INSTALLATION FOR CLEANING FLUE GAS AND OBTAINING ELECTRIC ENERGY, INCLUSIVE QUANTUM INCINATOR

During the burning of natural fuels in thermal power plants, environmentally harmful ash and flue gases are released due to their incomplete combustion in the furnace chambers and the imperfection of the purification installations. Therefore, the problem of purifying CO_2 from sulfur and nitrogen oxides - remains unsolved.

Here we show graphically in Fig. 1 seven standard technological blocks of an electric thermal plant that burns coal:

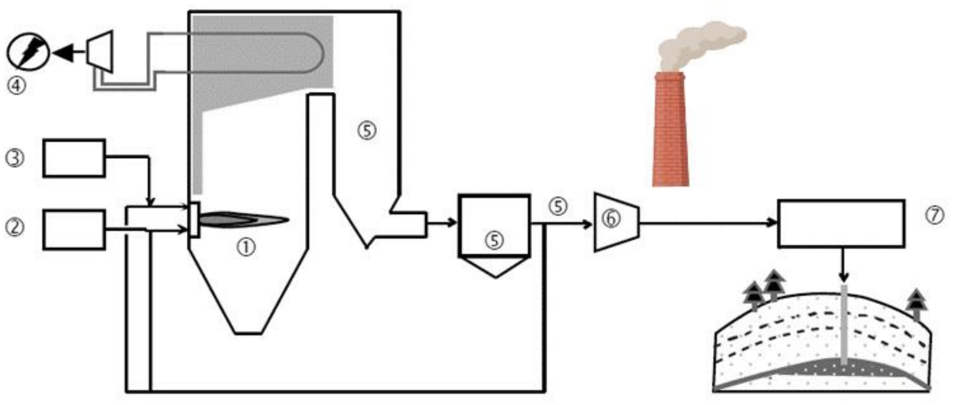


Fig. 1

1. *Fuel system of the unit*
2. *Coal block*
3. *Oxygen block (Cryogenic installation)*
4. *Power generation unit Unit for purification and recycling of* CO_2
5. *Block for compression and transport of* CO_2
6. *Storage block of* CO_2

On the one hand, the main drawback of the existing devices is the insufficient degree of utilization of the flue gases, and only a part of the harmful impurities. This is due to the fact that flue gases of cogeneration plants, as the main source of atmospheric pollution, contain carbon dioxide (CO_2 - 93% and 7% - the rest in descending order: sulfur dioxide, nitrogen oxides, carbon monoxide and soot, particulate matter, and often radioactive elements. At the same time, carbon dioxide gas (CO_2), making up the main percentage of the composition of flue gases, passes through the known devices practically without emission, pollutes the atmosphere and causes a greenhouse effect.

And here begins the conversation about quantum incinerators. Their place is at position 8 in fig.2, and their vocation is to invalidate position 7 - the landfill for processed waste, where unused material remains are buried.

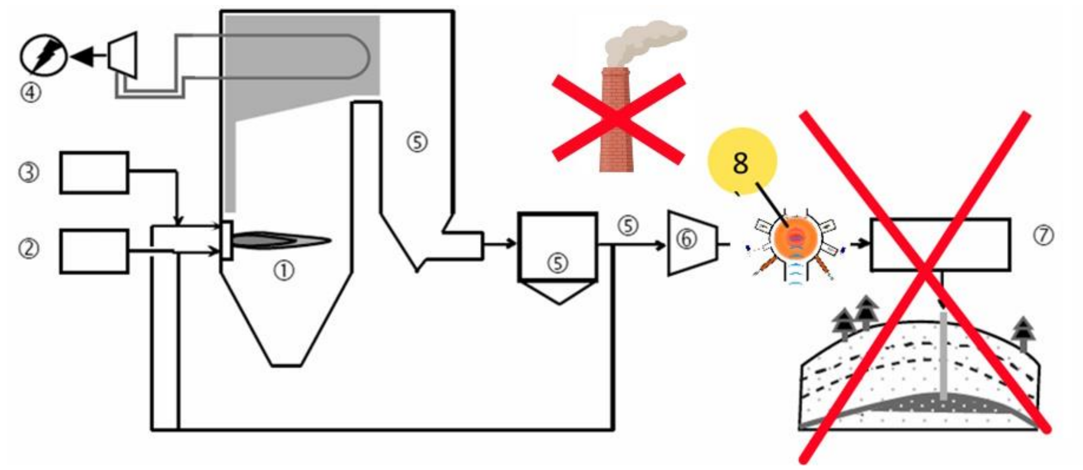


Fig. 2

Of interest is the intellectual property WO2010123391A1 of Alexander Alexandrovich Zvonov, Alexander Alexandrovich Basargin, Oleg Sergeevich Basargin. It is a flue gas utilization device presented in Fig.3.

