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(54) **ATHERMAL RADIATION TYPE OIL BURNER AND A METHOD FOR REDUCING GREENHOUSE GAS EMISSIONS**

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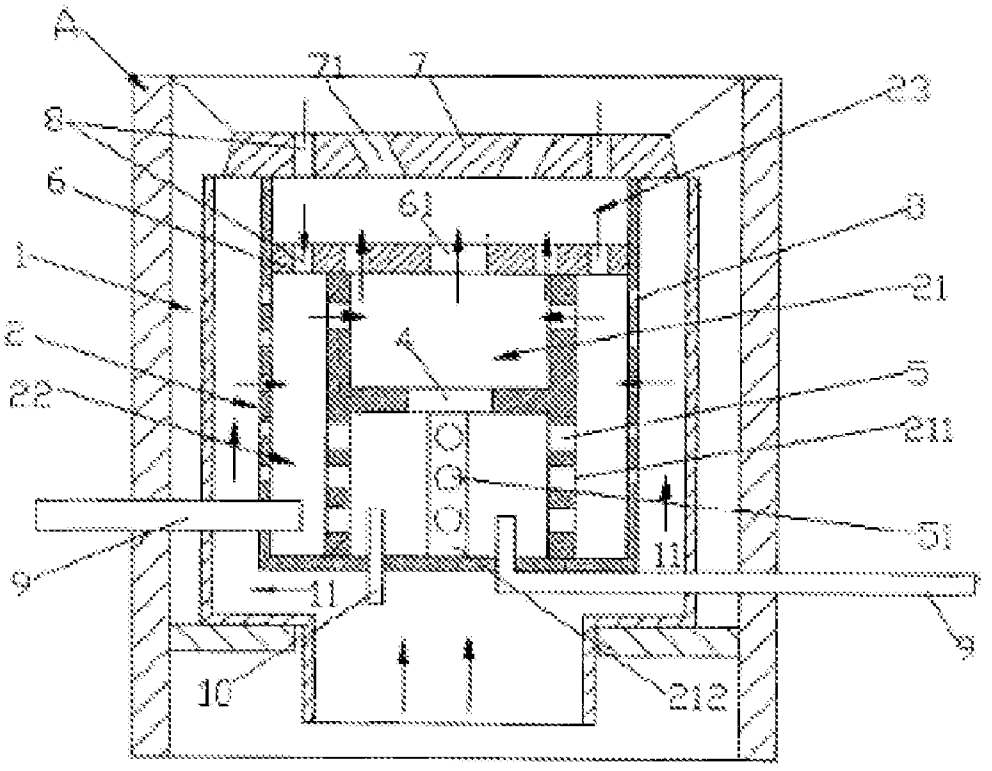
(57) **ABSTRACT**

Disclosed is an oil combustion method for reducing greenhouse gas emissions in which an athermal radiation type oil burner is arranged on a stove. The athermal radiation type oil burner includes a furnace body (**1**) in which a hearth (**2**) is placed. The hearth (**2**) composed of a casing with multiple through holes (**3**) includes a primary oil supply combustion chamber (**21**), a secondary oil supply combustion chamber (**22**) and an obstruction chamber (**23**). The primary oil supply combustion chamber (**21**) is a casing (**211**) divided into an upper layer and a lower layer. An interconnected hole (**4**) is arranged between the two layers. Multiple through holes (**5**) are distributed on the casing (**211**) and communicated with the secondary oil supply combustion chamber (**22**), which is formed by the interval among the casing (**211**) of the primary oil supply combustion chamber (**21**), an isolation plats (**6**) with multiple through holes (**61**) arranged on the casing (**211**) and the hearth (**2**). The obstruction chamber (**23**) is composed of a sealing plate (**7**) on the furnace body (**1**) and the isolation plate (**6**). Flame holes (**71**) are arranged on the sealing plate (**7**). Air flow holes (**8**) are formed on the corresponding positions of the isolation plate (**6**) and sealing plate (**7**), respectively. The secondary oil supply combustion chamber (**22**) and the obstruction chamber (**23**) are interconnected with the air flow holes (**8**). Oil in the burner is continuously spilt, gasified, expanded and compressed for multiple times in the furnace body (**1**), and oil molecules completely release heat energy and do not release heat radiation again. The burner ensures that generated harmful gas is reduced.



