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(54) Benævnelse: **FREMGANGSMÅDE TIL DRIFT AF ET KRAFTVÆRK TIL PRODUKTION AF ELEKTRISK ENERGI GENNEM FORBRÆNDING AF ET KULSTOFHOLDIGT BRÆNDSTOF OG TILSVARENDE SYSTEM TIL DRIFT AF ET KRAFTVÆRK**

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METHOD FOR OPERATING A POWER PLANT IN ORDER TO GENERATE ELECTRICAL ENERGY BY COMBUSTION OF A CARBONACEOUS COMBUSTIBLE, AND CORRESPONDING SYSTEM FOR OPERATING A POWER PLANT

The subject matter of the present invention is a method for operating a power plant for generating electrical energy for delivery to at least one consumer by combustion of a carbonaceous combustible, with carbon dioxide separation and a corresponding system for operating such a power plant.

Power plants for generating electrical energy by burning combustibles containing carbon have been known for a long time. It is assumed that the resulting carbon dioxide (CO_2) makes a significant contribution to the observed warming of the earth's atmosphere. In order to reduce the emission of carbon dioxide from fossil-fired power plants, efforts are being made in many countries to replace fossil energy, i.e. energy that is produced by burning fossil fuels such as coal, oil or natural gas, at least partially with renewable energies, for example from wind turbines, photovoltaic systems, the generation of electricity from biomass and/or from the use of hydropower. However, these energies fluctuate greatly and depend on environmental conditions, which can only be influenced to a limited extent. At the same time, grid stability in the power grid is of crucial importance, since changes in the grid frequency due to fluctuations in power generation can lead to failures and sometimes serious damage. This is particularly problematic when there are peak loads and/or a sudden reduction in the electrical energy fed into the corresponding power grid. In many countries, this has led to the decision to continue to generate at least part of the necessary energy from fossil fuels, at least for a certain period of time.

In order to reduce the resulting carbon dioxide emissions, it is also known to separate carbon dioxide from the flue gas of a fossil-fired power plant and either store or reuse the carbon dioxide produced. For example, it is known from DE 10 2010 010 540 A to combine a lignite-fired steam turbine power plant with a gas scrubber for separating carbon dioxide and to operate the gas scrubber and dry the lignite in such a way that part of the waste heat from the gas scrubber and/or drying is used to preheat the combustion air and/or the boiler feed water. Despite the efficiency increase described in this document, there is still a need to improve the overall efficiency of a fossil-fired power plant with subsequent carbon dioxide separation in order to further reduce the amount of carbon dioxide released into the atmosphere. Similar processes are known from DE 10

2011 013 922 A1 and US 2016/0237858 A1.
Proceeding from this, the object of the present invention is to at least partially overcome the disadvantages known from the prior art and in particular to achieve an improvement in the overall efficiency of a power plant with downstream carbon dioxide separation.
These objects are achieved by the independent claims. Dependent claims are directed to advantageous developments. It should be pointed out that the features listed individually in the dependent patent claims can be combined with one another in any technologically meaningful manner and define further refinements of the invention. In addition, the features specified in the claims are specified and explained in more detail in the description, wherein further preferred configurations of the invention are presented.
The method according to the invention is defined in claim 1.
A carbon-containing combustible is preferably understood to mean fossil fuels such as coal, in particular lignite or hard coal, crude oil and/or natural gas, and also biomass and residues such as tar, garbage and/or production waste. The design of a heat engine for generating electrical energy allows in particular an increase in the power output of the system of power plant and heat engine at peak loads. A heat engine can be started up quickly and can be controlled over a wide range with regard to the amount of electricity delivered, which does not apply to conventional fossil-fired power plants or only applies to a limited extent. This makes it possible to react quickly in the event of peak loads and/or a drop in the energy fed into a power grid, in particular from regenerative energy sources, in order to ensure grid stability.
At the same time, the generation of warm waste gas in the heat engine allows flexible use of the thermal energy contained therein to further increase the efficiency of the overall system consisting of power plant, carbon dioxide separation, fuel synthesis and, if necessary, other components such as fuel processing or fuel drying.
The heating of combustion air of a power plant is understood in particular to mean that the combustion air used in a furnace of the power plant, for example a pulverized coal furnace, is heated before it flows into the furnace. In this case, the heating can take place in an air preheater, which is operated, for example, by flue gas from the power plant and to which waste gas from the heat engine is now fed at least temporarily, so that the temperature and/or the volume flow of the mixture of flue gas and waste gas can be increased.
The heating of the process medium of the power plant is understood in particular as the heating of water, which is heated to generate steam by the furnace of the power plant and which, for example after flowing through the furnace as steam under pressure, is fed

to at least one turbine for expansion with simultaneous power generation.
Use in drying the fuel of the power plant is understood to mean that the waste heat from the waste gas of the heat engine is used in drying the fuel. This is particularly advantageous when considering a coal-fired power plant, since lignite in particular has to dry before it can be converted into electricity. In particular in the case of dust-fired power plants, drying can also comprise grinding. Even when generating electricity from biomass, it is advantageously possible to at least partially dry it using the waste heat from the heat engine before it is fed to the furnace.
Use in a carbon dioxide separation is understood in particular to mean that the waste heat serves as a heat source in such a carbon dioxide separation process. In particular in a cyclic absorption-desorption process, the waste heat can at least partially provide energy for heating a solvent flow, so that the input of other energy, for example via hot steam, can be reduced.
The measures mentioned each lead to a reduction in the energy that has to be supplied from other sources. This increases the overall efficiency of the overall system.
One embodiment is preferred in which the waste gas is fed to the flue gas of the power plant.
Flue gas and at least part of the waste gas are thus mixed. Since at least part of the waste heat is regularly removed from the flue gas to increase efficiency, the efficiency of the overall system can be increased in a simple manner, since the admixture of the waste gas allows the temperature of the mixture to be adjusted, preferably an increase in the temperature of the mixture, can be achieved and thermal use can take place in already existing facilities such as heat exchangers. The admixture to the flue gas is also preferably carried out after part of the waste heat of the waste gas has already been used for at least one of the processes a) to d).
In this context, it is preferred that the waste gas is fed to the flue gas before it is fed to at least one of the following processes:

i) heating the combustion air of the power plant;
ii) heating at least one process medium of the power plant; and
iii) carbon dioxide separation.