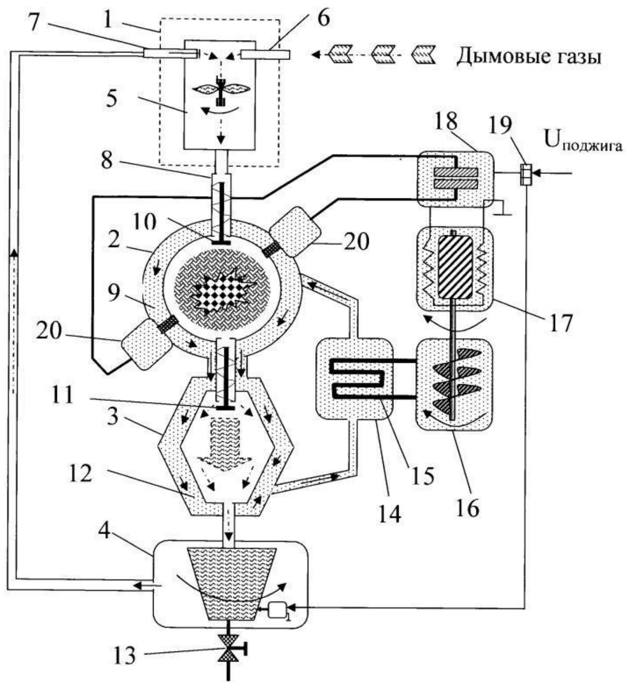


Fig. 3

1. Gas inlet
2. Gas reactor
3. Adiabatic cooler
4. Filter-ventilation block
5. Fan
6. Intake pipe
7. Pipe for gas receiver
8. Inlet pipe
9. Cooling shirt
10. Gas reactor inlet pipe
11. Pressure controlled valve
12. Cooling jacket of the adiabatic cooler
13. Shut-off valve for the filtered sludge
14. Heat exchanger
15. Pipeline for steam generation
16. Steam turbine
17. Electric current generator
18. Electrical energy storage device
19. Terminal box for low voltage
20. High voltage load input

The hazardous gas recycling unit contains a series-mounted hazardous gas intake, a gas reactor, a cooler, and a filter-ventilation unit. The gas reactor is constructed in the form of a metal container with double walls that form a cooling jacket. The cavities of the casings are connected by pipelines to each other and to the cavity of the heat exchanger, inside which a pipeline for generating steam is installed, connected to each other by a steam turbine. An electrical current generator is mounted on the turbine shaft, the input coils of which are connected to an electrical energy storage device. The charger is of the capacitive or inductive type and is connected through a low-voltage input to a terminal box for connections with external and internal consumers of electrical energy, and through a high-voltage output to the input of the excitation source. The source of excitation is designed in the form of an electromagnetic wave generator and/or electric discharger with an excitation frequency corresponding to one or more resonant frequencies of electromagnetic absorption of the gas reactant introduced into the reactor cavity.

The disadvantage of the known device is the degree of utilization of toxic gases, associated with the utilization of only part of the harmful impurities, as well as soot and unburned fuel particles. The purpose of the invention is to increase the degree of use of gases by burning them.

The next development is a further development of the above scheme is known by the initials RU2564121C2. Credit goes to Zvonov Alexander Alexandrovich (RU), Ostapenko Oleg Nikolaevich

(RU), Talalaev Alexander Borisovich (RU), Yagolnikov Sergey Vasilyevich (RU). It is about the so-called ***Molecular source of electricity.***

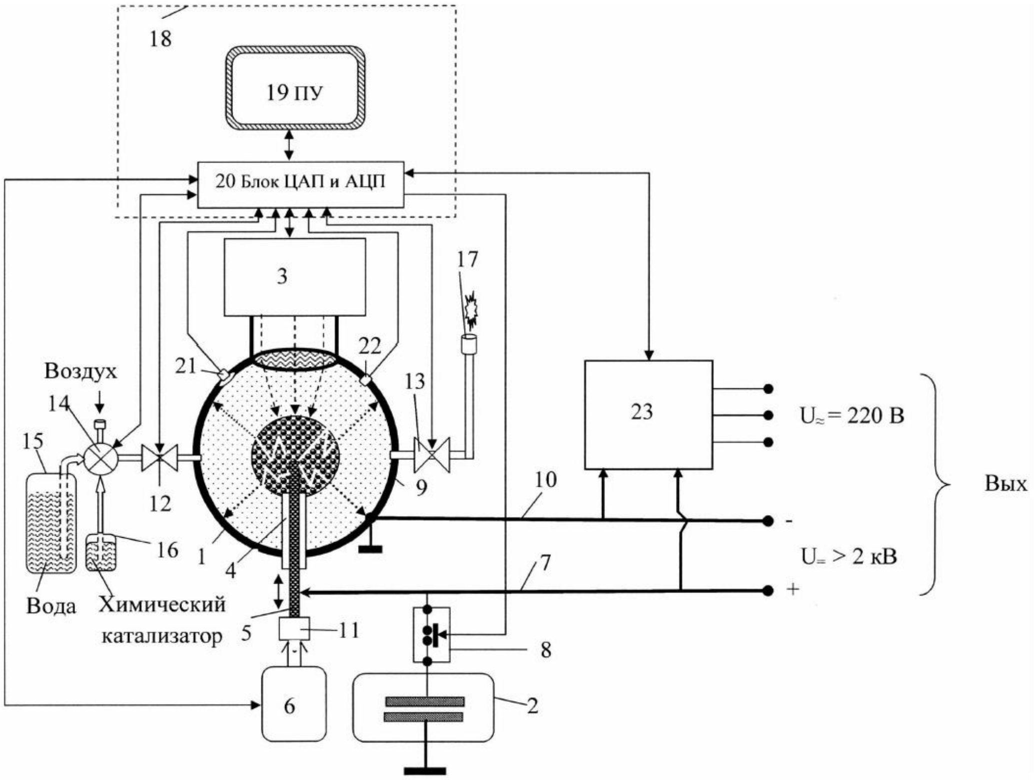


Fig. 4

1. *Electric discharge chamber*
2. *High-voltage storage device of electric energy*
3. *Plasma stabilizer*
4. *The dielectric sleeve*
5. *Movable electric discharge electrode*
6. *Reversible mechanism*
7. *Current collecting positive electrode (output bus)*
8. *Electronic key*
9. *Metal body*
10. *Negative output bus*
11. *Electrode holder*
12. *Electric valve*
13. *Electric valve*
14. *Carburetor (Mixer)*
15. *Water tank*
16. *Chemical catalyst tank*
17. *Flue gas inlet*
18. *Automation block*
19. *Control panel*
20. *Block with analog-digital and digital-analog converters*
21. *Quantum Object Sensor (Luminance Sensor)*
22. *Pressure sensor*
23. *Converter of direct voltage to alternating three-phase voltage*

