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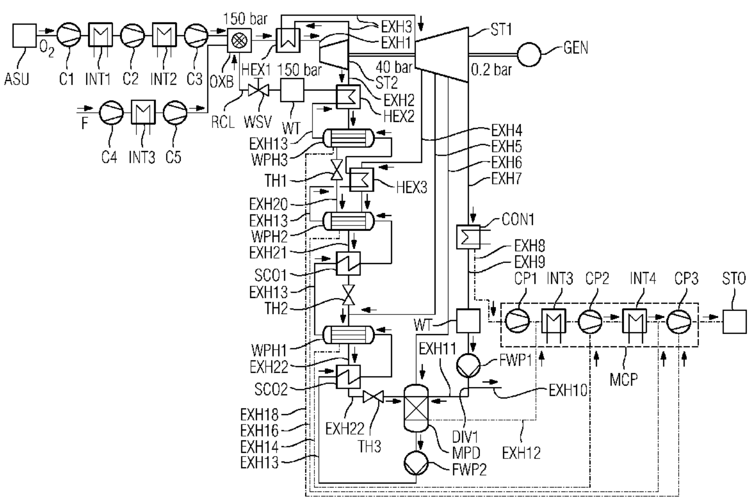
(54) Title: POWER GENERATION SYSTEM AND METHOD TO OPERATE



(57) Abstract: The invention relates to a power generation system (PGS) comprising: an oxy-fuel-burner (OXB), a steam cycle (RC), a recirculation line (RCL) extracting a part of said exhaust- fluid from said steam cycle (RC) and feeding said exhaust- fluid-stream into said oxy-fuel-burner (OXB). To improve efficiency a system and a method is proposed - providing at least one first feed-water-preheater (WPH1) and - wherein said steam cycle (RC) joins into said recirculation line (RCL) downstream said at least one first feed water pre- heater (WPH1) and - extracting a tenth exhaust-fluid-stream (EXH10) from said steam cycle (RC) downstream said first feed-water-pump (FWP1) as, - extracting an eighth exhaust-fluid-stream (EXH8) as carbon- dioxide downstream said first condenser (CON1), - wherein said at least one first feed water-preheater (WPH1) is heated with an exhaust-fluid-stream extracted from said first steam turbine (ST1), namely a fifth exhaust-fluid- stream (EXH5).

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Description

Power generation system and method to operate

The invention relates to a power generation system comprising
- an oxy-fuel-burner,
- a first heat exchanger,
- a steam cycle operated with a first exhaust-fluid-stream generated by said oxy-fuel-burner,
- a recirculation line extracting a part of said first exhaust-fluid from said steam cycle and feeding said exhaust-fluid-stream into said oxy-fuel-burner,
- wherein said steam cycle comprises at least one first turbine expanding at least a part of said first exhaust-fluid-stream, namely a third exhaust-fluid-stream,
- wherein said steam cycle comprises at least one first condenser downstream said first steam turbine condensing at least a part of said third exhaust-fluid-stream, namely a seventh exhaust-fluid-stream,
- wherein said steam cycle comprises at least a first feed-water-pump downstream of said first condenser delivering at least a part of said seventh exhaust-fluid-stream, namely a ninth exhaust-fluid-stream.

Power generation systems and respective methods to operate such systems are known for a long time since mechanical power or electrical power is generated especially by burning a fuel with an oxygen containing gas. Recently concerns came up about carbon-dioxide content in air increasing up to an amount where a so called green-house effect might occur. Since such awareness is rising several projects are initiated to reduce the emission of carbon-dioxide. One of those projects is burning a fuel with an oxygen containing gas other than air to a avoid the generation of NOx [nitrogen oxides] and to avoid the mixing of essential inert components with the carbon-dioxide generated during combustion to more easily enable the separation of carbon-dioxide from the exhaust gas generated. This easy separation simplifies storage of pure carbon-dioxide in a final storage capacity. Essentially pure carbon-dioxide can further better be used for subsequent chemical processes. The oxygen containing gas is basically pure oxygen with minor impurities generated by for example an air separation unit, which can be of conventional membrane type. In the context of this invention an oxy-fuel-burner is characterized by burning basically a fuel with an oxygen containing gas wherein said oxygen containing gas has significant higher oxygen content than ambient air and wherein oxygen is its main component and wherein said oxygen containing gas is preferably pure oxygen with some impurities. This oxygen containing gas may contain some further additives but its main component is preferably oxygen.

