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DESCRIPTION WO2015108434A1

[0001]

METHOD AND DEVICE FOR OBTAINING THERMAL ENERGY BY PLASMA ELECTROLYSIS

[0002]

The invention relates to the field of electric power engineering, in particular to the conversion of electrical energy into thermal energy.

[0003]

A method and device for converting electrical energy into thermal energy are known (RU Patent No. 2355953). The method consists of creating low-temperature plasma and maintaining its combustion, and the combustion temperature is set and maintained by connecting to the network in a different sequence and different combinations of groups of electrodes.

The specified method is implemented using a device for converting electrical energy into thermal energy, made in the form of an electrode heating unit containing a housing equipped with a supply pipe, a group of electrodes placed in the housing, while at least five groups of electrodes are installed in the housing. When heated, as a result of plasma-electrochemical action on water, a cluster destruction of the structure of liquid water occurs and an increased coefficient of conversion of electrical energy into thermal energy is achieved. In the process of circulation and capture of make-up water, the water in the system, having passed through the heat exchanger, has time to restore its cluster structure, and the thermal cycle is repeated.

[0004]

A device is known (RU Patent No. 2258097) consisting of a dielectric cylindrical body with upper and lower covers inserted into the body by means of a thread, an anode located on a cylindrical dielectric rod having a lower lug, an axial hole and inserted by means of a thread into the axial hole of the cover, which together with the anode and the cylindrical dielectric rod is screwed by means of a thread into the body, a cylindrical cathode with an axial hole inserted by means of a thread into the cover, a gap between the end surfaces of the cylindrical dielectric rod and the cathode, pipes for the inlet and outlet of oxygen, a power source connected to the anode and cathode.

In the known device, the solution is fed into the anode cavity and, after passing through the dielectric gap, reaches the cathode, is heated in it and exits downwards through its axial hole.

[0005]

In addition, a thermal cell for a heating battery is known (RU patent NQ2457284), in which heating water from a power source in a pulsed electromagnetic field of a spiral anode allows for a reduction in energy costs for heating the solution circulating in the heating battery.

[0006]

The disadvantages of the listed technical devices for heating liquids are the high design complexity and energy consumption of the heating process, as well as the low productivity of heating elements using traditional mechanisms of known physical processes.

[0007]

Also known are a method and device for performing a highly efficient exothermic reaction (application NsWO/2009/125444), wherein the reaction occurs between nickel and hydrogen atoms at a high temperature (from 150° to 5000° C), while hydrogen is injected into a chamber containing pressed nickel powder under a pressure of 2 to 20 bar.

[0008]

The disadvantages of this method and device include their lack of efficiency, complexity and large dimensions.

[0009]

This invention was chosen as a prototype.

[0010]

The technical problem that the proposed invention is aimed at solving is to increase the efficiency of the method for converting electrical energy into thermal energy by using a new nuclear-physical phenomenon of cold transmutation of nuclei, as well as a simple in design and compact in size installation for implementing the developed method, which allows for the intensive conversion of water into steam.

[0011]

The achievement of the specified technical result in terms of the method is ensured by the fact that in a special electrolytic cell (vessel) with an aqueous solution of electrolyte, which is a salt or alkali of a certain concentration (see

Table 1-2), when applying a voltage of more than 300 V and a current of more than 1.0 A, a plasma discharge is created on the anode, ensuring the initiation and occurrence of low-temperature nuclear reactions in the near-anode water space of the electrolyte, leading to intensive energy release and intensive evaporation of the electrolyte water, while the electrolyte column is maintained at a constant level, and the function of the cathode is performed by the internal part of the electrolytic cell.

[0012]

In the part of the device, the claimed technical result is achieved by the fact that an anode 2 is placed in the center of a cylindrical vessel 1 with a diameter of more than 10 cm, made of a high-temperature material in the form of a rod with a diameter of 3 to 10 mm with a sharp tip immersed in an electrolyte 3 to a depth corresponding to the diameter of the rod, wherein the cathode 1 is the inner body of this vessel, and the outer body of the vessel 4 with a thickness of more than 1 cm is made of heat-resistant plastic, including the bottom 5 and its lid 6, with a thickness of more than 1

[0013]

15 cm.