The invention relates to AC and DC electrical power sources. The source shown in Fig.4 contains an electric discharge chamber 1 for activating the working substance and a device for activating the working substance, including a high-voltage storage device 2 of electric energy and a plasma stabilizer 3 in the working chamber 1. Chamber 1 is equipped with a heat-resistant dielectric sleeve 4, reaching the central part of the chamber 1. In the dielectric sleeve 4, a movable electric discharge electrode 5 is installed. Electrode 5 is kinematically connected to the reversing mechanism 6 and electrically - to the current-collecting positive electrode (output bus) 7 directly and through the electronic switch 8 - with the positive pole of the drive 2. The negative pole of the drive 2 is grounded and electrically connected to the metal body 9 of the working chamber 1 and to the collector electrode (negative output bus) 10. Electric buses 7 and 10 supply to the consumers of electric energy a constant high voltage and through a converter 23 of constant voltage to alternating three-phase voltage to consumers of alternating voltage.. Breaking the molecular bonds of hydrogen and oxygen in water, its decomposition (catalysis) to combustible components require significant energy costs. However, the use of chemical, electrolytic, electric discharge, photo, microwave catalysts and their combinations can reduce the cost of water dissociation to acceptable values and therefore synthesize a fuel from water that significantly exceeds the existing types of hydrocarbon fuel for thermal power plants (CHP). Similarly, flue gases from microwave catalysis can be decomposed into combustible components, including carbon monoxide and oxygen.

Although the specific heat (60 kJ / mol) released during the chemical reaction of combustion of the constituent flue gases is significantly lower than the specific heat (532 kJ/mol) of burning the constituents of water, the use of flue gases to generate electrical energy is of some interest. This is due to the increased ionization capacity of CO_2 gases (lower consumption of microwave energy for catalysis) and the possibility of additional production of electrical energy directly in the thermal power plant due to the energetically beneficial utilization of flue gases.

There are known sources of electrical energy using water vapor and flue gases as a working substance and based on pulsed microwave catalysis (resonant decomposition) of the working substance into combustible components with subsequent conversion of their energy from a chemical combustion reaction into thermal energy and then from thermal energy into electrical energy through electrodynamic or electromechanical conversion.

In addition, the electric discharge chamber for activating the working substance has a cooling jacket, equipped with water cooling pipes and a connection with a heat exchanger for generating heat energy for heating and hot water, as well as for generating steam for a steam dynamo (steam generator). The electrodes of the high-voltage accumulator of electrical energy are immovably fixed in the dielectric walls of the working chamber and are made in the form of tungsten metal rods with a discharge gap in the working chamber sufficient for the destruction of the working substance with the electric arc.

The disadvantage of the known molecular source of electrical energy is a relatively low resource of continuous operation (several hours), associated with insufficient strength of the chamber and the need for frequent replacement of burnt electrodes in it.

In this case, the electromagnetic wave generator is made with a wavelength equal to or a multiple of the Fraunhofer absorption line lengths of the working substance in the centimeter, millimeter and/or hard ultraviolet EMW range. The refractory electrode is made of tungsten and/or graphite, and the heat-resistant dielectric sleeve for it is made of porcelain and/or ceramic.

In addition, series-connected current-collecting electrodes are introduced to output the energy of direct voltage electric current and an electronic converter of direct voltage to three-phase alternating voltage, and a reversing mechanism is additionally introduced for the positive electrode, mounted movably in a heat-resistant dielectric sleeve fixed in the metal housing of the working chamber. The kinematic connection of the movable electrode with the reversing mechanism and the electrical connection with one of the collector electrodes, the other of which is connected to the metal housing of the working chamber, connected to the negative electrode of the electrical energy storage device, allow directly (without additional thermal transformations that reduce the reliability of the operational power source) to discharge electrical energy from an artificial ball lightning created inside the electrical discharge chamber housing, and automatically push the active end of the movable electrode into the electrical discharge chamber while burning without disassembling the electrical discharge chamber housing. The specified technical advantages allow to increase the reliability of the operation of the molecular source of electrical energy and the resource of its operation.

The control panel 19 is made in the form of a microcomputer equipped with a display with a touch control panel and a reprogrammable memory equipped with a program for initializing the ball lightning in the glow mode, separating electric charges in the formed plasma ball and stabilizing the glow plasma discharge mode from electromagnetic radiation. The plasma stabilizer 3 is made in the form of a power-controlled electromagnetic wave (EMW) generator connected to the working chamber through a corresponding waveguide.