One known power generation system is disclosed in US 7,021,063 B2, which deals with an oxy-fuel-burner respectively gas generator comprising a recuperative heat exchanger for reheating of steam that has passed a first expansion machine stage, which heat exchanger is heated by outlet steam respectively exhaust from said gas generator.

The total efficiency of a conventional power generation system with an oxy-fuel-burner is significantly below the efficiency of an ordinary power generation system if the energy consumption of the air separation unit is considered. The efficiency is therefore to be improved to make this technology economically feasible and to have a positive effect on the environment.

It is one object of the invention to improve the efficiency of the known power generation system comprising an oxy-fuel-burner.

The object of enhancing the efficiency of the incipiently defined power generation system is achieved by a power generation system according to the incipiently mentioned type with the further features of the characterizing portion of claim

1. Further the object is achieved by a method of the incipiently mentioned type with the further features of the characterizing portion of the independent method claim.

One essential aspect of the proposed improvement of the power generation system respectively the method according to the invention is the addition of heat exchangers for preheating of the re-circulated feed water submitted to the oxy-fuel-burner for mixing into the exhaust stream. According to the invention by preheating with extraction steam the cycle performance is improved.

In the cycle according to the invention the steam respectively exhaust-fluid taken from the steam turbine(s) contains carbon-dioxide in a substantial concentration, typically more than 5%, preferably about 10% by volume, which makes the cycle much different from a conventional steam cycle. The carbon-dioxide led to the pre-heaters is preferably separated from the pre-heaters and then collected to be routed to an export carbon-dioxide stream. Preferably a carbon-dioxide compression process for the delivery to a final user – for example enhanced oil recovery or methane synthesis – is integrated in the power generation system respectively method.

A further beneficial improvement of the process according to the invention is obtained by providing a recuperator respectively first heat exchanger downstream said oxy-fuel-burner before the exhaust-fluid enters a steam turbine. This heat exchanger respectively recuperator re-heats steam respectively exhaust-fluid that has passed a first expansion through said steam turbine, wherein the exhaust-fluid from said oxy-fuel-burner is heating the exhaust-fluid from said steam turbine. This heat exchanger provides a certain protection for the downstream steam turbine as it provides some heat capacity damping thermal gradients from upstream equipment control variations or disturbances. Further this heat exchanger assist in protecting the turbine from possible water droplets carried over from said oxy-fuel-burner.

Said oxy-fuel-burner according to the invention is basically a gas generator generating an exhaust gas respectively exhaust fluid from a fuel burned with essentially pure oxygen. This exhaust gas is referred to as exhaust-fluid since it might contain liquid components or parts of the fluid might condense to a liquid.

Another beneficial improvement of the invention is given by providing at least one adjustable valve to control the flow through said recirculation line. This control feature allows maintaining the desired exhaust-fluid temperature downstream said oxy-fuel-burner respectively before said exhaust-fluid enters any turbine equipment. Preferably a control unit controls the position of said adjustable valve in the recirculation line according to a temperature measurement upstream a turbine of the power generation system. This control unit is designed such that it receives the measurement results from temperature measurement and submits control signals to said control valve. The control method preferably is designed such that the valve opens further when exceeding a temperature limit is recognized. Further the valve control unit can be designed such that upper limits of temperature increases respectively steep temperature transients in a turbine of the power generation system are avoided.

Another preferred embodiment provides a degasification port at said at least one feed water pre-heater to collect gaseous carbon-dioxide from the condensing exhaust-fluid.

Another preferred embodiment of the invention provides an air separation unit upstream of said oxy-fuel-burner to preferably separate oxygen from ambient air to be burned with a fuel in said oxy-fuel-burner. This air separation unit can be of a membrane type.

The above mentioned attributes and other features and advantageous of this invention and the manner of attaining them will become more apparent and the invention itself will be understood by reference to the following description of the currently known best mode of carrying out the invention taken in conjunction with the accompanying drawings, wherein

figure 1 shows a schematic flow diagram of an oxy fuel power plant comprising the arrangement according to the invention and depicting the method according to the invention.