In principle, the process medium preferably comprises water and/or steam. Steam and water are regularly heated during circulation as the process medium by the furnace of the power plant, in order to drive at least one turbine to generate electricity through the pressurized steam generated, as a result of which the steam is expanded and, if necessary, at least partially condensed into water, which is then heated and evaporated again. By performing carbon dioxide separation to separate the carbon dioxide from the flue gas and the waste gas, a carbon dioxide cycle can be achieved since the carbon dioxide can be separated again from the waste gas produced by burning the fuel generated from the separated carbon dioxide.

By admixing at least a portion of the waste gas to the flue gas before the combustion air and/or process medium is heated, the efficiency of the corresponding process and thus the overall efficiency of the power plant can be increased.

According to the invention, the heat engine comprises a diesel engine and/or a petrol engine.

A diesel engine in particular has proven to be particularly efficient because on the one hand it can be operated with high efficiency and on the other hand the fuel dimethyl ether or methanol or mixtures comprising dimethyl ether and methanol, which are preferably synthesized from carbon dioxide, can be burned directly in it. In particular, the fuels methane and methanol can advantageously be burned in a gas engine, in particular a gas petrol engine or a gas diesel engine. In addition to a diesel engine, a petrol engine or a Stirling engine can also preferably be used as the internal combustion engine.

A method is preferred wherein the fuel comprises at least one of the following substances:

- methanol (CH_4O);
- methane (CH_4); and
- dimethyl ether (DME, C_2H_6O).

On the one hand, methanol and methane can be used as raw materials for the synthesis of other fuels. On the other hand, both methanol and methane can be burned directly in heat engines. DME is particularly preferred since DME is also available as a raw material for the synthesis of other substances and, moreover, burns with practically no soot. Compared to a power plant without the heat engine according to the invention, the method described here leads to an increase in overall efficiency and a reduction in carbon dioxide emissions as well as emissions of nitrogen oxides (NO_x) and soot. DME is preferably obtained via a catalytic conversion of carbon dioxide with (electrolytically generated) hydrogen.

Preferably, there is one embodiment in which the at least one consumer of the electrical energy is connected to the power plant via a power grid.

A preferred application of the present invention is the supply of a power grid, in which several electrical consumers are usually connected at least partially to the power plant for the purpose of power supply. During operation, the heat engine also feeds the generated electrical energy at least partially into the power grid.

Preferably, there is one method process, wherein the heat engine is operated based on the electrical load in the power grid.

In particular, this allows the heat engine to be switched on when a nominal output of the power plant is exceeded, i.e. a higher electrical power would have to be fed into the power grid than the power plant can nominally deliver, i.e. a peak load situation is present. Here, a pure (binary) activation of the heat engine can take place, but operation can also take place depending on the electrical load in the power grid, in which the power output of the heat engine takes place at least in some areas depending on the requested load in the power grid. The heat engine is therefore preferably operated in such a way that the electrical power it outputs is defined as a function of the electrical load in the power grid.

Preferably, there is also one method process, wherein the conversion of the carbon dioxide into fuel is operated based on the electrical load in the power grid.

A portion of the power provided by the power plant can then be used for synthesising the fuel when the load is below the nominal power of the power plant.

This allows the power plant to be operated in which the generation of the fuel and the operation of the heat engine are used to store and release energy.

Furthermore, according to the invention, a system is defined in claim 8.

The system preferably also comprises at least one mixer for mixing waste gas (from the heat engine) and a flue gas from the power plant.

The details and advantages disclosed for the method according to the invention can be transferred and applied to the system according to the invention and vice versa.

The method according to the invention and the system according to the invention allow a significant increase in the overall efficiency of the system compared to conventionally operated power plants with carbon dioxide separation or compared to synthesis installations for synthesizing a fuel from carbon dioxide from other sources, such as from the air.

The invention and the technical environment are explained in more detail below with reference to the figures. It should be pointed out that the invention should not be limited by the exemplary embodiments shown. In particular, unless explicitly stated otherwise, it is also possible to extract partial aspects of the facts explained in the figures and to combine them with other components and/or findings from other figures and/or the present description. The following are shown schematically:

Fig. 1 shows a system consisting of a power plant with carbon dioxide separation and a heat engine;

Fig. 2 shows an example of a carbon dioxide separator as part of a system for operating a power plant;

Fig. 3 shows an example of a drying installation as an optional element of a system for operating a power plant;

Figs. 4 to 8 show details of a power plant;

Fig. 9 shows an example of a power grid with consumers; and

Fig. 10 shows an example of a system with a power plant.

In the following, identical elements are provided with the same reference numerals. Figure 1 schematically shows a power plant 1. In this power plant 1, a carbon-containing fuel is burned, thereby generating steam, which in turn is used to generate electrical energy by expanding it via at least one turbine. The resulting flue gas from power plant 1 contains carbon dioxide. The power plant 1 is preferably a fossil-fired power plant, in which fossil fuels such as coal, in particular lignite or hard coal, oil and/or gas are burned, and/or a power plant for burning biomass. In this case, the configuration as a dry lignite-fired power plant is preferred. The diagram shown in Fig. 1 does not relate to the design of the power plant 1 as such, which is known; rather, Fig. 1 shows the thermal interaction of certain elements of the power plant 1 and other elements. In addition to the power plant 1, the overall system has a carbon dioxide separator 2 and a drying installation 3. The system shown also comprises a heat engine 4.