The

molecular source of electrical energy works as follows.
According to the given program for initializing the molecular source of electrical energy, the control unit 18 switches the carburetor 14 to the "enrichment of the working mixture" mode, opens the valve 12 and closes the valve 13 of the electric discharge chamber 1. In this case, steam is formed in the carburetor 14 a gas mixture of the working substance containing the electrolyte "alcohol and water" in a ratio of 40:60%, with increased ionization capacity. Then the formed working substance enters the chamber 1 and the valve 12 is closed. After the chamber 1 is filled with the working substance, a signal for initializing the working substance is sent to the control input of the electronic switch 8 from the block 18. In this case, the potential difference sufficient for an electrical breakdown and initialization of an electric arc of the working substance in chamber 1 is supplied by the electric energy accumulator 2 or from a separate dynamo machine (not shown) through busbars 7 and 10 to electrode 5 and housing 9 of chamber 1. Under the action of the electric arc discharge in chamber 1, the working substance is ionized and under conditions of isolation from the external air environment (reduced relaxation) a long-lasting glow discharge plasma is formed. The data on the parameters of the plasma in terms of the brightness of the glow and the pressure in the chamber 1 are taken from the corresponding sensors 21 and 22 and are used by the block 18 to stabilize the plasma by controlling the quality of the working mixture in the carburetor 14, control of the radiation power of the EMV generator of the stabilizer 3, the temporary modes of operation of the valves 12 and 13, respectively, for supplying the working mixture and discharging the spent substance. At the same time, in order to prevent the rupture of the chamber 1, the control unit 18 controls (according to the speed of measurement of the readings of the pressure sensor 22) pressure surges exceeding the permissible ultimate strength of the walls 9 of the chamber 1 and with the help of the valve 13 releases excess pressure in chamber 1.
When the molecular source of electrical energy enters the operating mode from the central (region of positive charges) and peripheral (region of negative charges) parts of the chamber 1, a constant potential difference is output from the electrodes 5 and 9 and transmitted to the output buses 7 and 10 At the same time, the control unit 18, by means of an electronic switch 8, connects the electrical energy storage device 2 in parallel with the output buses 7 and 10. Capacitor 2 stores and stabilizes the output constant voltage on buses 7 and 10 and through converter 23 - alternating voltage (for the consumer of electrical energy with the current renewal of the working substance during consumption).

In our opinion, the flue gas utilization device has the following disadvantages:

1. The high voltage electrodes will wear out very quickly due to the strong erosion of the charges in the chamber
2. The inlet and outlet valves for the flue gases of the chamber work under very harsh conditions, which means that they wear out and fail quickly

3. During operation, the working chamber will become dirty very quickly to the point of clogging the inlet-outlet valves.

4. No rhythmicity of the processes is expected in case of partial blockage of any of the uncontrollable valves, etc.

5. It is not certain that in the adiabatic process of the flue gases in the second chamber after opening the outlet valves, the necessary temperature for burning the carbon atoms will be obtained. They receive lightning but do not excite it to reach temperatures high enough to burn the carbon atoms.

The above project has been improved, through the refinement under the number RU2573820C2 - Fig.5. Device name changed to: Ball Lightning Generating Device.

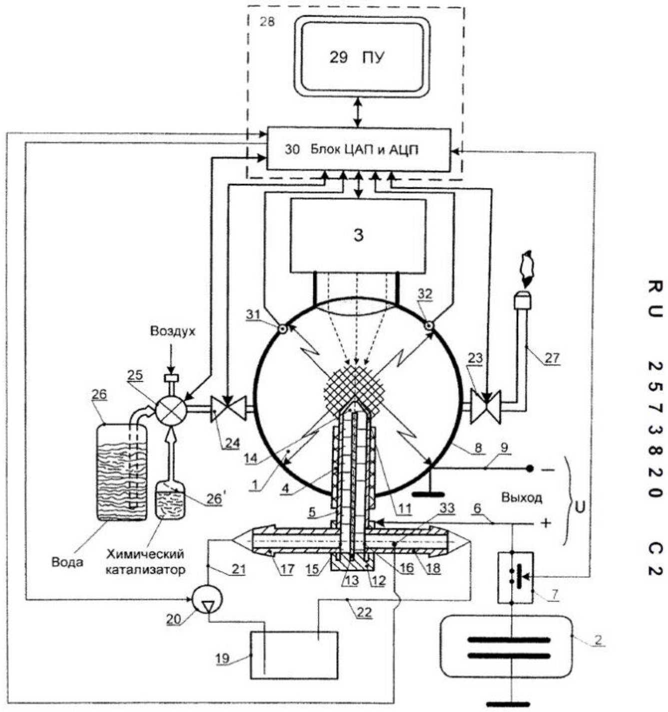


Fig. 5

We offer a QUANTUM INCINATOR - (Fig. 6), which not only eliminates shortcomings, but also provides additional electrical energy from:

1. Excitation of the quantum nucleus of a plasmasphere by an electric field
2. Excitation of the quantum core of a plasmasphere by a magnetic field

Fig. 6 shows that we create a PLASMOSPHERE - (24)(see ps), which we EXCITE ADDITIONALLY by means of:

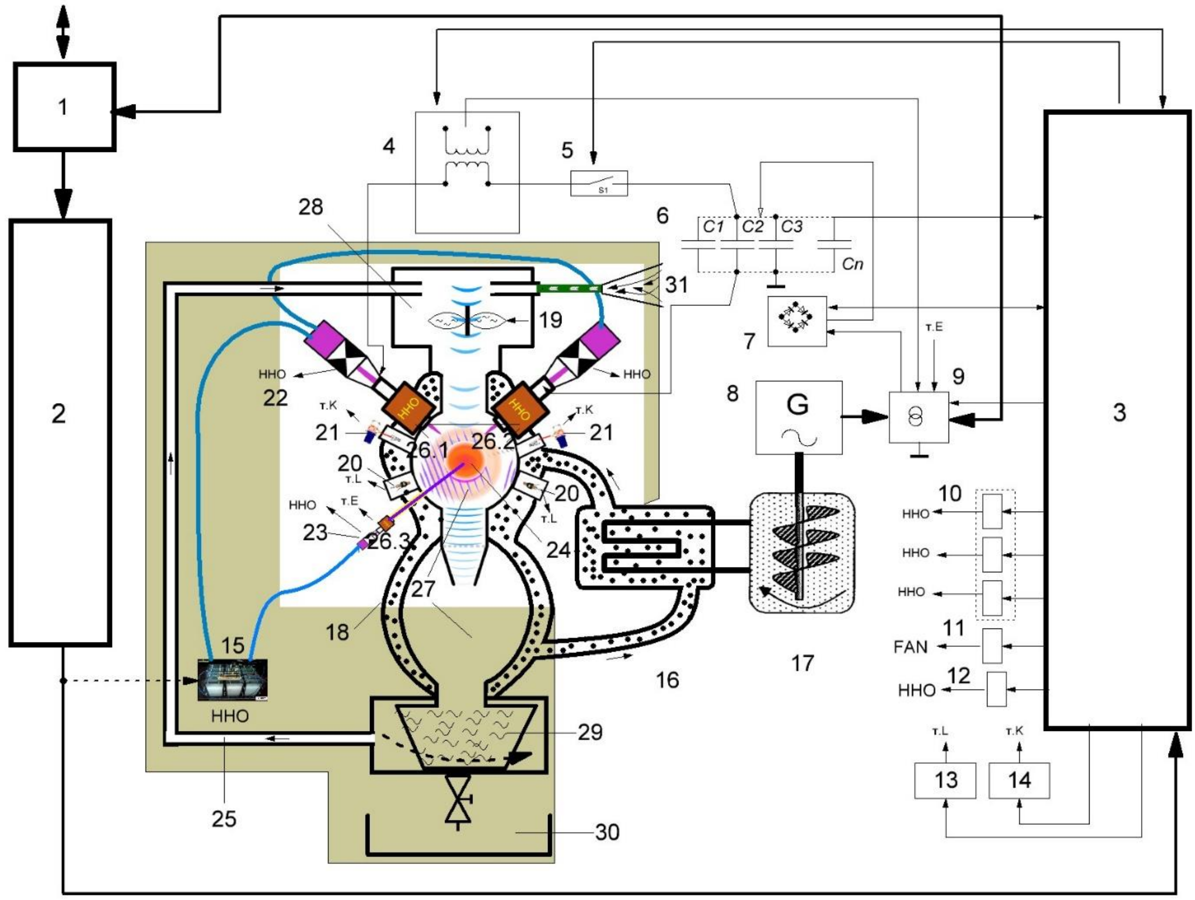
o Pulse magnetrons (21) – 3 pcs.

o Powerful pulses from a Capacitor battery (7) – controllable gas discharges from an HNO generator are used for electrodes

o Pressure increase in the working chamber created by a fan turbine (19)

Zab. The supply of HNO gas, in addition to providing excitation, sharply helps to further burn the carbon atoms.

Quantum incinerator (block diagram)



A legend

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2. Power supply unit
3. Controller
4. Transformer output
5. Switch
6. Capacitor battery
7. Controllable rectifier
8. Three-phase electric generator
9. Electrical collection unit
10. HHO valve control unit
11. Compression turbine control unit.
12. Block for controlling the LV generator.
13. Block for managing the base magnetrons.
14. Block for controlling the excitation magnetrons.
15. HHO generator
16. Steam generator
17. Steam turbine
18. Corps
19. Fan turbine
20. Basic magnetrons
21. Exciting magnetrons
22. Electric valves for oxyhydrogen gas on a magnetic loop
23. Electric valve for hydrogen oxygas on a current loop
24. Plasmasphere
25. Pipeline for unburned gases
26. Oxyhydrogen burners
27. Working chamber of two parts
28. Mixing chamber
29. Centrifugal filter
30. Container for solid residue
31. Flue gas inlet

Fig. 6

The purpose of the proposal is to extract and remove carbon dioxide and increase the utilization rate of the flue gases by passing them through an incinerator.

An example implementation of the utility model

The principle of operation of the installation for cleaning flue gases and obtaining electrical energy, including a quantum incinerator, is illustrated by means of the elements and devices included in it and the functions they perform.

Initially, in the working chamber 27 of the incinerator 18, the pressure is approximately 1.5 atm, and the temperature is approximately 600oC. The flue gases enter the mixing chamber 28, the revolutions of the fan turbine 19 increase, during which the pressure in the working chamber 27 of the incinerator 18 rises to 8-10 atm.

As the pressure increases, the excitation magnetrons 21 are simultaneously turned on and the electrical valves for hydrogen oxyhydrogen gas are opened for electrical excitation of the plasmasphere 22. The temperature of the plasmasphere rises sharply to a value of 5000°C-6000°C, depending on the operating mode, up to 10,000 °C. Under these conditions, the carbon burns and gases under pressure are driven towards the centrifugal filter 29, which passes, under certain conditions, residual product and clean air to an external container. The remaining flue gases, through pipeline 25, enter again into the mixing chamber 28. Exciting magnetrons 21 are switched off. The revolutions of the fan turbine 19 decrease and the pressure in the working chamber 27 decreases to about 2 atm. The base magnetrons 20 continue their operation and are not switched off during the entire operation process. When additional quantities of flue gases are introduced for cleaning, the cycle is repeated.

Excitation of the plasmasphere in the working chamber 27 of the quantum incinerator 18 is carried out by means of:

- Exciting magnetrons 21 - located on the periphery of the working chamber 27, immediately above the base magnetrons 20;
- Pulses from a capacitor battery 6, controlled gas discharges from the oxyhydrogen generator 15 are used as electrodes;
- Pressure increase in the working chamber 27, which is created by the fan turbine 19.