Figure 1 is a schematic depiction of a simplified flow diagram showing a power generation system and illustrating a method according to the invention. Fuel F and oxygen O_2 from an air separation unit ASU are both elevated to a higher pressure level by compressors C1, C2, C3, C4, C5 which compressors C1, C2, C3, C4, C5 are respectively provided with intercoolers INT1, INT2, INT3 before both fluids are injected in an oxy-fuel-burner OXB at a pressure of 150bar. In said oxy-fuel-burner OXB - which can also be considered as a gas generator - combustion takes place of said fuel F with said oxygen O_2 generating exhaust gas hereinafter referred to as exhaust-fluid. The exhaust-fluid – namely a first exhaust-fluid-stream EXH1 - exits said oxy-fuel-burner OXB and enters a first heat exchanger HEX1. The temperature of said first exhaust-fluid-stream EXH1 is adjusted by controlling a flow of evaporating media to the oxy-fuel-burner OXB to be boiled off and thus cool the exhaust-fluid to the right temperature to subsequently enter a second steam turbine ST2.

Downstream said first exchanger HEX1 said first exhaust-fluid-stream EXH1 is expanded in said second steam turbine ST2, which is a high pressure steam turbine (high pressure means that this pressure level is higher than the pressure level of the downstream turbine).

The first exhaust-fluid-stream EXH1 exiting said second steam turbine ST2 is divided in a second exhaust-fluid-stream EXH2 and a third exhaust-fluid-stream EXH3, wherein approximately above 90% of said first exhaust-fluid-stream EXH1 becomes said third exhaust-fluid-stream EXH3.

Downstream said second steam turbine ST2 said third exhaust-fluid-stream EXH3 enters said first heat exchanger HEX1 to be reheated taking thermal energy from said first exhaust-fluid-stream EXH1 coming from said oxy-fuel-burner OXB.

Further downstream said third exhaust-fluid-stream EXH3 enters a first steam turbine ST1 to be expanded from approximately 40bar pressure down to a pressure of 0.2bar. Said first turbine ST1 comprises several extractions of exhaust-fluid-streams so that said expanded third exhaust-fluid-stream EXH3 is reduced to a seventh exhaust-fluid-stream EXH7 by extraction of a fourth exhaust-fluid-stream EXH4, extraction of a fifth exhaust-fluid-stream EXH5 and extraction of a sixth exhaust-fluid-stream EXH6. Downstream said first steam turbine ST1 said seventh exhaust-fluid-stream EXH7 is partly liquefied in a first condenser CON1, which is equipped with a degasifier to separate said seventh exhaust-fluid-stream EXH7 into a gaseous eighth exhaust-fluid-stream EXH8 and a liquid ninth exhaust-fluid-stream EXH9 both exiting said first condenser CON1. Said eighth exhaust-fluid-stream EXH8 is basically gaseous carbon-dioxide and compressed in an intercooled multistage compressor consisting of the stages CP1, CP2, CP3 and the intercooling heat exchangers INT3, INT4. Said multistage compressor MCP receives further gaseous streams of carbon-dioxide at several intermediate pressure levels of compression to be compressed for subsequent usage, here indicated as storage STO.

Downstream said first condensers CON1 said ninth exhaust-fluid-stream EXH9 it delivered to a higher pressure level by a first feed water pump FWP1. At a downstream division point DIV1 said ninth exhaust-fluid-stream EXH9 is split into a tenth exhaust-fluid-stream EXH10 – which basically consists of liquid water H2O – and an eleventh exhaust-fluid-stream EXH11, which enters a downstream mixing pre-heater and degasifier MPD. In said mixing pre-heater and degasifier MPD said eleventh exhaust-fluid-stream EXH11 mixes with said sixth exhaust-fluid-stream EXH6 extracted from said first steam turbine ST1 to increase the temperature and further mixes with a 22nd exhaust-fluid-stream EXH22, which is throttled by a valve TH3 into said mixing pre-heater and degasifier MPD. The gaseous amount generated in said mixing pre-heater and degasifier MPD is directed to said multistage compressor MCP as a twelfth exhaust-fluid-stream EXH12. The liquid amount from said mixing pre-heater and degasifier MPD is delivered to a downstream second feed-water-pump FWP2 as a thirteenth exhaust-fluid-stream EXH13. Further downstream said thirteenth exhaust-fluid-stream EXH13 is heated-up in a second sub-cooler SCO2 exchanging heat with said 22th exhaust-fluid-stream EXH22 before it enters said mixing pre-heater and degasifier MPD. Further downstream said thirteenth exhaust-fluid-stream EXH13 enters a first feed water pre-heater WPH1, a first sub-cooler SCO1, a second feed water pre-heater WPH2, a third heat exchanger HEX3 and a third feed water pre-heater WPH3 and a second heat exchanger HEX2. Downstream this pre-heating sequence said thirteenth exhaust-fluid-stream EXH13 joins into said recirculation line RCL through an adjustable valve WSV to be injected into said oxy-fuel-burner OXB to adjust the temperature of said first exhaust-fluid-stream EXH1 as said above mentioned cooling media.

