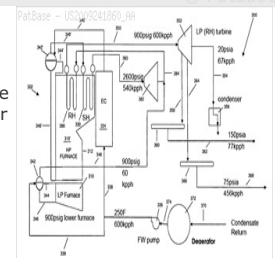


1) Family number: 43782118 (US2009241860A)**ENHANCED STEAM CYCLE UTILIZING A DUAL PRESSURE RECOVERY BOILER WITH REHEAT**

Abstract: Source: US2009241860A An enhanced steam cycle utilizing a dual pressure recovery boiler with reheat allows a large increase in electrical generation with various turbine cycles while overcoming traditional lower furnace material limitations. A dual pressure designed recovery boiler furnace is provided with a lower furnace and an upper furnace. The lower furnace is operated at a lower temperature to prevent or reduce corrosion of the lower furnace wall tubes caused by the reducing environment. The lower furnace can be either a low pressure natural circulation steam generating (drum) system or economizer. Unlike the lower furnace, the upper furnace is not exposed to a reducing environment and is therefore not as susceptible to severe corrosion rates. The upper furnace is operated at higher temperatures and pressures which permit implementation of higher efficiency reheat steam cycles. The upper furnace thus operates as a high pressure natural circulation steam generating (drum) system, or as a once-through supercritical steam generating system. The dual pressure recovery boiler can thus be coupled to a variety of condensing, non-condensing or a combination of condensing and non-condensing turbine cycles to provide a large increase in electrical generation.

Probable Assignee: BABCOCK AND WILCOX CO

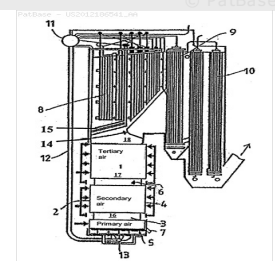
Earliest Publication Date: 20090926

**2) Family number: 43226847** (US2012186541A)**METHOD OF REDUCING FLUE GAS EMISSIONS AND A BOILER**

Abstract: Source: US2012186541A The present invention relates to a method and a boiler for decreasing the amount of nitrogen oxides in flue gases of a boiler, which flue gases are generated in the combustion of fuels and air. The boiler has a water circulation system comprising superheaters (8) and a furnace (1) for combustion of fuel and for generating flue gases that contain nitrogen oxides, which flue gases mainly flow upwards in the furnace and further to the superheater zone and via other heat recovery surfaces of the boiler out of the boiler, and a nitrogen oxides reducing agent is introduced into the flue gases. It is essential that the nitrogen oxides reducing agent is introduced into the flue gases prior to the superheater zone, before which the temperature of the flue gases is decreased by means of at least one heat exchanger (15) that is located in the flue gas flow upstream of the introduction of the reducing agent, for obtaining a suitable temperature window in the flue gas flow in order to reduce nitrogen oxides.

Probable Assignee: ANDRITZ OY

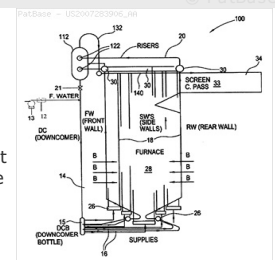
Earliest Publication Date: 20101016

**3) Family number: 40901950** (US2007283906A)**CIRCULATION SYSTEM FOR SLIDING PRESSURE STEAM GENERATOR**

Abstract: Source: US2007283906A A steam generator circulation system is provided and includes a boiler feed pump for forcing water through an economizer, and through the waterwall tubes of an evaporator. A separator receives a mixture of steam and water and sends the steam to a steam utilization unit such as a superheater. A valve is provided below the separator. If the valve is open, the saturated water from the separator is mixed with feedwater and recirculated through the tubes of the evaporator. If the valve is closed, recirculation is terminated. At loads below the critical point, the valve below the separator system would be open and the boiler would operate like a natural circulation drum boiler. At loads above the critical point, the valve below the separator system would be closed resulting in a boiler that operates like a once-through boiler.