Various processes are known for carbon dioxide separation, for example a typical carbon dioxide separation process is based on what is known as amine scrubbing, in which the gas containing carbon dioxide (e.g. the flue gas from the power plant 1) is washed with an alkaline aqueous solution of amines, for example monoethanolamine (MEA), diethanolamine (DEA), methyldiethanolamine (MDEA), piperazine (PZ), aminomethylpropanol (AMP) and/or diglycolamine (DGA), and the carbon dioxide is separated from the gas by alternating absorption and desorption processes.

An example of a carbon dioxide separator 2 is shown schematically in Fig. 2, which corresponds to the prior art. The carbon dioxide separator 2 comprises an absorber 201 and a desorber 202. The flue gas 7 of the power plant 1 flows through the absorber 201. The waste gas 203, which essentially consists of nitrogen, leaves the absorber 201; the carbon dioxide was dissolved in a solvent, an aqueous solution of at least one amine, in the absorber 201. For this purpose, the absorber 201 is charged with a first solvent inflow 204, while a first solvent outflow 205 is discharged from the absorber 201. The first solvent inflow 204 is low in carbon dioxide, while the first solvent outflow 205 is rich in carbon dioxide. The first solvent inflow 204 is fed to the absorber 201 at a comparatively low temperature of about 40–60°C.

The first solvent outflow 205 is fed to a heat exchanger 206 which is designed as a countercurrent heat exchanger. The first solvent outflow 205 is heated in the heat exchanger 206 by heat exchange with a second solvent outflow 207. This second solvent outflow 207 thus leaves the desorber 202. The second solvent outflow 207 is also low in carbon dioxide, but is at a significantly higher temperature than the first solvent inflow 204 when it flows into the absorber 201. Consequently, the second solvent outflow 207 heats up the second solvent outflow 205 via the heat exchanger 206, which after heating is fed to the desorber 202 as the second solvent inflow 208. In the desorber 202, hot vapour (desorber vapour 212), which is generated from solvent in a reboiler 209, flows against the solvent flow. For this purpose, a partial flow of the solvent, which is drawn off in the desorber sump 214 of the desorber 202, is heated by steam 213, here low-pressure steam. At the resulting increased temperatures of the solvent, the solvent releases the carbon dioxide again, this is drawn off at the top of the desorber 202 as a carbon dioxide flow 210 and then cooled by a cooler 211 and sent for further use.

Fig. 3 shows an example of conventional drying for lignite in a drying installation 3. Raw lignite 301 is fed to a raw lignite bunker 302 and fed from there to a dryer 304 via various mills 303 as required. The dryer 304 is heated by steam 305, which gives off its heat to the lignite to be dried, which is finely ground in the mills 303, and leaves the dryer 304 again as condensate 306. The dried lignite, also referred to as dry lignite 307, is discharged from the dryer 304 via a cooler 308. After any subsequent grinding in a mill 309, the dry lignite 307 produced in this way can be put to further use, for example for firing in a power plant 1.

The vapours 310 arising in the dryer 304 are cleaned in a filter 311 of the lignite dust contained therein, which is also added to the dry lignite 307. After filtering, the vapours 310 are condensed in a vapour condenser 312 through which, for example, a process medium (boiler feed water) or combustion air flows, which are thereby heated. The resulting vapour condensate 313 is discharged. The vapour 310 can optionally be compressed via a vapour compressor 314.

Referring again to Fig. 1, the power plant 1 has heat sources, i.e. process areas, that provide heat or from which heat that can be used in other processes can be removed from a thermal perspective. In addition to the flue gas, which is not shown in Fig. 1, this involves, for example, a turbine 5 (see Fig. 1) by which a generator, not shown, is driven to generate electricity. The turbine 5, particularly in modern power plants 1, is often a combination of a high-pressure turbine, in which the steam generated is first expanded from a high pressure level to a medium pressure level, and at least one additional turbine connected thereto, for example a low-pressure turbine, in which the steam is expanded from a medium pressure level to a low pressure level or a combination of a medium-pressure and a low-pressure turbine.

The turbines each drive a generator to generate electricity. The steam present when leaving the turbine 5 is comparatively warm, in particular has a temperature of 100°C [degrees Celsius] to 300°C.

It is led to heat sinks, i.e. used in process steps that are endothermic, i.e. process steps that require the supply of thermal energy, which is supplied by the steam. This is necessary, for example, as part of carbon dioxide separation 2 in detergent regeneration 6. Alternatively or additionally, the steam can be fed to a drying installation 3. Another heat source in the system is, for example, the desorber vapour 212 of the carbon dioxide separator 2 (see description of Fig. 2 above), which can be supplied to heat sinks in the power plant 1, for example a process medium preheater 13, through which a process medium such as the feed water of the boiler of power plant 1 can be preheated, a condensate preheating or a preheating of the steam supplied to a high-pressure or low-pressure turbine. Alternatively or additionally, the desorber vapour 212 can be used to preheat the combustion air of the power plant 1 by supplying the desorber vapour 212 to an air preheater 11.

Further heat sources are, for example, the vapours 310 of the drying installation 3, depending on the use of a vapour compressor 314, as non-compressed vapours 17 or as compressed vapours 18. The corresponding vapour 310 can serve as a heat source, for example for preheating the feed water of the boiler of the power plant 1, for condensate preheating or for preheating the steam supplied to a high-pressure or low-pressure turbine. Alternatively or additionally, the vapour 310 can be used to preheat the combustion air of the power plant 1.