Said third feed water pre-heater WPH3 is heated by said second exhaust-fluid-stream EXH2 extracted from said second steam turbine ST2 downstream passing said second heat exchanger HEX2 transferring thermal energy to said thirteenth exhaust-fluid-stream EXH13. Said third feed water pre-heater WPH3 splits the hot side of this heat exchange into a gaseous component supplied to the multistage compressor MCP as an eighteenth exhaust-fluid-stream EXH18. The liquid component of the hot side of the third feed water pre-heater WPH3 is provided as a heating fluid through a first throttle TH1 into said second feed water pre-heater WPH2.

Said second feed water pre-heater WPH2 subsequently receives said fourth exhaust-fluid-stream EXH4 from said first steam turbine ST1 to heat-up said thirteenth exhaust-fluid-stream EXH13.

Said second feed water pre-heater WPH2 discharges a gaseous sixteenth exhaust-fluid-stream EXH16 – consisting basically of carbon-dioxide – and a liquid 21st exhaust-fluid-stream EXH21 both resulting from said incoming fourth exhaust-fluid-stream EXH4 and 20^{th} exhaust-fluid-stream EXH20. Said 21th exhaust-fluid-stream EXH21 enters the heating side of said first sub-cooler SCO1 and further downstream enters said first feed water pre-heater WPH1 through a second throttle valve TH2 on the heating side.

Said first steam turbine ST1 and said second steam turbine ST2 both drive at least one generator GEN to produce electrical power. As an alternative a direct drive can be provided for example for a compressor or any other unit to be driven.

Said first condenser CON1 can be cooled by ambient air, ambient water from a sea or a river or it can be a water spray condenser cooling the fluid to be condensed by water jet. Water can be provided by for example water extracted from said power generation system cooled and re-injected.

To prevent accumulation of undesired products in the cycle a water treatment WT can be inserted for example in said recirculation line RCL. Alternatively or in addition said water treatment WT can be inserted upstream of the extraction of water H2O as the tenth exhaust-fluid-stream EXH10. This location would also improve the quality of water to be extracted for any potential subsequent usage.

Patent claims

1. Power generation system (PGS) comprising
- an oxy-fuel-burner (OXB), wherein said oxy-fuel-burner (OXB) is made to generate exhaust-fluid from burning fuel (F) with an oxygen containing gas (O2), which's oxygen content is higher than the oxygen content of ambient air,
- a steam cycle (RC) operated with said exhaust-fluid generated by said oxy-fuel-burner (OXB),
- a recirculation line (RCL) extracting a part of said exhaust-fluid from said steam cycle (RC) and feeding said exhaust-fluid-stream into said oxy-fuel-burner (OXB) to mix with said continuously generated exhaust-fluid,
- wherein said steam cycle (RC) comprises at least one first steam turbine (ST1) expanding at least a part of said exhaust-fluid, namely a third exhaust-fluid-stream (EXH3),
- wherein said steam cycle (RC) comprises at least one first condenser (CON1) downstream said first steam turbine (ST1) condensing at least a part of said third exhaust-fluid-stream (EXH3), namely a seventh exhaust-fluid-stream (EXH7),
- wherein said steam cycle (RC) comprises at least one first feed-water-pump (FWP1) downstream of said first condenser (CON1) delivering at least a part of said seventh exhaust-fluid-stream (EXH7) to a higher pressure level, namely a ninth exhaust-fluid-stream (EXH9)
characterized in that,
said steam cycle (RC) comprises at least one first feed-water-preheater (WPH1) downstream said first feed-water-pump (FWP1) heating at least a part of said seventh exhaust-fluid-stream (EXH7), namely a thirteenth exhaust-fluid-stream (EXH13),
- wherein said steam cycle (RC) joins into said recirculation line (RCL) downstream said at least one first feed water pre-heater (WPH1) feeding at least a part of