Probable Assignee: BABCOCK AND WILCOX CO

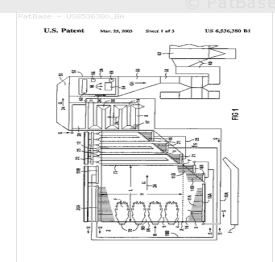
Earliest Publication Date: 20071207

**4) Family number: 23179304** (US6536380B)**FOSSIL-FUEL HEATED STEAM GENERATOR, COMPRISING DENTRIFICATION DEVICE FOR HEATING GAS**

Abstract: Source: US6536380B A steam generator has a nitrogen removal device for fuel gas and a combustion chamber, which is followed on the fuel-gas side, via a horizontal gas flue and a vertical gas flue, by a nitrogen removal device for the fuel gas. The steam generator has a particularly low space requirement and ensures a reliable removal of nitrogen from the fuel gases of the fossil fuel. For this purpose, the combustion chamber has a number of burners arranged level with the horizontal gas flue. Moreover, the vertical gas flue is designed for substantially vertical flow of the fuel gas from the bottom upward, and the nitrogen removal device for fuel gas is designed for an substantially vertical flow of the fuel gas from the top downward.

Probable Assignee: SIEMENS AG

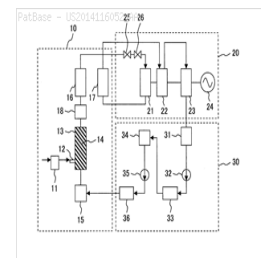
Earliest Publication Date: 20000824

**5) Family number: 56332642** (US2014116052A)**SUBCRITICAL PRESSURE HIGH-TEMPERATURE STEAM POWER PLANT AND SUBCRITICAL PRESSURE HIGH-TEMPERATURE VARIABLE PRESSURE OPERATION ONCE-THROUGH BOILER**

Abstract: Source: US2014116052A A subcritical pressure high-temperature steam power plant includes a combustion boiler system, steam turbine generator system, and condensate and feedwater system and wherein the conditions of steam generated in the boiler system and supplied to the steam turbine generator system are subcritical pressure and high temperature (turbine inlet temperature of 593 degrees centigrade or more).

Probable Assignee: BABCOCK HITACHI KK

Earliest Publication Date: 20140430



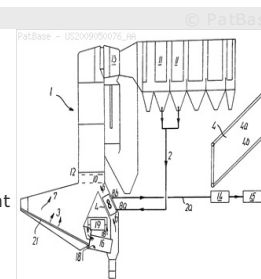
6) Family number: 34367077 (US2009050076A)

BOILER PRODUCING STEAM FROM FLUE GASES WITH HIGH ELECTRICAL EFFICIENCY AND IMPROVED SLAG QUALITY

Abstract: Source: US2009050076A This invention relates to a boiler (1) drying, igniting and combusting refuse and producing steam (2, 2a) by heat exchange with flue gases (3). Said boiler (1) comprises a reactor (16) with firing a secondary fuel (18) for generating a less-corrosive gas flow (6) and an end superheater (8) located in the flow (6) of said less-corrosive gas. Said reactor (16) could be a sintering reactor, a rotary kiln, a fluidised bed or a spouted bed. This provides for an increased lifetime of the end superheater and makes the boiler provide a high and efficient electrical power output.

Probable Assignee: BABCOCK AND WILCOX VOLUND APS

Earliest Publication Date: 20070405



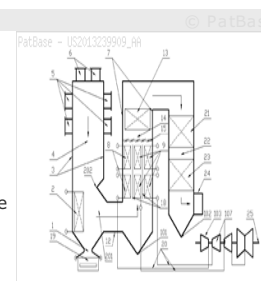
7) Family number: 49457554 (US2013239909A)

ARRANGEMENT STRUCTURE SUITABLE FOR INVERTED PULVERIZED COAL BOILER WITH ULTRA-HIGH STEAM TEMPERATURE STEAM PARAMETERS

Abstract: Source: US2013239909A The disclosure provides an arrangement structure suitable for an inverted pulverized coal boiler with ultra-high steam temperature steam parameters, including a hearth, wherein the hearth is communicated with a middle uplink flue, and the top of the middle uplink flue is communicated with that of a tail downlink flue. In the arrangement structure suitable for an inverted pulverized coal boiler with ultra-high steam temperature steam parameters, the hearth is connected with the middle uplink flue by a hearth outlet horizontal flue at the bottom, so that the high-temperature gas at the hearth outlet is drained to a low elevation and then flows upwards through the middle uplink flue; a final heating surface may be arranged at the low position of the hearth outlet horizontal flue and the middle uplink flue so as to reduce the length of the high-temperature steam pipeline between the final heating surface and the steam turbine, lower the manufacturing cost of the boiler as well as the friction and radiation loss of the pipe, improve the efficiency of the power generating unit and make the power generating unit possible to adopt ultra-high steam temperature steam parameters and/or double reheat system.