According to the present invention, the system further comprises at least one heat engine 4, which can increase the electric power output of the power plant 1 at times of increased load. This is a diesel engine and/or a petrol engine. This heat engine 4 is operated with a fuel that is generated from the carbon dioxide, which is separated in the carbon dioxide separator 2 and then converted into a fuel, for example DME.

The combustion of the fuel produces a waste gas 8, which also represents a heat source, at least part of the thermal energy of the waste gas 8 being used in at least one of the described processes a) to d).

Fig. 4 shows a schematic detail of a power plant 1 with a furnace 9 in which pulverized coal is preferably burned. A boiler system (not shown) for generating and, if necessary, at least temporarily superheating steam is operated by the furnace 9. To increase the efficiency of the power plant, combustion air 10 that is to be fed to the furnace 9 is heated. For this purpose, an air preheater 11 is formed, which includes a heat exchanger, via which the combustion air 10 is usually heated via a heat exchange with the flue gas 7 of the power plant 1. According to the present invention, waste gas 8 from the heat engine 4 is mixed with the flue gas 7 upstream of the air preheater 11 at least temporarily. This causes an increase in the efficiency of the power plant 1 by increasing the temperature of the combustion air 10 reached in the air preheater 11.

Fig. 5 shows an alternative situation in which the air preheater 11 is operated exclusively with waste gas 8 from the heat engine 4. A mixing device, not shown here, is preferably formed, through which the waste gas 8 is mixed with the flue gas 7 and the mixing ratio between the flue gas 7 and the waste gas 8 can be varied.

Fig. 6 schematically shows a further section of a power plant 1 which is designed as a coal-fired power plant with pulverized coal firing as the furnace 9. A drying installation 3 is formed here, which is basically designed, for example, as shown in Fig. 3. Reference is made to the statements made about this figure. The corresponding dryer 304 is usually operated with steam 305. According to the invention, the corresponding dryer 305 can be operated at least partially with waste heat 12 which, for example, is transferred from the waste gas 8 of the heat engine 4 to the steam 305 in a heat exchanger (not shown). The waste gas 8, which has been slightly cooled in the heat exchanger, can be fed to the flue gas 7 in particular upstream of an air preheater 11. As a result, the efficiency of the entire power plant 1 is increased.

Fig. 7 schematically shows a further detail of a power plant 1 with a furnace 9. Furthermore, a process medium preheater 13 is formed, by means of which a process medium 14, for example water and/or steam, can be warmed up and/or superheated before it is passed through the furnace 9. For this purpose, the process medium preheater 13, which is designed here as a heat exchanger, is simultaneously flowed through by the waste gas 8 of the heat engine 4, so that the waste heat 12 of the waste gas 8 is used to heat the process medium 13. In addition, the waste gas 8 cooled in this way can then be added to the flue gas 7 of the power plant upstream of an air preheater 11. This allows significant increases in the overall efficiency of the power plant 1 to be achieved.

Fig. 8 schematically shows a detail of a carbon dioxide separator 2 of a power plant, such as the carbon dioxide separator 2 shown in Figure 2. Reference is made to the statements made there. A reboiler 209 is also provided here, by means of which the solvent in the desorber 202 is heated. In addition, the reboiler 209 is also at least partially heated here, at least at times, by waste heat 12 from the heat engine 4. For this purpose, a heat exchanger (not shown here) is preferably formed, through which at least part of the waste heat 12 is transferred from the waste gas 8 to the steam 213, for example. The waste gas 8 cooled in this way can then, for example, be mixed with the flue gas 7 of the power plant 1 upstream of an air preheater 11 and/or a process medium preheater 13. As a result, the overall efficiency of the power plant 1 can be increased.

Fig. 9 shows very schematically a power plant 1 which is connected to a power grid 15 with a number of consumers 16. In principle, it is possible, based on the carbon dioxide separated from the flue gas 7, to carry out energy storage at times of reduced load on the power grid 15 by synthesizing and storing a fuel such as DME from the carbon dioxide. If the load on the power grid 15 rises above a nominal value, then this fuel is burned in the heat engine 4 to generate electricity. If the waste gas 8 is now mixed with the flue gas 7 of the power plant 1 as described above and this is done upstream of the carbon dioxide separator 2, the carbon dioxide in the waste gas 8 of the heat engine 4 can be at least partially separated out again, so that a carbon dioxide cycle can be created which, on the one hand, reduces carbon dioxide emissions and, on the other hand, enables a further increase in the overall efficiency of power plant 1.

Fig. 10 schematically shows a system 100 for operating a power plant 1, in particular proposed according to the method according to the invention, comprising the power plant 1, a carbon dioxide separator 2 and a synthesis installation 101 for synthesizing a fuel from carbon dioxide. The flue gas 7 is fed to the carbon dioxide separator 2. The carbon dioxide 19 separated there is fed to the synthesis installation 101. The fuel 20 synthesized in the synthesis installation 101, for example DME, is stored in a store 102. The system 100 also comprises a heat engine 4 through which the fuel 20 can be combusted to generate electrical energy and waste gas 8. The waste gas 8 can be fed to a mixer 103 in which it can be mixed with the flue gas 7 directly downstream of the power plant 1 and/or with the flue gas 7 after leaving the carbon dioxide separator 2. The waste gas 8 can also initially serve as a heat source in the carbon dioxide separator 2 and then be fed into the mixer 103. The mixer 103 is preferably also operated in such a way that the mixture of flue gas 7 and waste gas 8 is finally fed to the carbon dioxide separator 2 for separating the carbon dioxide.

The power plant 1 is supplied with dry lignite 307 from a drying installation 3 which is burned with combustion air 8. The combustion air 8 is heated in an air preheater 11, which is at least partially heated with flue gas 7 and/or waste gas 8 which is discharged from the mixer 103. Furthermore, a process medium 14 such as water is supplied to the power plant 1 via a process medium preheater 13. In the process medium preheater 13, the process medium 13 is preheated at least partially via flue gas 7 and/or waste gas, which is discharged from the mixer 103. The waste gas 8 can alternatively or additionally be passed through the drying installation 3 before it flows into the mixer 103.