said thirteenth exhaust-fluid-stream (EXH13) into said recirculation line (RCL), namely a nineteenth exhaust-fluid-stream (EXH19),
- wherein a part of said ninth exhaust-fluid-stream (EXH9) is extracted from said steam cycle (RC) downstream said first feed-water-pump (FWP1) as a tenth exhaust-fluid-stream (EXH10),
- wherein a part of said seventh exhaust-fluid-stream (EXH8) is extracted as carbon-dioxide downstream said first condenser (CON1), namely an eighth exhaust-fluid-stream (EXH8),
- wherein said at least one first feed water-preheater (WPH1) is heated with an exhaust-fluid-stream extracted from said first steam turbine (ST1), namely a fifth exhaust-fluid-stream (EXH5).

2. Power generation system (PGS) according to claim 1, wherein a second steam turbine (ST2) is provided down-stream of said oxy-fuel-burner (OXB) and upstream of said first steam turbine (ST1) receiving said first ex-haust-fluid-stream from said oxy-fuel-burner (OXB).

3. Power generation system (PGS) according to claim 2, wherein a first heat exchanger (HEX1), is provided down-stream said oxy-fuel-burner (OXB) and upstream said se-cond steam turbine wherein at least a part of said first exhaust-fluid-stream exiting said first steam tur-bine (ST1), namely a third exhaust-fluid-stream is heat-ed up by said first heat exchanger receiving thermal en-ergy from said first exhaust-fluid-stream.

4. Power generation system (PGS) according to at least one of the preceding claims 1 to 3,
wherein said recirculation line (RCL) comprises at least one adjustable valve (WSV) to control the flow through said recirculation line (RCL).

5. Power generation system (PGS) according to at least one of the preceding claims 1 to 4,
wherein said at least one first feed water pre-heater comprises a degasification part to collect gaseous exhaust-fluid from the condensing fifth exhaust-fluid-stream.

6. Power generation system (PGS) according to at least one of the preceding claims,
wherein upstream said oxy-fuel-burner (OXB) is provided an air separation unit as part of said power generation system to provide pure oxygen from ambient air.

7. Method to operate a power generation system (PGS) defined by the following steps:
- generating exhaust-fluid from burning an oxygen containing gas (O2) and fuel (F),
- wherein an oxygen content of said oxygen containing gas (O2) is higher than the oxygen content of ambient air,
- providing a steam cycle (RC) comprising at least one first steam turbine (ST1), at least one first condenser (CON1) downstream said first steam turbine (ST1), at least one first feed-water-pump (FWP1) downstream said first condenser (CON1), at least one first feed-water-preheater (WPH1) downstream said first feed-water-pump (FWP1),
- operating said steam cycle (RC) with said exhaust-fluid generated by said oxy-fuel-burner (OXB),
- extracting a part of said exhaust-fluid from said steam cycle (RC) by a recirculation line (RCL) and feeding said exhaust-fluid-stream into said oxy-fuel-burner (OXB) to mix with said continuously generated exhaust-fluid,
- expanding at least a part of said exhaust-fluid, namely a third exhaust-fluid-stream (EXH3) by said at least one first steam turbine (ST1),
- condensing at least a part of said third exhaust-