The supply of oxyhydrogen gas - participates in the process of excitation of the plasmasphere and helps to further burn the carbon atoms.

Residual gases - during operation, not all gases can be 100 percent processed, and therefore some of them are returned to the bypass for reprocessing, until the requirements of the centrifugal filter 29 are reached.

The quantum incinerator 18 consists of a working chamber 27 with a formed lower and upper part, and the plasmasphere is formed in the upper part. The body of the working chamber is made of stainless steel with high strength indicators, with a built-in water cooling jacket.

A mixing chamber 28 is installed above the quantum incinerator, into which the flue gases enter and mix with the residual combustion products, which are returned for reprocessing until they are completely burned.

The steam generator 16 is fed by the water cooling jacket built into the housing of the quantum incinerator 18 and creates steam for the steam turbine 17, which in turn drives a three-phase electric generator 8 producing three-phase current.

The commutator 5 is turned on before the supply of oxyhydrogen gas, which, upon contact with the plasmasphere, instantly transfers about 1-2 megawatts of electrical impulse from the capacitor battery.

The controllable rectifier 7 is connected to a synchronizing unit for an electrical network, which is an electrical collection unit 1 and is required for charging a capacitor battery 6.

In the oxyhydrogen generator 15, oxyhydrogen gas is created, necessary for the oxyhydrogen burners 26.1, 26.2, (mounted in the upper part of the incinerator above the base magnetrons 20 and the excitation magnetrons 21), and for the oxyhydrogen burner 26.3, mounted on the left side of the quantum incinerator housing, immediately below the base magnetrons 20.

The oxyhydrogen burners for magnetic circuit 26.1, 26.2 and the oxyhydrogen burner for current circuit 26.3 supply oxyhydrogen gas in portions, on the one hand performing the role of gas high-voltage

electrodes, and on the other hand, helping to completely burn the residual gases. The oxyhydrogen burners for a magnetic loop 26.1 and 26.2 are controlled by electric valves for oxyhydrogen gas for electric excitation of the plasmasphere 22 installed to them, and the oxyhydrogen burner for a current loop 26.3 is controlled by an electric valve for oxyhydrogen gas for a current loop 23 installed to it.
Exciting magnetrons 21 serve to excite the plasmasphere electromagnetically, by "piercing" part or all of the electronic layers of the different quantum levels of the plasmasphere.
Base magnetrons 20 maintain the plasmasphere in a continuous working state, and when they are turned off, the processes subside until the work process is completely extinguished.
The centrifugal filter 29 is an electromechanical filter installed on the lower base of the quantum incinerator 18 and its function is to remove the residual product after the combustion of the flue gases in the form of waste ash (graphite) and to release purified air that has passed a certain limit of the pressure of the working environment .
A waste container 30 is located immediately next to the centrifugal filter 29, where residual products that can be used as construction material accumulate.
The fan turbine 19 is installed in the mixing chamber 28 and provides the necessary working pressure in the upper part and the adiabatic process in the lower part of the working chamber 27 of the incinerator. The fan turbine 19 operates continuously in a controllable mode and programmatically changes its pressure at certain intervals, synchronized with the operation of the excitation magnetrons 21 and the base magnetrons 20.
The proposed installation, in addition to cleaning flue gases, is also used to obtain electrical energy, combining the following options:
- Obtaining electrical energy by electrical circuit;
- Obtaining electrical energy by magnetic loop;
- Obtaining electrical energy through a steam generator.

Each of the options can work independently, as well as in any combination.
To illustrate the method of obtaining electrical energy, which unites all three mentioned options, the following devices included in the installation presented in fig. 1:
- power distribution unit 1 - this unit is a synchronized input-output commutator of three-phase electricity. It powers the quantum incinerator 18 and at the same time "radiates" into the external electrical network three-phase energy obtained in the incinerator itself;
- power supply unit 2 - here the necessary voltages and currents are produced to power the oxyhydrogen generator 15 and the controller 3, through which the processes in the installation are managed and powered;
- controller 3 with a control program that, according to a certain algorithm, manages the work processes in the incinerator;
- output transformer 4, by means of which electricity is extracted along a magnetic loop;
- switch 5, which turns on or off the magnetic circuit for additional energy;
capacitor battery 6 - high-voltage capacitors, by means of which a charge of about 1-2 MW or more is transferred to excite the plasmasphere in the working chamber 27 of the quantum incinerator 18;
- controllable rectifier 7 - has the main function of charging the capacitor battery 6;
- standard three-phase electric generator 8 for obtaining electrical energy;
- electric collection unit 9 - here the electricity coming from the three-phase standard generator 8, from the magnetic loop of the output transformer 4 and from the electric loop is collected;
- electric valves for oxyhydrogen gas for electrical excitation of the plasmasphere 22 mounted on the oxyhydrogen burners for the magnetic loop 26.1 and 26.2 and electric valve for oxyhydrogen gas for the current loop 23 mounted on the oxyhydrogen burner for the current loop 26.3, which let in oxyhydrogen gas at certain times from the work process;
- fan turbine 19, which provides the necessary working pressure in the different phases of the work process;
- control unit of the oxyhydrogen generator 12 - monitors the state of the oxyhydrogen generator 15, if necessary changes the state of the electrolyte, regulates the productivity of oxyhydrogen gas or completely shuts down the production of oxyhydrogen gas;

- block for controlling the base magnetrons 13;