Probable Assignee: HUANENG CLEAN ENERGY RESEARCH INST

Earliest Publication Date: 20110810



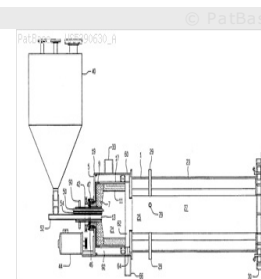
8) Family number: 8594256 (US5390630A)

STATIONARY FEED ARRANGEMENT FOR USE IN A ROTARY FLUID BED GASIFIER

Abstract: Source: US5390630A A rotary fluid bed gasifier having a combustor assembly and a stationary feed conduit which is capable of feeding a carbonaceous material and/or limestone from outside of the gasifier and delivering this material to the gasification chamber of the combustor assembly through a rotating wall of the combustor assembly, wherein the stationary conduit is centrally disposed within the combustor assembly such that the rotatable inner assembly of the combustor assembly revolves about the stationary conduit.

Probable Assignee: SPINHEAT LTD

Earliest Publication Date: 19950221



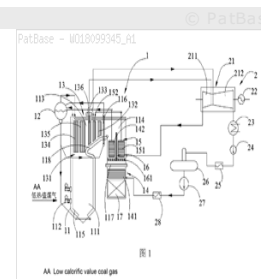
9) Family number: 65516054 (WO18099345A1)

LOW CALORIFIC VALUE COAL GAS POWER GENERATION SYSTEM AND POWER GENERATION METHOD

Abstract: Provided is a low calorific value coal gas power generation system, comprising: a coal gas boiler (1) and a power generator set (2); the power generator set comprises a steam turbine (21) and a power generator (22), while the coal gas boiler comprises a furnace body (11) and a boiler drum (12), the furnace body comprising a horizontal flue (113) and a vertical flue (114), and the furnace body being provided thereon with a water cooling wall (115), wherein the water cooling wall (115) communicates with a liquid outlet and a steam inlet of the boiler drum; the furnace body (11) is also provided therein with a superheater unit (13) and an economizer unit (14), the superheater unit communicating with a steam outlet of the boiler drum (12) and an inlet of a high-pressure cylinder (211) of the steam turbine (21), while the economizer unit (14) communicates with a waste steam outlet of the steam turbine (21) and a liquid inlet of the boiler drum (12); also provided is a power generation method: stably burning low calorific value coal gas by means of a burner (112); first heating liquid water in the water cooling wall (115) to a vapor state; then using the superheater unit (13) to heat the steam to superheated steam, and using work of the superheated steam to generate power; the solution may stabilize steam and water parameters, which may not only ensure safety, but may also improve the power generating efficiency of low calorific value coal gas, while heat utilization rate is relatively high.

Probable Assignee: CHINA CITY ENV PROT ENG CO LTD

Earliest Publication Date: 20170426



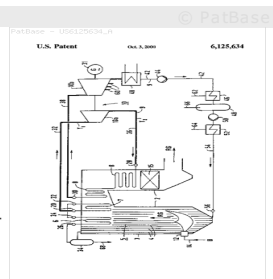
10) Family number: 12571110 (US6125634A)

POWER PLANT

Abstract: Source: US6125634A A method for operating a power plant includes generating flue gas in a furnace of a fossil-fueled steam generator and generating steam for a steam turbine from heat contained in the flue gas. The steam is superheated prior to entry into the steam turbine and after partial expansion in the steam turbine. Feedwater is preheated exclusively outside the steam generator. The preheated feedwater is evaporated at high pressure. Nitrogen is removed from the hot flue gas directly following heat exchange of the flue gas with the partially expanded steam. A power plant includes a fossil-fueled steam generator having a combustion chamber wall being constructed as an evaporator heating surface, a number of tubes of the evaporator heating surface being gas-tightly joined together and having inlet ends, an inlet collector communicating with the inlet ends of the tubes, and an intermediate superheater. A deNO_x device is disposed directly downstream of the intermediate superheater in flow direction of flue gas. A steam turbine is disposed down-stream of the steam generator. A feedwater preheater is disposed outside the steam generator. An inlet side of the feedwater preheater communicates with the steam turbine and a feedwater line directly connects an outlet side of the feedwater preheater with the inlet collector.