fluid-stream (EXH3), namely a seventh exhaust-fluid-stream (EXH7), by said at least one first condenser (CON1),
- delivering at least a part of said seventh exhaust-fluid-stream (EXH7) downstream of said first condenser (CON1) to a higher pressure level, namely a ninth exhaust-fluid-stream (EXH9), by said at least one first feed-water-pump (FWP1),
characterized by the further steps:
- heating at least a part of said seventh exhaust-fluid-stream (EXH7), namely a thirteenth exhaust-fluid-stream (EXH13) by at least one first feed-water-preheater (WPH1),
- feeding at least a part of said thirteenth exhaust-fluid-stream (EXH13) from said steam cycle (RC) into said recirculation line (RCL), namely a nineteenth exhaust-fluid-stream (EXH19), downstream said at least one first feed water pre-heater (WPH1),
- extracting a part of said ninth exhaust-fluid-stream (EXH9) from said steam cycle (RC) downstream said first feed-water-pump (FWP1) as a tenth exhaust-fluid-stream (EXH10),
- extracting a part of said seventh exhaust-fluid-stream (EXH8) as carbon-dioxide downstream said first condenser (CON1), namely an eighth exhaust-fluid-stream (EXH8),
- heating said at least one first feed water-preheater (WPH1) by an exhaust-fluid-stream extracted from said first steam turbine (ST1), namely a fifth exhaust-fluid-stream (EXH5).

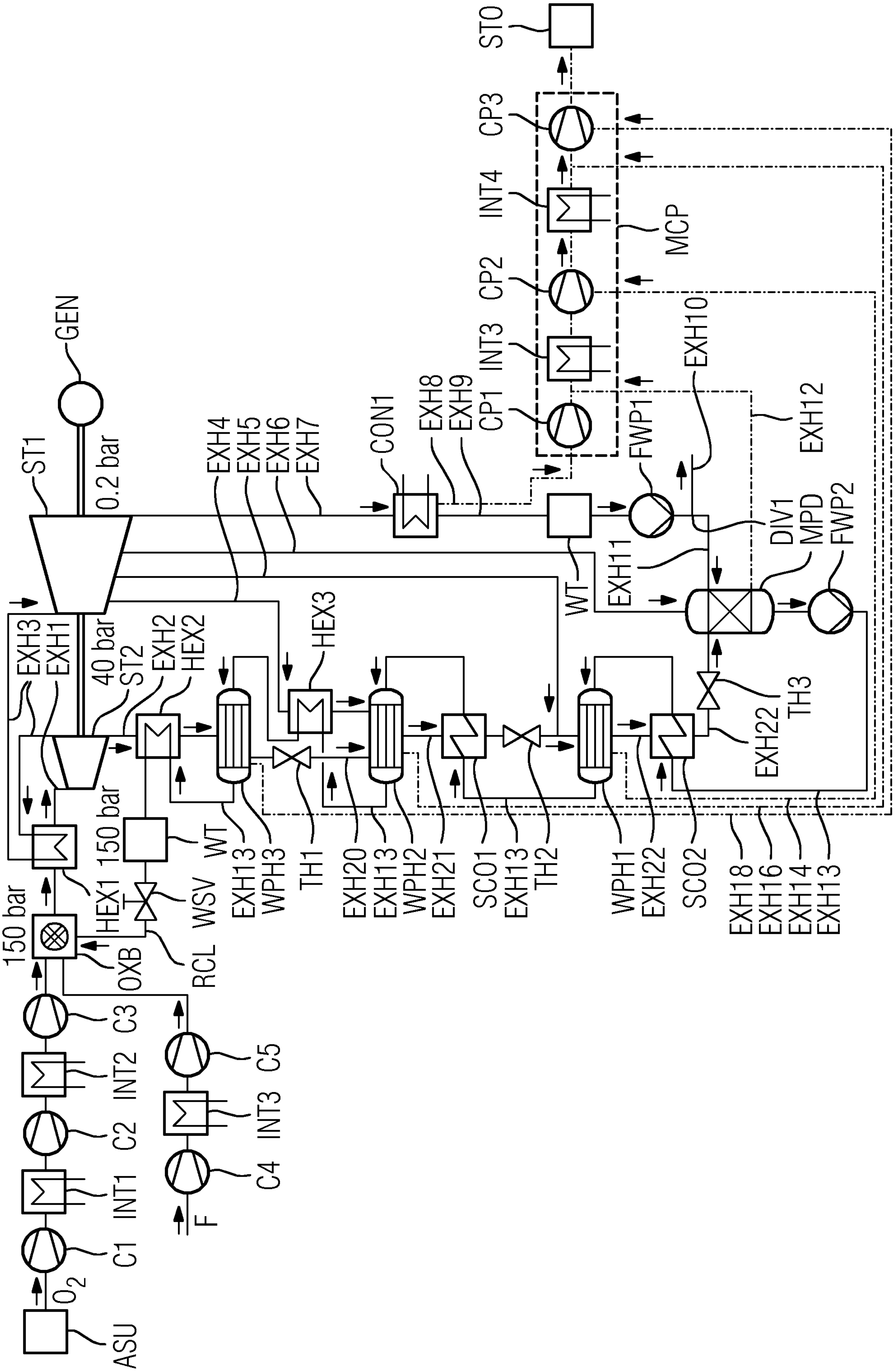
8. Method according to claim 7 comprising the step of providing a second steam turbine (ST2) downstream of said oxy-fuel-burner (OXB) and upstream of said first steam turbine (ST1) receiving said first exhaust-fluid-stream from said oxy-fuel-burner (OXB).