- unit for controlling the excitation magnetrons 14;

- oxyhydrogen generator 15 - produces oxyhydrogen gas;

- steam generator 16 - produces steam to drive the steam turbine 17;

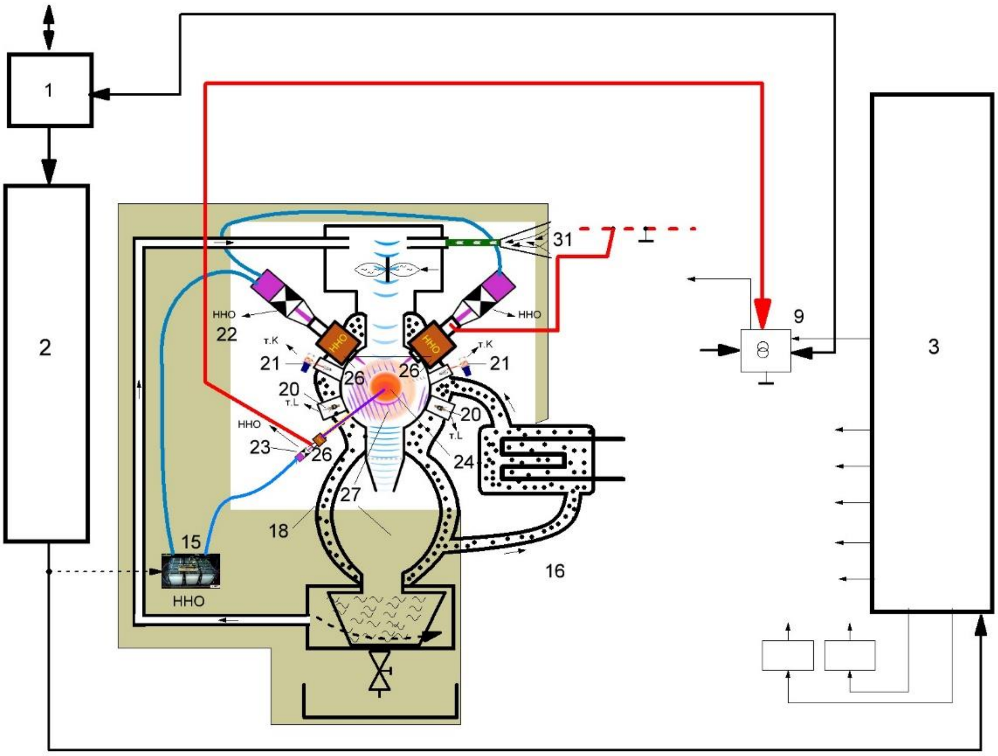
- steam turbine 17 - drives three-phase electric generator 8;

- fan turbine 19 to create a different pressure of the incoming gases.

Obtaining electrical energy along an electrical circuit is presented in fig. 7. This variant of ex

Obtaining electrical energy along an electrical circuit is presented in fig. 7. This embodiment is due to the fact that the plasmasphere represents at a certain moment the equivalent of a high-voltage spherical capacitor charged to 3,000 - 4,000 V.

Quantum incinerator
Application 1
(Electric loop)



A legend

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25. Pipeline for unburned gases
26. Oxyhydrogen burners
27. Working chamber of two parts
28. Mixing chamber
29. Centrifugal filter
30. Container for solid residue
31. Flue gas inlet

Fig. 7

Through the proposed installation, it is possible to transfer this charge to the electric collection unit 9. For this purpose, with the help of an electric valve for oxyhydrogen gas for the current circuit 23, oxyhydrogen gas is introduced under pressure, which in the conditions of an air envelope reaches the core of the plasmasphere and transfers positive high-voltage potential to the electric collection unit 9. The negative potential is transferred directly from the housing of the quantum incinerator 18. This additional electricity is processed by inverter circuits in a standard three-phase voltage synchronized with the standard transmission power grid.

Quantum incinerator
Application 2
(Magnetic loop)