[0014]

The diagram of the developed installation for implementing the method of converting electrical energy into thermal energy is shown in Fig. 1, where:

[0015]

I - inner body of the vessel;

[0016]

20 2 - anode made of a rod of high-temperature material;

[0017]

3 - electrolyte;

[0018]

4 - outer body of the vessel;

[0019]

5 - the bottom of the vessel;

[0020]

6 - vessel lid;

[0021]

25 7 - special power supply unit;

[0022]

8 - electrolyte level gauge in the housing;

[0023]

9 - water dispenser;

[0024]

10 - special hose for supplying tap water;

[0025]

I I - steam outlet pipe;

[0026]

zo 12 - external steam heating system hose;

[0027]

13 - plasma formation;

[0028]

The production of excess thermal energy using the device of this invention is achieved in the following manner.

[0029]

Electrolyte 3 of a certain concentration and volume is poured into the housing 1 of the device (hereinafter referred to as the heat generator, HG).

A special power supply unit 7 is connected to the TPG cover to the cathode 1 and anode 2, providing the required current and voltage. A level gauge 8 provides a certain level of electrolyte solution, and a dispenser 9 supplies water to this level via a special hose 10.

A hose 12 of the external steam heating system is placed on the branch pipe 1 1 for removing steam from the TPG.

[0030]

When voltage is applied to the thermal generator, a low-temperature plasma formation 13 is formed in the aqueous electrolyte solution and current flows in the surrounding electrolyte 3.

In this case, plasma is formed due to the blockage of the near-anode space with oxygen and subsequent discharge in this gas gap.

The OH- anions are accelerated in this discharge gap until they collide with the anode metal, receiving sufficient energy in the process - more than 100 eV. Within the framework of the ersion catalysis model (ECM) (Bazhutov Yu.N., Vereshkov G.M., Kuzmin R.N., Frolov A.M. // Collection of FPINVOF, TsNIIMash, 1990, 67-70; Bazhutov Yu.N., Vereshkov G.M. "New stable hadrons in cosmic rays, their theoretical interpretation and possible role in the catalysis of cold nuclear fusion" Preprint 1, TsNIIMash, 1990, p. -56) the nuclei of hydrogen and oxygen are the carriers of anyons.

An energy of 100 eV becomes sufficient for their release and entry into the anode metal, where they are converted into neutral ersion ions, which, in turn, are emitted into the near-anode water space.

When released into water, ersion ions on deuterium nuclei (H²) and oxygen isotope nuclei O¹⁷ mediate nuclear reactions of ersion catalysis in accordance with the IEC model. This releases significant thermal energy (approximately 10 kW at an electrolyte current of approximately A) from the nuclear reaction products (H¹, H³, O¹⁶, and O¹⁸), leading to intense water evaporation (>600% compared to standard heating elements).

[0031]

Tables 1-2 present data on the experimental testing of the proposed method and device on the Fakel-1, 2, 3 installations.

Table 1 Summary of experimental data for all 12 series at the Fakel-1 facility

[0033]

b

[0034]

Table 2 Summary of experimental data for 7 series at the facility

[0035]

Fakel-2.3

[0037]

In particular, in Table 1, in addition to all the main parameters, the intensity of quasi-neutrons measured on a neutron radiometer is presented, which, as it turned out, demonstrates the counting of neutral ersion. Checking the true neutron flux by the neutron activation method of an indium plate showed the absence of a neutron flux at a measurable level. At the same time, a gamma dosimeter showed the absence of excess radiation background on the surface of the installation. Table 2 presents data demonstrating the presence of excess heat, measured by the evaporation technique, in experiments with anodic plasma electrolysis in all series with a pronounced dependence of the systematic increase in excess heat on the increase in the concentration of the electrolyte. These

experiments also demonstrated the production of the isotope tritium, fluorine-20 in fluoroplastic and the generation of protons with an energy of 4 MeV inside a plastic scintillator in full accordance with the predictions of the ersion catalysis model (see Fig. 1 and 2). Thus, the proposed method and device in terms of obtaining thermal energy by the plasma method Electrolysis allows for a significant increase in the efficiency of converting electrical energy into thermal energy by using the new nuclear physics phenomenon of cold transmutation of nuclei, as well as simplifying the design and reducing the dimensions of the installation for implementing the developed method.