9. Method according to claim 7 or 8 comprising the step of providing a first heat exchanger (HEX1) downstream said oxy-fuel-burner (OXB) and upstream said second steam turbine wherein at least a part of said first exhaust-fluid-stream exiting said first steam turbine (ST1), namely a third exhaust-fluid-stream is heated up by said first heat exchanger receiving thermal energy from said first exhaust-fluid-stream.

10. Method according to claim 7, 8 or 9 comprising the step of
controlling the flow through said recirculation line (RCL) by at least one adjustable valve (WSV) or pump or compressor.

11. Method according to at least one of the claims 7 - 10 comprising the step of,
degasifying to collect gaseous exhaust-fluid from the condensing fifth exhaust-fluid-stream (EXH5).

12. Method according to at least one of the claims 7 - 11 comprising the step of,
providing an air separation unit as part of said power generation system to provide pure oxygen from ambient air upstream said oxy-fuel-burner (OXB).


ASU
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INT1
C2
INT2
C3
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OXB
F
C4
INT3
C5
RCL
WSV
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150 bar
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ST1
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GEN
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WPH3
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EXH9
CP1
INT3
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INT4
CP3
STO
MCP
EXH10
FWP1
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WT
EXH11
DIV1
MPD
FWP2
EXH22
TH3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/053446

A. CLASSIFICATION OF SUBJECT MATTER
INV. F01K7/22 F01K25/00 F25J3/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F01K F25J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CICCONARDI S P ET AL: "Steam power-plants fed by high pressure electrolytic hydrogen", INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, ELSEVIER SCIENCE PUBLISHERS B.V., BARKING, GB, vol. 29, no. 5, 1 April 2004 (2004-04-01), pages 547-551, XP004488750, ISSN: 0360-3199, DOI: 10.1016/S0360-3199(03)00085-5 page 547, paragraph 1 page 547, right-hand column, line 13 - page 549, right-hand column, line 31; figure 2 -----	1-12

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 2014	21/07/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Henkes, Roeland

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 03/049122 A2 (CLEAN ENERGY SYSTEMS INC [US]; ANDERSON ROGER E [US]; BRANDT HARRY [US) 12 June 2003 (2003-06-12) page 3, line 5 - page 5, line 14; figures 1,3 -----	1-12
A	STERNFELD H J: "WASSERSTOFF/SAUERSTOFF-DAMPFERZEUGER IN DER ENERGIETECHNIK", VDI BERICHTE, DUESSELDORF, DE, 1 March 1987 (1987-03-01), pages 231-247, XP002047184, ISSN: 0083-5560 paragraph [03.2]; figures 5,9 -----	1-12
A	WO 98/17897 A1 (WESTINGHOUSE ELECTRIC CORP [US]) 30 April 1998 (1998-04-30) page 3, line 22 - page 13, line 32; figures 1-3 -----	1-12
A	GB 2 351 323 A (NEWTONVILLE LTD [GB]) 27 December 2000 (2000-12-27) page 4, line 12 - page 9, line 24; figure 1 -----	1-5,7-11
A	US 2011/094228 A1 (FAN ZHEN [US] ET AL) 28 April 2011 (2011-04-28) paragraphs [0019] - [0031]; figures -----	1-12

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2014/053446

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