With the method according to the invention and the system 100 according to the invention, an increase in the overall efficiency of the system 100 and of the power plant 1 is possible, so that carbon dioxide emissions can be effectively saved. This can be intensified if at least a partial carbon dioxide cycle is achieved in which the waste gas 8 is mixed back into the flue gas 7.

List of reference numerals

1	Power plant
2	Carbon dioxide separator
3	Drying installation
4	Heat engine
5	Turbine
6	Detergent regeneration
7	Flue gas
8	Waste gas
9	Furnace
10	Heating combustion air
11	Air preheater
12	Waste heat
13	Process medium preheater
14	Process medium
15	Power grid
16	Consumer
17	Non-compressed vapours
18	Compressed vapours
19	Carbon dioxide
20	Fuel
100	System
101	Synthesis installation
102	Store
103	Mixer

201 Absorber
202 Desorber
203 Waste gas
204 First solvent inflow
205 Second solvent outflow
206 Heat exchanger
207 Second solvent outflow
208 Second solvent inflow
209 Reboiler
210 Carbon dioxide flow
211 Cooler
212 Desorber vapours
213 Steam
214 Desorber sump
301 Raw lignite
302 Raw lignite bunker
303 Mill
304 Dryer
305 Steam
306 Condensate
307 Dry lignite
308 Cooler
309 Mill
310 Vapours
311 Filter
312 Vapour condenser
313 Vapour condensate
314 Vapour compressor

FREMGANGSMÅDE TIL DRIFT AF ET KRAFTVÆRK TIL PRODUKTION AF ELEKTRISK ENERGI GENNEM FORBRÆNDING AF ET KULSTOFHOLDIGT BRÆNDSTOF OG TILSVARENDE SYSTEM TIL DRIFT AF ET KRAFTVÆRK

Patentkrav

1. Fremgangsmåde til drift af et kraftværk (1) til produktion af elektrisk energi til levering til mindst én forbruger (16) gennem forbrænding af et kulstofholdigt brændstof, hvor der udskilles kuldioxid (19) fra røggassen (7) i kraftværket (1), hvor den udskilte kuldioxid (19) i det mindste delvist omdannes til et brændstof (20), hvor brændstoffet (20) i det mindste periodisk forbrændes i mindst én varmekraftmaskine (4) under dannelse af en spildgas (8), hvor der ved hjælp af varmekraftmaskinen (4) produceres elektrisk energi, der leveres til mindst én forbruger (16), hvor i det mindste en del af varmeenergien fra spildgassen (8) anvendes i mindst én af de følgende processer:
   a) opvarmning af en forbrændingsluft (10) i kraftværket (1);
   b) opvarmning af et procesmedium (14) i kraftværket (1);
   c) tørring af brændstoffet i kraftværket (1) og
   d) udskillelse af kuldioxid, kendetegnet ved, at varmekraftmaskinen (4) omfatter en dieselmotor og/eller en benzinmotor.

2. Fremgangsmåde ifølge krav 1, ved hvilken spildgassen (8) tilføres til røggassen (7) i kraftværket (1), særligt inden denne tilføres mindst én af de følgende processer:
   i) opvarmning af forbrændingsluften (10) i kraftværket (1);
   ii) opvarmning af mindst ét procesmedium (14) i kraftværket (1) og
   iii) udskillelse af kuldioxid.

3. Fremgangsmåde ifølge et af de foregående krav, ved hvilken procesmediet (14) omfatter vand.

4. Fremgangsmåde ifølge et af de foregående krav, ved hvilken brændstoffet (20) omfatter i det mindste et af de følgende stoffer:
   - metanol (CH_4O);
   - metan (CH_4); og

- dimetylæter (DME, C_2H_6O).

5. Fremgangsmåde ifølge et af de foregående krav, ved hvilken den i det mindste ene forbruger (16) af den elektriske energi er forbundet med kraftværket (1) via et elforsyningsnet (15).

6. Fremgangsmåde ifølge krav 5, ved hvilken varmekraftmaskinen (4) drives afhængigt af den elektriske belastning i elforsyningsnettet (15).

7. Fremgangsmåde ifølge krav 5 eller 6, ved hvilken omdannelsen af kuldioxid (19) til brændstof (20) udføres afhængigt af den elektriske belastning i elforsyningsnettet.

8. System (100) til drift af et kraftværk (1), der omfatter
kraftværket (1),
et kuldioxidudskillelsesanlæg (2),
et synteseanlæg (101) til syntese af et brændstof (20) af kuldioxid (19),
hvor der er udformet en varmekraftmaskine (4), ved hjælp af hvilken brændstoffet (20) kan forbrændes i forbindelse med produktion af elektrisk energi og spildgas (8), hvor varmekraftmaskinen (4) i det mindste periodisk kan forbindes termisk med mindst ét af de følgende elementer til overførsel af i det mindste en del af spildvarmen fra spildgassen (8):
A) en luftforvarmer (11) til opvarmning af en forbrændingsluft (10) i kraftværket (1);
B) en procesmedieforvarmer (13) til opvarmning af et procesmedium (14) i kraftværket (1);
C) et tørringsanlæg (3) til tørring af brændstoffet i kraftværket (1) og
D) kuldioxidudskillelsesanlægget (2), kendetegnet ved, at varmekraftmaskinen (4) omfatter en dieselmotor og/eller en benzinmotor.

9. System ifølge krav 8, der desuden omfatter mindst én blandeanordning (103) til blanding af spildgas (8) og en røggas (7) i kraftværket (1).