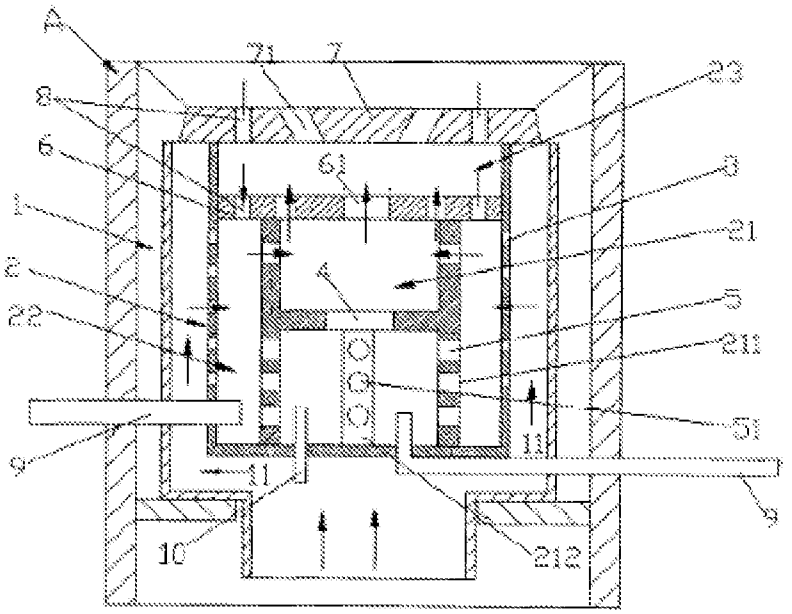


Fig. 1

ATHERMAL RADIATION TYPE OIL BURNER AND A METHOD FOR REDUCING GREENHOUSE GAS EMISSIONS

FIELD OF THE INVENTION

[0001] The present invention relates to a combustion device, particularly to a combustion device with oil as the fuel and a method for reducing, greenhouse gas emissions using the same.

BACKGROUND OF PRIOR ART

[0002] The atmosphere is filled of various gaseous compounds and compound particles, which include a variety of greenhouse gases defined as contributing to global warming by the "United Nations Framework Convention on Climate Change", such as nitrogen dioxide, nitrogen oxide, carbon monoxide, carbon dioxide and sulfur dioxide. These greenhouse gases are caused mainly by the economic development and daily life behavior of the human being, for example, as caused by such industrial developments as aircrafts, ships, cars, power plants, factories and food industry, and as caused by such everyday life activities as cook, electricity consumption and waste production. The majority of energy used in industrial production and daily life is provided by fossil fuels (coal, oil and gas), and currently the liquid fuel is generally used directly or indirectly through a burner to release thermal energy for doing work. The glasshouse gases, generated in the course of doing work, are caused by emissions of unclean gases that fail in complete combustion. Greenhouse gases are thus resulted from cumulation of continuous combustion of fossil fuels by the human being.

[0003] The main greenhouse gas is carbon dioxide; with the concentration of carbon dioxide in the atmosphere rising to a dangerous level, massive latent natural disasters have appeared gradually. Therefore, the "Copenhagen Agreement" was held on Dec. 7-18, 2009 in Copenhagen, Denmark and a new agreement was signed on the global action to address climate change in the future. But it ultimately failed to reach a unanimous agreement mainly for the following reasons: There is not yet a good effective method to solve the greenhouse gases of the present climate. The current global economic power mainly depends on the industry development which has to consume various fuels, thus emitting large amounts of greenhouse gases. However, the existing solution depends mainly on recovery or reduced consumption of greenhouse gases. Thus, the industrial development or the fuel consumption can only be reduced to ensure the emissions of greenhouse gases, which does not meet the requirements of human survival and development.

