in the form of potential energy (compressed air) and can be deployed near central power plants or distributioncenters. In response to demand, the stored energy can be discharged by expanding the stored air with a turboexpander generator.

By then the patent application "Means for Storing Fluids for Power Generation" was submitted by F.W. Gay to the US Patent Office [3]. However, until the late 1960s the development of compressed air energy storage (CAES) was pursued neither in science nor in industry. ... Development of second generation CAES like hybrid, adiabatic or ...

In the realm of mechanical energy storage, it is clear that pumped hydroelectric (PSH), flywheel (FES), and compressed air energy storage (CAES) lead the way in patent publications. Of these, pumped storage hydroelectricity (PSH) is the dominant sub-sector, reflecting its established position in the market.

@article{osti_5382914, title = {Compressed air energy storage system}, author = {Ahrens, F W and Kartsounes, G T}, abstractNote = {An internal combustion reciprocating engine is operable as a compressor during slack demand periods utilizing excess power from a power grid to charge air into an air storage reservoir and as an expander during peak demand periods to feed power ...

Case docket: MULTIPLE CAVERN COMPRESSED AIR ENERGY STORAGE SYSTEM AND METHOD, 14/5,074 in U.S. Patent Application, last filing 01/22/2016, filed 09/13/2013.

Patents on compressed air energy storage

In the realm of Chinese patents, lithium-ion batteries and supercapacitors demonstrate significant growth, alongside other flourishing technologies such as compressed air and hydrogen energy storage, liquid ...

Compressed air energy storage is a promising technique due to its efficiency, cleanliness, long life, and low cost. This paper reviews CAES technologies and seeks to demonstrate CAES"s models, fundamentals, operating modes, and classifications. Application perspectives are described to promote the popularisation of CAES in the energy internet ...

Keywords: ACAES; thermomechanical energy storage; isobaric CAES; thermodynamic analysis 1. Introduction There are two heat-based categories of Compressed Air Energy Storage (CAES): sys-tems which use a supplementary heat input to heat the air prior to expansion, most often denoted Diabatic CAES (DCAES) systems; and systems which do not ...

Compressed air energy storage (CAES) is an effective solution for balancing this mismatch and therefore is suitable for use in future electrical systems to achieve a high penetration of renewable energy generation. This study introduces recent progress in CAES, mainly advanced CAES, which is a clean energy technology that eliminates the use of ...

There is described an energy storage system (300, 310) for storing energy in connection with a renewable energy generating facility (100). The energy storage system (300, 310) is operable to employ one or more of: (a) compressed air energy storage apparatus (300, 310) for storing energy generated by the energy generating facility (100), the stored energy ...

Research on the performance characteristics of an oil-free scroll expander that is applied to a micro-scale compressed air energy storage system Article Full-text available

At present, the commercialised large-scale physical energy storage technology mainly includes pumped water storage and compressed air energy storage (CAES). The former accounts for about 99% of the global 141 ...

It summarizes the technical point description of the patent document. This approach significantly enhances the efficiency of the compression and expansion processes, ...

An internal combustion reciprocating engine is operable as a compressor during slack demand periods utilizing excess power from a power grid to charge air into an air storage reservoir and ...

Compressed-air energy storage device and heat pump device Citations (4) * Cited by examiner, + Cited by third party; Publication number Priority date Publication date Assignee Title; ... 2009-03-16 RU RU2010139758/06A patent/RU2010139758A/en not_active Application Discontinuation;

Compressed air energy storage system is a promising solution in the energy storage field: it is characterized by

a high reliability, low environmental impact and a remarkable energy density. ... Four patents related to storage system based on liquid piston and scroll compressor/expander technology have been filed [19]. Enairys Powertech first ...

Energy storage system using supercritical air according to this invention runs compressors by use of low-cost off-peak electricity to pressurize air to supercritical state (at ...

FIG. 3 is a schematic configuration diagram showing the flow of water as a heating medium in the compressed air energy storage power generation device; and. FIG. 4 is a schematic configuration diagram of a compressed air energy storage power generation device showing a modified example of FIG. 3. MODE FOR CARRYING OUT THE INVENTION

WO2023228938 - COMPRESSED AIR ENERGY STORAGE METHOD. [Problem] To provide an economical compressed air energy storage (CAES) method for effectively ...

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