Probable Assignee: SIEMENS AG

Earliest Publication Date: 19940504



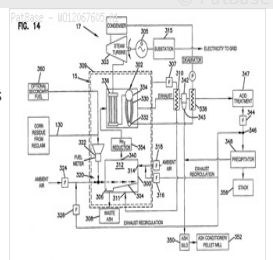
11) Family number: 51134661 (WO12067605A1)

SYSTEMS AND METHODS FOR MANAGING AND UTILIZING EXCESS CORN RESIDUE

Abstract: Systems and methods for managing excess above-ground corn residue are disclosed. Systems and methods for combusting corn residue to produce heat for generating steam are also disclosed. Additionally, methods and systems for harvesting and pre-processing corn residue prior to combustion of the corn residue are disclosed.

Probable Assignee: BIOMASS PRODUCTS LLC

Earliest Publication Date: 20120524



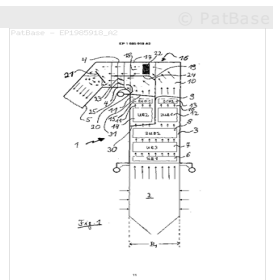
12) Family number: 41703700 (EP1985918A3)

VERTICAL SINGLE-PASS BOILER WITH FLUE GAS DAMPER

Abstract: The generator (1) has a flue gas channel (4), which is arranged above heating surfaces of a heat exchanger. Separation walls (9, 19) divide a flue gas string (3) into two separated standard strings (10, 11) of a reheater. The standard strings have areas forming a flue gas channel, where one of the standard strings is attached to a control butterfly valve. A channel distribution element is arranged on a longitudinal axis of a drawn-in area. An independent claim is also included for a method for controlling a vapor outlet temperature of heating surfaces of a reheater.

Probable Assignee: HITACHI POWER EUROPE GMBH

Earliest Publication Date: 20080417



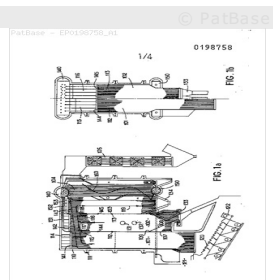
13) Family number: 4480680 (EP0198758A1)

FURNACE FOR REFUSE AND AUXILIARY FUEL AND ITS OPERATION.

Abstract: 1. Compound furnace with integrated and regulatable backup heating, notably for supplying a turbo-generator or an industrial network or for urban heating, of the type constituted by a combustion installation coupled to a steam generator, the combustion installation comprising a chamber (101, 201, 301, 401) for the combustion of domestic refuse, a chamber (102, 202, 301, 401) for the combustion of auxiliary fuel, and a chamber (103, 203, 303, 403) for mixing the combustion gases, the said chambers (101, 102, 103; 201, 202, 203; 301, 303; 401, 403) being juxtaposed one behind the other and being separated by substantially vertical solid walls (112, 113; 212, 213; 312; 412) in such a manner as to define the circulation circuit of the combustion gases, the said separating walls being interrupted in the upper part of the furnace so as to define openings (115, 116; 215, 216; 315; 415) for passage of the combustion gases from one chamber to the other, characterized in that the lateral walls and the separating walls of the said chambers (101, 102, 103; 201, 202, 203; 301, 303; 401, 403) are constituted by pipes of a single cold circulation circuit for water-steam emulsion or for hot water, respectively, in that the single cold circuit is constituted by the panels of pipes of each wall of the said chambers (101, 102, 103; 201, 202, 203; 301, 303), assembled in parallel, in that the panel of pipes of each separating wall (112, 113; 212, 213; 312) comprises a horizontal header (144, 145; 244, 245; 344; 444) situated in the upper part of each of the said walls, and prolonged by an assembly of spaced discharge tubes forming a vertical grid situated across the opening (115, 116; 215, 216; 315; 415) for passage of the combustion gases.