[0004] Therefore, the applicant submitted an invention patent application with an application number "20101003167.5" and titled "Athermal Radiation Type Oil Burner", which substitutes a controlled precise combustion process for the incomplete combustion concept of the conventional burner. However, merely using an individual burner is difficult to embody the advantages of energy saving and environmental protection of the burner, and thus difficult to achieve the good effects of energy saving and greenhouse gas reduction.

SUMMARY OF THE INVENTION

[0005] For eliminating the inadequacies of the existing burner, a purpose of the present invention is to provide an athermal radiation type oil burner comprising: a furnace body in which a hearth is placed; the hearth composed of a casing with multiple through holes includes a primary oil supply combustion chamber, a secondary oil supply combustion chamber and an obstruction chamber; the primary oil supply combustion chamber is a casing divided into an upper layer and a lower layer, between which is arranged an interconnect hole; multiple through holes are distributed on the casing and communicated with the secondary oil supply combustion chamber, which is formed by the interval among the casing of the primary oil supply combustion chamber, an isolation plate with multiple through holes arranged on the casing and the hearth; the obstruction chamber is composed of a seating plate on the furnace body and the isolation plate; flame holes are arranged on the sealing plate; air flow holes are formed on the corresponding positions of the isolation plate and sealing plate respectively; the secondary oil supply combustion chamber and the obstruction chamber (**23**) are interconnected with the airflow holes.

[0006] Furthermore, the hearth is provided inside with two oil ports, one being communicated with the lower end of the primary oil supply combustion chamber, the other being communicated with the lower end of the secondary oil supply combustion chamber.

[0007] Furthermore, the primary oil supply combustion chamber is provided inside with an igniter (**10**).

[0008] Furthermore, an air chute is arranged between the furnace body and the hearth.

[0009] Furthermore, the lower layer of the primary oil supply combustion chamber is composed of two or more supporting feet.

[0010] Furthermore, the supporting feet are provided with multiple through holes.

[0011] On the other hand, the present invention provides a method for reducing greenhouse gas (CO_2) emissions, comprising the step that the athermal radiation type oil burner according to any of claims **1-6** is instated on a stove (A).

[0012] The present invention has the following beneficial effects:

[0013] 1. Because the present invention uses the athermal radiate type off burner on the stove, the oil consumption of the stove is reduced by 30% or more than the conventional oil burner. The present invention is thus effective to release the energy of various components in the oil in combustion, the mass of the components themselves becoming smaller, radiation of the substances themselves being decayed to a weak degree; after oxidation and reduction, the measured mass of various generated compounds is far below the safety standard. That is, the amount of carbon dioxide and oxygen compounds is reduced in the combustion process, while the amounts of simple oxygen and nitrogen is relatively increased. This not only saves energy and gets high-temperature athermal radiation heat energy, but also filters the discharged gases to meet the environmental protection requirements.

[0014] 2. Because the present invention uses the athermal radiate type oil burner on the stove, the discharged greenhouse gases are converted into oxygen required by the human being in the oil combustion process or oxygen in the discharged gases has a higher proportion than other components, thus proving a whole new concept of environmental protection to improve the global gases or climate.

[0015] 3. Because the present invention is only to substitute an athermal radiation type oil burner on the original combus-

tion stove, and there is no need to replace other facilities, it is simple and convenient, and has a low cost, instantly saving more than 30% of the oil after adoption, thus achieving energy saving and environmental protection effects.

[0016] If the present invention is popularized, the greenhouse gas emissions can effectively be reduced to protect the environment.

BRIEF DESCRIPTIONS OF THE DRAWINGS

[0017] FIG. **1** is a schematic view of the structure of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0018] A method of the present invention for reducing greenhouse gas (CO_2) emissions is to install an athermal radiation type oil burner on a stove A.