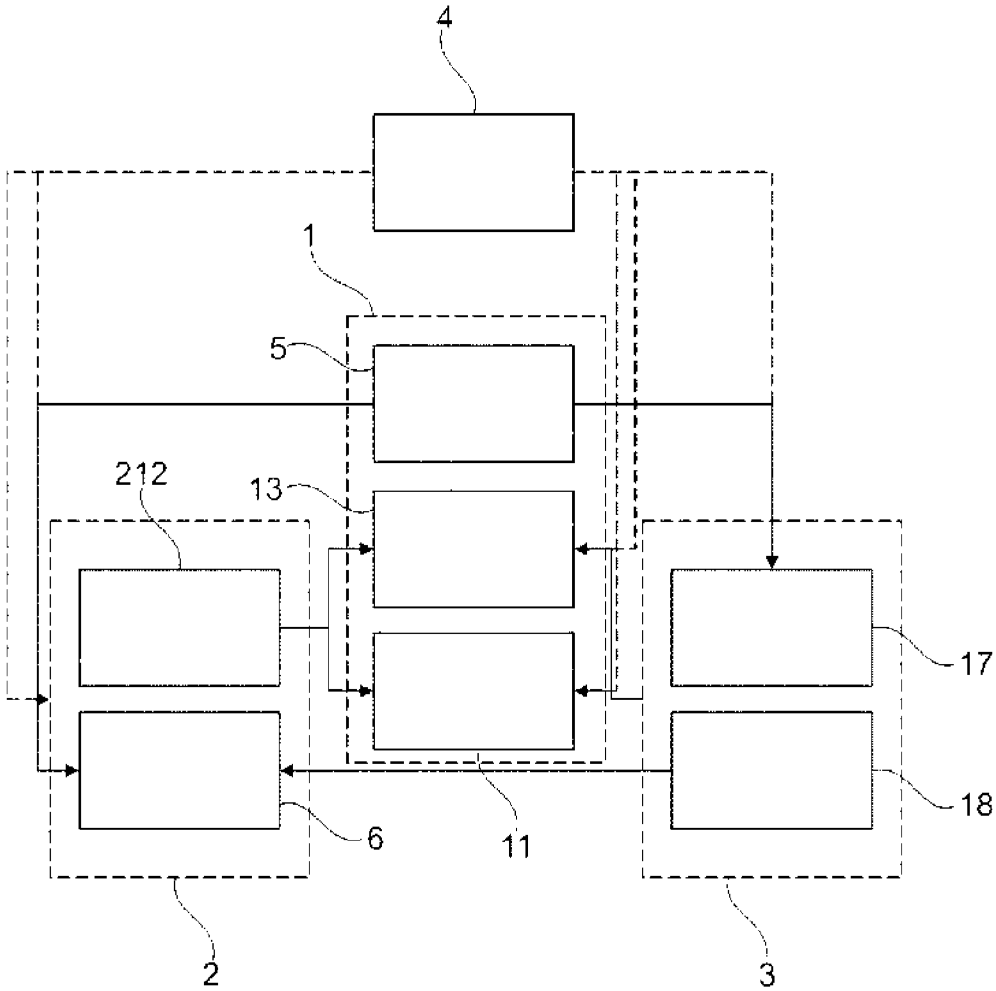

Fig. 1

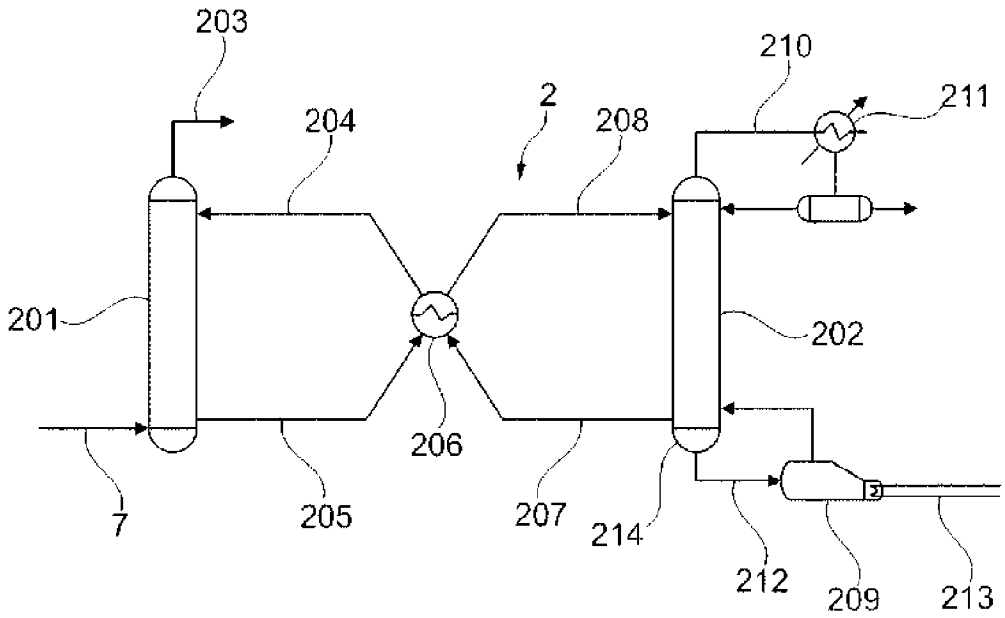
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Fig. 2