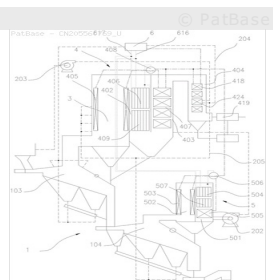
Probable Assignee: MEDITERRANEE CONST NAVALES IND

Earliest Publication Date: 19861010



14) Family number: 62379128 (CN205560769U)

MECHANICAL STOKER FORMULA WASTE GASIFICATION BURNS DUAL -BOILER ENERGY -SAVING POWER GENERATION SYSTEM



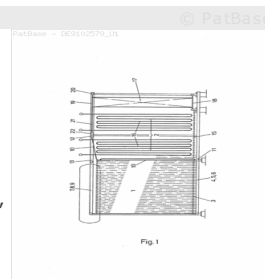
Abstract: Source: CN205560769U The utility model discloses an it is less to change the heat exchange efficiency loss, mechanical stoker formula waste gasification burns dual -boiler energy -saving power generation system that thermal recovery efficiency is higher. Including gasification incineration furnace, boiler system, circular air supplying system, power generation system, gasification incineration furnace includes the gasifier that can seal or communicate and fires the cinder stove, boiler system includes boiler body a, b, and boiler body a has cyclone combustion chamber, oven chamber a, b, and boiler body b has oven chamber d, cyclone dust chamber, establishes the water -cooling wall in cyclone combustion chamber, the cyclone dust chamber, establishes the over heater in the oven chamber a, establishes the evaporimeter in the oven chamber b, establishes over heater, evaporimeter in the oven chamber d, and the steam pocket is established on two boiler body's top, and cyclone combustion chamber flue gas entry linkage gasifier exhaust gas outlet, cyclone dust chamber flue gas entry linkage fire the export of cinder kiln gas, power generation system includes steam input pipe, steam turbine, generator, and steam input pipe connects over heater a, b and steam turbine.

Probable Assignee: UNIV CHONGQING SCI AND TECH

Earliest Publication Date: 20160518

15) Family number: 17667909 (DE9102579U1)

Abstract: Source: DE9102579U1 (Claim 1) SCHUTZANSPRUECHE 1) Dampferzeuger bestehend aus einem horizontal angeordneten Feuerraum mit horizontal anschliessendem Beruehrungszug, in dem die Rohre der einzelnen Beruehrungsheizflaechen, z. B. Ueberhitzer, oder Verdampfer vertikal angeordnet sind und die Seitenwaende, Decken und Boeden durch Rohre, die an den Wasserkreislauf angeschlossen sind, gekuehlt werden, dadurch gekennzeichnet, dass die Rohre der Feuerraumboden,-Seiten und Deckenberohrung a) wasserseitig an parallel zur Kesselmitte liegenden Ver- teilen angeschlossen sind, b) dieser Anschluss rechtwinklig zur Verteilerrohrmitte er- folgt und diese Rohre c) mit genuegender Neigung zur Waagerechten in Richtung zur Seitenwand gefuehrt-und somit die Bodenberohrung bilden werden-bis sie in einer Entfernung von der Kessel- mitte, die durch die Kesselgrosse d) vorgegeben ist d) senkrecht nach oben gefuehrt, die Seitenwandrohre bilden und oben von einer Stelle, die durch die Kesselgrosse ge- geben ist, mit geringer Neigung von der Seitenwand weg in Richtung von parallel zur Kesselachse liegenden Sam- melrohren gefuehrt werden, und e) rechtwinklig, wasserseitig mit diesen verbunden werden und somit die Kesseldecke bilden.



Machine translation: (Claim 1) SCHUTZANSPRUECHE 1) steam generator consisting of a horizontally positioned furnace with horizontal followed Beruehrungszug, in which the tubes of the individual heating surfaces are arranged such as superheater or evaporator vertical and the side walls, ceilings and floors through pipes that are connected to the water cycle, can be cooled, wherein the tubes of the furnace bottom, pages and Deckenberohrung a) water-side on parallel to the tank center located Ver-dividers are connected, b) of this port at right angles to the distribution center of the tube takes place, and these tubes c)-led and with enough slope to the horizontal direction to the side wall, to thereby form the Bodenberohrung them at a distance from the vessel center, which is determined by the Kesselgrosse d) vertically upward, forming the side wall tubes and above by a will place that is giving GE the Kesselgrosse be low slope of the side wall in the direction away from parallel to the vessel axis lying Sam melrohren RAS, and e) rectangular, water-side with these connected and thus form the boiler roof.