[0019] The athermal radiation type oil burner, as shown in FIG. **1**, includes: a furnace body **1** in which a hearth **2** is placed; an air chute **11** is arranged between the furnace body **1** and the hearth **2**; the hearth **2** composed of a casing with multiple through holes **3** includes a primary oil supply combustion chamber **21**, a secondary oil supply combustion chamber **22** and an obstruction chamber **23**; the hearth **2** is provided inside with two oil ports **9** that are respectively connected to a connecting tube, one connecting tube being connected to a lower end of the primary oil supply combustion chamber **21**, the other connecting tube being connected to a lower end of the secondary oil supply combustion chamber **22**; the primary oil supply combustion chamber **21** is a casing **211** divided into an upper layer and a lower layer, between which is arranged an interconnected hole **4**; multiple through holes **5** are distributed on the casing **211** and communicated with the secondary oil supply combustion chamber **22**; and the primary oil supply combustion chamber **21** is provided inside below with an igniter **10**; the secondary oil supply combustion chamber **22** is formed by the interval among the casing **211** of the primary oil supply combustion chamber **21**, an isolation plate **6** with multiple through holes **61** arranged on the casing **211** and the hearth **2**; an obstruction chamber **23** is composed of a sealing plate **7** on the furnace body **1** and the isolation plate **6** in the hearth **2**; flame holes **71** are arranged on the sealing plate **7** forming an acute angle with the center axis to facilitate the flame to be dispersedly elected upward; air flow holes **8** are formed on the corresponding positions of the isolation plate **6** and sealing plate **7**, respectively; and the secondary oil supply combustion chamber **22** and the obstruction chamber **23** are interconnected directly with the airflow holes **8**.

[0020] The lower layer of the primary oil supply combustion chamber **21** is composed of two or more supporting feet **212**, which are provided with multiple through holes **51**.

[0021] The present invention will further be described in detail below with reference to the principle of the athermal radiation type oil burner:

[0022] During operation, first the oil is sent through one of the oil ports **9** to inside the primary oil supply combustion chamber **21**, and the igniter **10** is started, making the fire maintain the basic temperature and fire point of the combustion chamber for the preliminary and incomplete combustion, when the oil is constantly spilt and gasified in the combustion chamber. Then the oil is sent through another oil port **9** to the secondary oil supply combustion chamber **22** to supplement the oil. The oil, heated by the oil of the primary oil supply combustion chamber **21** and mixed with the air flowing in from the air flow hole **8** on the sealing plate **7**, is instantaneously split and gasified for the intermediate and complete combustion, and then enters the obstruction chamber **23**. Because the sealing plate **7** on the obstruction chamber **23** is only provided with a flame hole **71** to let the fire out of the furnace body **1**, the oil while combustion cannot rush quickly out of the furnace body **1** but is blocked in the furnace body **1**, making the oil further continuously gasified, compressed, split and fused in the furnace body **1** for multiple times to have a more thorough pyrolysis, thus making the internal energy of the chemical elements contained in the oil completely released to be converted into thermal energy, without thermal radiation transferring energy of the bright flame torn inside to outside, thus achieving advanced and perfect combustion. Because the flame is finally ejected through the flame hole of the sealing plate **7** on the obstruction chamber **23**, the ejected flame has its thermal radiate completely eliminated except the high temperature, and the palm will not be burnt even if it is near to the flame.

[0023] This athermal radiation type oil burner enables the oil to be burnt more completely, and flameout is not easy to occur even in the sealed condition and at a trace oil supply of 20 mL/min. This athermal radiation type oil burner can reach the temperature up to 1350+, save more than 50% of oil compared to the same type of facilities, and greatly reduce emission of harmful gases, simplify the catalytic transformation process of the discharged gases much more, allow the recovery as the clean thermal energy.