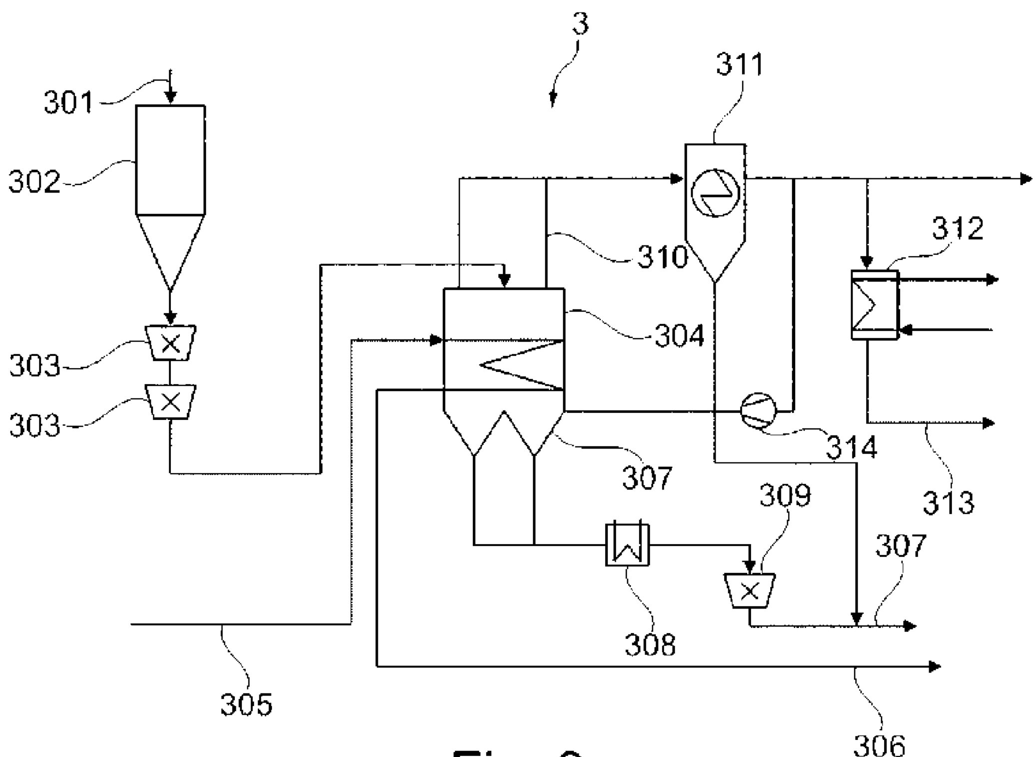
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Fig. 3