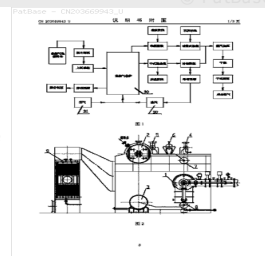
Probable Assignee: ERK ECKROHRKESSEL GMBH 1000 BERLIN DE

Earliest Publication Date: 19910725

16) Family number: 56764649 (CN203669943U)

ENERGY- SAVING POWER GENERATION DEVICE BY USING SOLID WASTES

Abstract: Source: CN203669943U The utility model discloses an energy-saving power generation device by using solid wastes. The energy-saving power generation device comprises a pyrolysis and gasification device and a gas boiler body. The gas outlet of the pyrolysis and gasification device is connected with a combustion chamber on the gas boiler body, the gas boiler body comprises an upper boiler cylinder and a lower boiler cylinder positioned on the left side of a boiler furnace, and an upper collection box and a lower collection box positioned on the right side of the boiler furnace, wherein a convection tube bundle is arranged between the upper and lower boiler cylinders, a combustion chamber consisting of a membrane wall tube is arranged between the upper and lower collection boxes, two stages of vertical convection superheaters which are provided with collection boxes at the inlets of the superheaters are distributed in a horizontal flue at the outlet of the boiler furnace, and a surface type attemperator is arranged between the two stages of superheaters; smoke generated by sufficient burning in the furnace enters into an economizer after passing through the superheaters and the convection tube bundle, and then exhausted through a chimney by an induced draft fan; the collection box at the steam outlet of the superheater is connected with a power generator through a steam turbine, combustible gas can be generated by gasifying the solid wastes and supplied to the gas boiler to generate steam, and then the steam turbine is driven to act, and thus the energy-saving power generation device is environment-friendly and energy-saving.



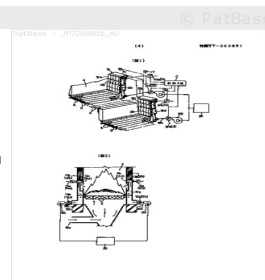
Probable Assignee: XI AN HUAXIN NEW ENERGY CO LTD

Earliest Publication Date: 20140625

17) Family number: 15279429 (JP7269831A)

REFUSE INCINERATING FURNACE

Abstract: Source: JP7269831A PURPOSE:To provide a refuse incinerating furnace in which prevention of clinker at a furnace wall is effectively stopped and generation of NOX is reduced. CONSTITUTION:A refuse incinerating furnace comprises a waste heat boiler for generating steam by heat generated upon incinerating of refuse, a superheater 80 for superheating steam generated from the boiler, a generator for generating by superheated steam generated by the superheater 80 so that cooling gas is supplied to a furnace wall surface 120 opposed to a refuse combustion zone to form a furnace wall 12 as air-cooled walls 12a, 12b, and exhaust gas introducing passages 16b, 12c, 12d for introducing exhaust gas exhausted from the superheater 80 to the surface 120 as cooling gas.



Probable Assignee: KUBOTA KK

Earliest Publication Date: 19951020

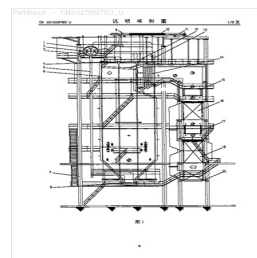
18) Family number: 47095218 (CN201599783U)

FIRED SUPERHEATED STEAM GENERATOR (MACHINE TRANSLATION)

Abstract: Source: CN201599783U The utility model discloses a coal-fired superheated steam generator, with a hearth surrounded by the Wall on its stand, Wall is connected with the drum, the drum is provided with a separator, is connected to the furnace flue, Flue including horizontal and vertical flue section communicating flue segment, vertical flue section provided with an air preheater and economizer, horizontal flue section is provided with a single-stage superheater, the single-stage superheater on through a pipe connected to a separator of the steam outlet, the outlet in the single-stage superheater is connected to spray desuperheater. The utility model is provided by the furnace flue single stage superheater existing wet saturated steam superheating, so enthalpy steam to further increase and improve the steam in the super heavy oil wells flooding effect; superheater rear connector spray desuperheater superheated steam so that the temperature control is very convenient, additional auxiliary oil or gas burners can be achieved raw coal or coal, oil and gas co-firing, boiler wider range of applications.