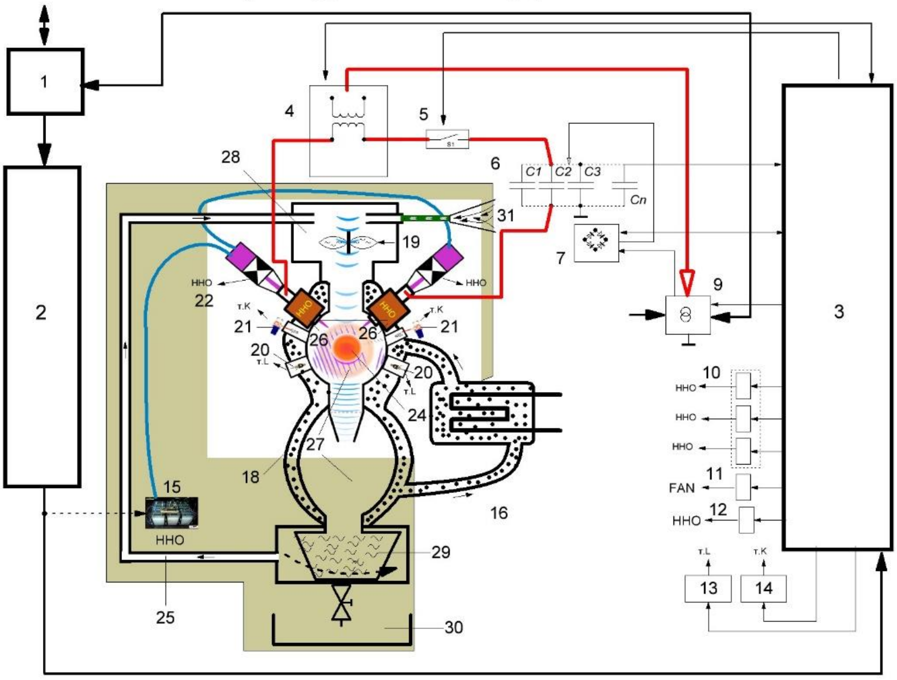

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Fig. 8

The production of electrical energy along a magnetic loop is presented in fig. 8. An important property of the plasmasphere is that it is effective only if it is brought to an excited state. One of the methods for this is the so-called electrical excitation, which is carried out with a powerful electrical impulse in the periphery of the plasmasphere and leads to the activation of quantum electrons from the inner layers of the plasmasphere, i.e. those located near the nucleus of the quantum object. Quantum electrons effectively extend the excitation pulse by at least 3-4 times the time. When the discharge circuit of the capacitor battery 6 does not pass through the quantum object plasmasphere, the discharge time is about 1 millisecond or varies depending on the specific structural elements and charge level. When the discharge current passes through the quantum object, it practically turns into a quantum power amplifier (an additional electric source appears in the sequential discharge circuit), which amplifies in amplitude and extends in time the real flowing current, in which the quantum excited current is added . This causes the process to take more than 4 milliseconds. This is additional power from the quantum process itself, which is supplied electromagnetically through the output transformer 4 (magnetic loop) to the electric collection unit 9 and further through an inverter circuit a three-phase current is obtained.

Obtaining electrical energy through a steam generator is presented in Fig.9

Quantum incinerator
Application 3
(Steam generator)

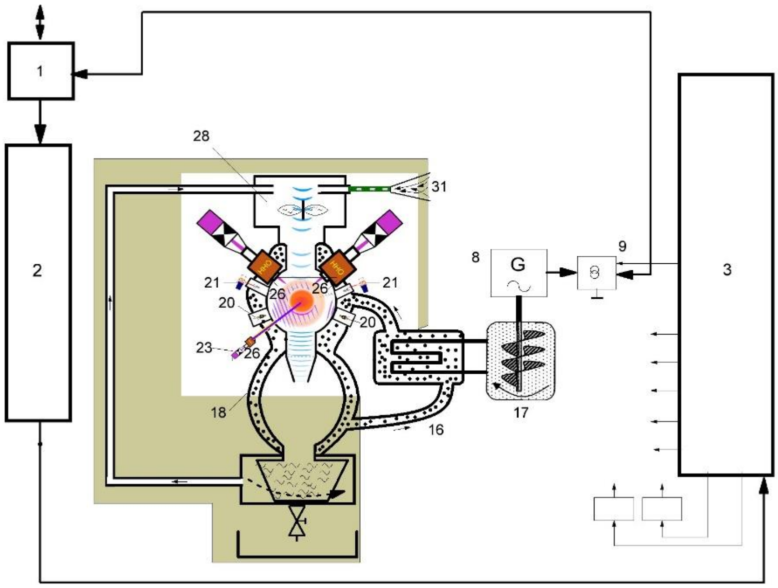

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Fig. 9

This variant of obtaining electrical energy is due to the conversion of the energy of the steam generator 16 into the mechanical rotation of a steam turbine 17 driving a three-phase electric generator 8. This energy is collected in the electrical collection unit 9 and is synchronized with the external power supply network.

CLOSING

In order to obtain a complete combustion of all residual harmful smoke, chemical and dust gases, we propose to place quantum incinerators at the final outlet of the gases, ensuring complete and harmless combustion, zero emissions and obtaining clean air, which will also be able to be used to significantly improve the thermal efficiency of individual facilities and of energy units as a whole:

At the exit of the incinerator there will be a 100% clean air jet with a high temperature of the order of 300°C to 1000°C and more, which can be regulated and controlled;
This heated air can be used to dry the coal, eliminating the need for turbine exhausts and increasing

turbine power by about 5% and efficiency. on the block;

Pre-drying the lignite from 60% initial moisture to less than 12% can bring an additional increase in efficiency. by another 2%;
The heated air stream will be used to improve the combustion process by feeding it into the powder burners, it will increase the parameters of the superheated steam and increase the efficiency. by about 1.5%
With the application of the system for cleaning the outgoing flue gases with a quantum incinerator, a real opportunity is created to optimize the costs of electrical and thermal power for own needs, and increase the efficiency. of energy blocks by about 1.5-2.5%;
By optimizing the combustion processes in the furnace chambers of the steam boilers, and using the quantum incinerators, it is possible not to place air heaters to the steam boilers, as well as not to build expensive cleaning installations.

This will enable coal to remain as an energy source for a long period, well into the future.

1. p.s. Plasmasphere. The plasmasphere is produced by rapid ionization of the medium, in which many nuclei merge into a single quantum nucleus, and the released electrons arrange themselves in quantum levels, similar to the Fermi levels of an ordinary atom. The resulting object is optimized in the form of a sphere, which is the figure that is reached with the least energy. The core of this sphere exists at the border of contact between the world and the anti-world, and in reality the annihilation turns it into a quantum point, which means that if we "touch" anywhere on this sphere, we are actually touching its entire surface. There is no space inside this sphere! It is a 2D object that is a quantum nucleus surrounded on all sides by a 3D electron cloud. The plasmasphere is a giant atom, during the creation of which a huge electromagnetic flux is produced, the peak being in the area of ultraviolet rays - in the range of 10 ÷ 400 nanometers; up goes the x-ray range and down goes the microwave range.
2.