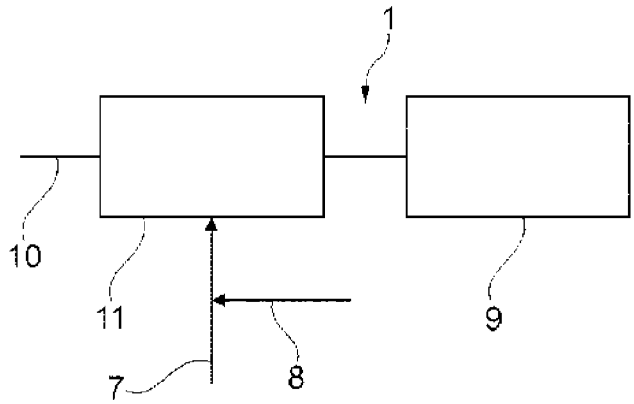

Fig. 4

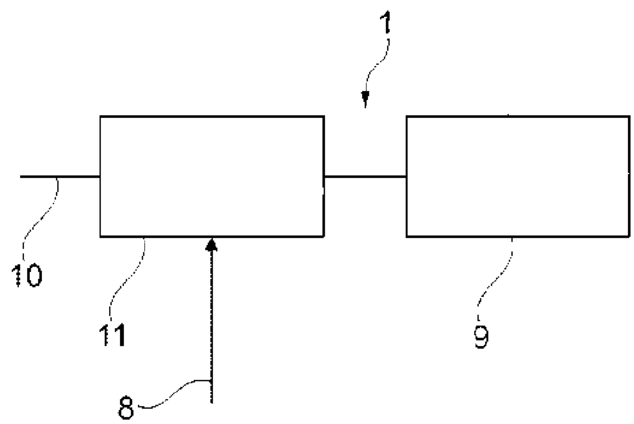

Fig. 5

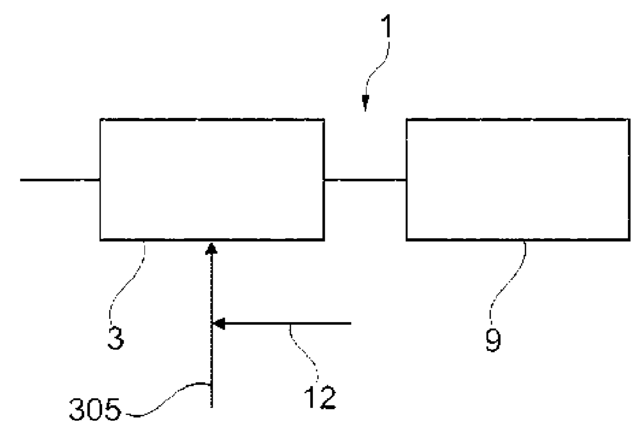

Fig. 6

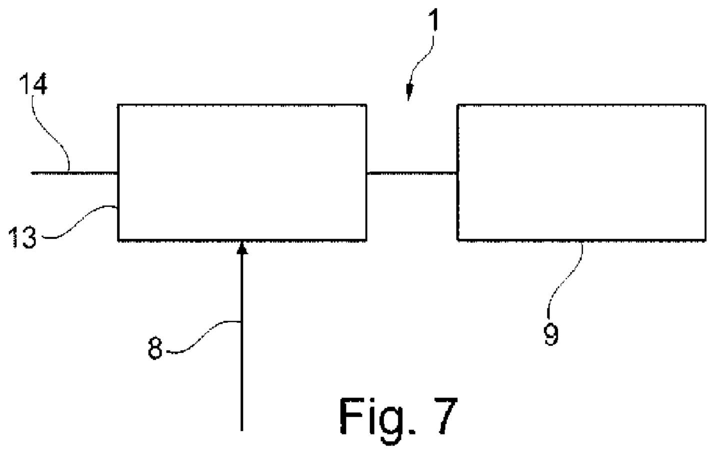

Fig. 7

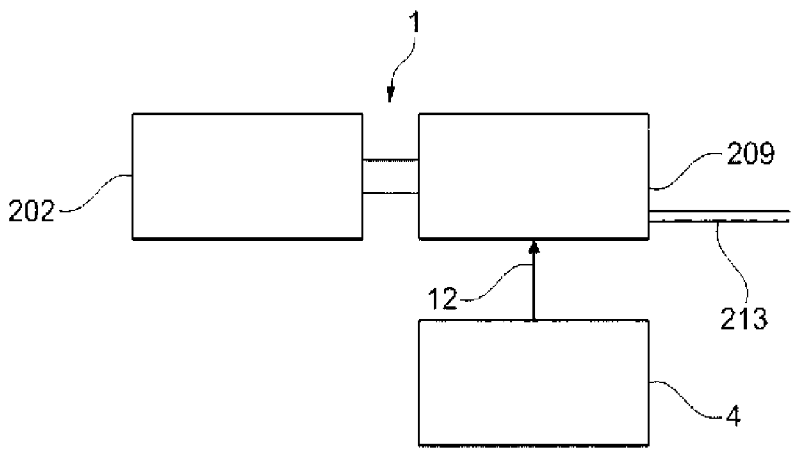

Fig. 8

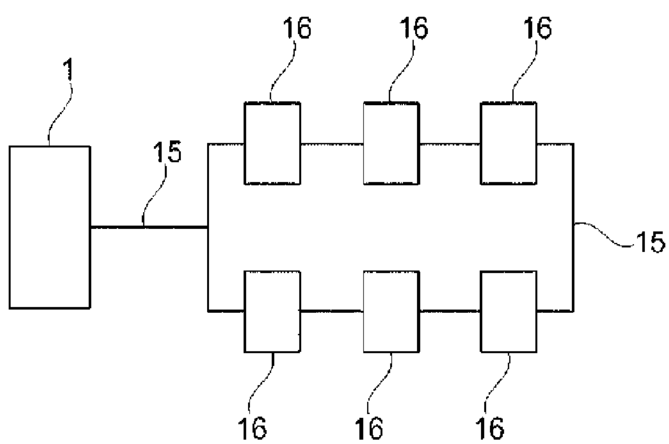

Fig. 9

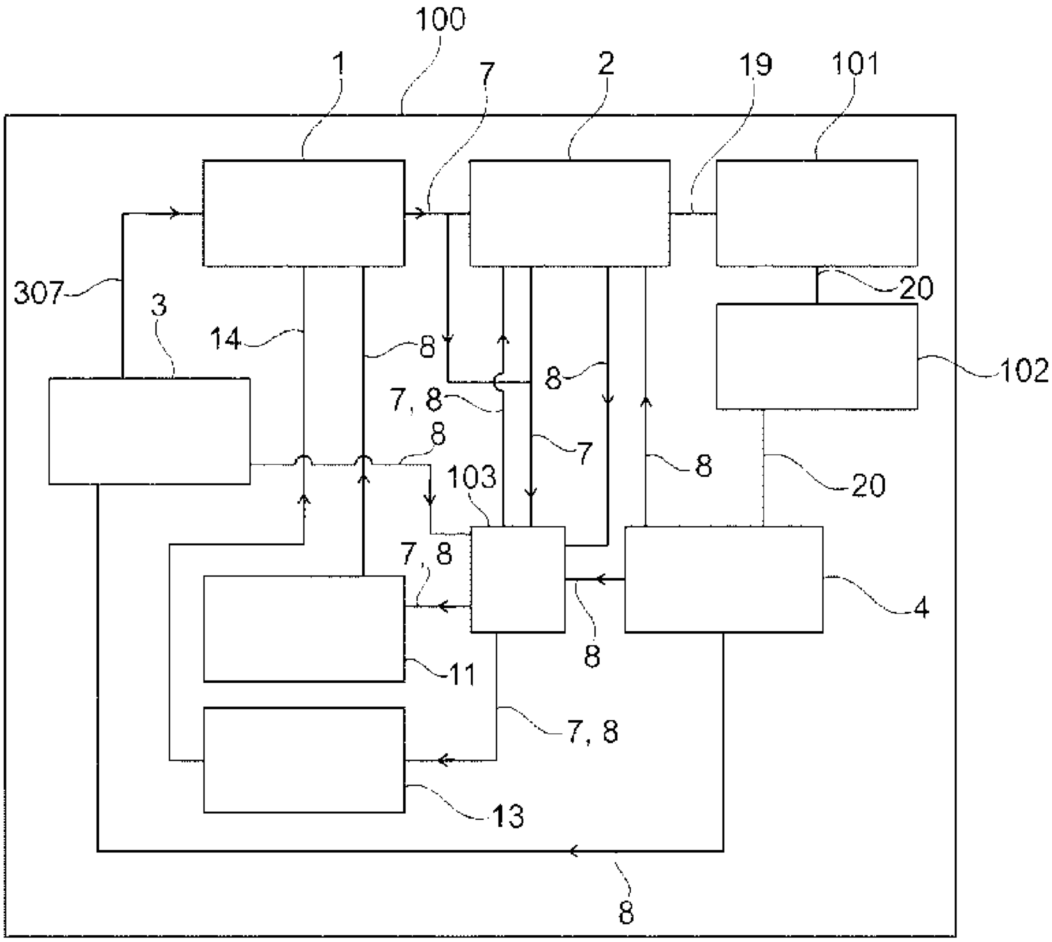

Fig. 10