Probable Assignee: SURVEY AND DESIGN INST SINOPEC HENAN PETROLEUM EXPLORATION BUREAU

Earliest Publication Date: 20101006



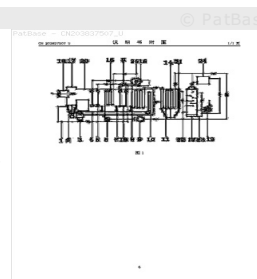
19) Family number: 57381847 (CN203837507U)

FLUE GAS TREATING DEVICE OF GLASS MELTING FURNACE

Abstract: Source: CN203837507U The utility model provides a flue gas treating device of a glass melting furnace. The flue gas treating device of the glass melting furnace is characterized in that a flue gas separating wall is arranged on the middle lower portion of a waste heat boiler, a discharge ash pull chain machine is arranged on the bottom of the waste heat boiler, a spiral conveyor is arranged on the bottom of the left end of the waste heat boiler, a preheating pipe is arranged in a dust collector, a steam outlet of a superheater is connected to a generator through a communication pipe, a hot water outlet of the generator is connected to a gas scrubber tower and a preheating pipe through communication pipes, an activated carbon layer is arranged at the right end of the interior of the dust collector, a water outlet of the preheating pipe is connected with a water inlet of a coal economizer through a communication pipe, a water outlet of the coal economizer is connected with a steam pocket through a communication pipe, a steam pocket steam outlet is formed in the top of the steam pocket, and the steam pocket steam outlet is connected to an inlet of the superheater through a communication pipe. Waste heat in the fuel gas is sufficiently used for generating electricity, and meanwhile dust, sulfide and nitration in the flue gas are effectively treated.

Probable Assignee: YUNNAN YUNXIANG GLASS CO LTD

Earliest Publication Date: 20140917



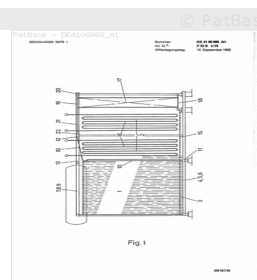
20) Family number: 8770517 (DE4106868A1)

GAS TURBINE EXHAUST BOILER - HAS PERIPHERAL COOLING PIPES CONNECTED AT RIGHT ANGLES TO DISTRIBUTOR AND COLLECTOR PIPES

Abstract: Source: DE4106868A1 The steam generator has a horizontal firebox and flue in which vertical evaporative or superheating tubes are mounted. The sides, top and bottom are cooled by pipes connected to the water circuit. These pipes(3) are connected at the water side to distributors running parallel to the boiler centre line and at right angles to them. They slope towards the sidewall and then extend vertically upwards, finally sloping gently away from the sidewall to collector pipes parallel to the boiler centre line, forming the boiler top in the process. USE - In gas turbine exhaust, giving sufficient water circulation irrespective of operating pressure.

Probable Assignee: ERK ECKROHRKESSEL

Earliest Publication Date: 19920910



21) Family number: 4573289 (JP57153102A)

HEAT EXCHANGE FOR BLACK LIQUOR RECOVERY BOILER

Abstract: Source: JP57153102A 1, the name of the invention Claim 1 black liquor [Source: recovery boiler heat exchange in the scope of the appended claims 1 Method 2 concentrated pulp waste solution by burning combustion exhaust gas cooking chemicals to the furnace together with the recovery of water-cooled wall of the superheater heat exchange with the boiler body sequentially to generate steam, further is introduced into the heat recovery in the economizer, on the other hand, in the combustion exhaust gas economizer, the acid dew point of the same or slightly sulfurous acid gas high C preheated to a temperature 120 degrees before and after the boiler feed water to be introduced in the black liquor recovery steam generator. The downstream side of the economizer, air preheater flue gas type provided with a combustion exhaust gas economizer heat recovery on the downstream side of the economizer in the combustion exhaust gas of the sulfurous acid gas, much higher than the 130 to 160' acid dew point C preheated to a temperature, characterized in that introducing a boiler feed water to the heat exchange in the black liquor. The method recovery steam generator. 3,

Probable Assignee: KAWASAKI HEAVY IND LTD

Earliest Publication Date: 19820921