[0024] The test results of the present invention are as follows:

Rated	Detected Temperature		Time to Boiling	Energy	Rated Heat	Consumption	Power
Capacity	Begin	End	Point	Consumption	BTU/British	BTU/British	KW
10 L/L	25•	100•	4.40/min	170/g	2970	6732	26

[0025] Related auxiliary facilities and information:

[0026] The oil supply tank is 2 m high above the ground;

[0027] an iron pan containing 10 kg water is placed on the athermal radiation type oil burner, with the surrounding sealed;

[0028] calorific capacity of oil; 39672 BTU/Kg or 10000 kcal/kg;

[0029] an air blower, having a power of 750 W;

[0030] temperature of the day 20*; and

[0031] flame temperature 1,350*.

[0032] The specific contents of the report of detection of the discharged gases after combustion and doing work are as follows:

[0033] A) Detection and sampling conditions

[0034] The defection is performed in a room having an area of 68 m^3, with an exhaust fan installed therein. The discharged gas samples are collected in the room, and the detecting devices are arranged within about 0.5 m from the exhaust outlet of the furnace body in combustion. The EP diesel is used as the oil for combustion.

[0035] B) The unit responsible for the detection

Environmental Service Department of the Hong Kong SGS

[0036] C) Sampling and detection time

Continuous combustion for 8 hours; and the gas sample is collected for 1 hour.

[0037] D) Monitoring results

Monitoring Items	Monitoring Items	Detection Results	Safety Standard
Discharged Gases	Nitrogen Dioxide	PPM	PPM
	NO_2	0.26	3
	Nitrogen Oxide	MG/M^3	MG/M^3
	$NO + NO_2$	0.06	31
	Carbon Monoxide	PPM	PPM
	CO	8.7	25
	Carbon Dioxide	PPM	PPM
	CO_2	1000	5000
	Sulfur Dioxide	MG/M^3	MG/M^3
	SO_2	<0.9	5.2

[0038] E) Description

[0039] The above safety standards are legislation of the "Operating Instructions of Controlling Workplace and Air Impurities (Chemicals)" of the Occupational Safety Legislation of Hong Kong Labor Department, it means for working 40 hours per week and 8 hours per day at this concentration, almost all workers will not be impaired in health even they are repeatedly exposed to the related chemicals.

What is claimed is:

1. An athermal radiation type oil burner, comprising: a furnace body (**1**) in which a hearth (**2**) is placed; the hearth (**2**) composed of a casing with multiple through holes (**3**) includes a primary oil supply combustion chamber (**21**), a secondary oil supply combustion chamber (**22**) and an obstruction chamber (**23**); the primary oil supply combustion chamber (**21**) is a casing (**211**) divided into an upper layer and a lower layer, between which is arranged an interconnected hole (**4**); multiple through holes (**5**) are distributed on the casing (**211**) and communicated with the secondary oil supply combustion chamber (**22**), which is formed by the interval among the casing (**211**) of the primary oil supply combustion chamber (**21**), an isolation plate (**6**) with multiple through holes (**61**) arranged on the casing (**211**) and the hearth (**2**); the obstruction chamber (**23**) is composed of a sealing plate (**7**) on the furnace body (**1**) and the isolation plate (**6**); flame holes (**71**) are arranged on the sealing plate (**7**); air flow holes (**8**) are formed on the corresponding positions of the isolation plate (**6**) and sealing plate (**7**), respectively; and the secondary oil supply combustion chamber (**22**) and the obstruction chamber (**23**) are interconnected with the air flow holes (**8**).

2. The athermal radiation type oil burner according to claim **1**, characterized in that: the hearth (**2**) is provided inside with two oil ports (**9**), one being communicated with a lower end of the primary oil supply combustion chamber (**21**), the other being communicated with a lower end of the secondary oil supply combustion chamber (**22**).

3. The athermal radiation type oil burner according to claim **1**, the primary oil supply combustion chamber (**21**) is provided inside with an igniter (**10**).

4. The athermal radiation type oil burner according to claim **1** characterized in that: an air chute (**11**) is arranged between the furnace body (**1**) and the hearth (**2**).

5. The athermal radiation type oil burner according to claim **1**, characterized in that: the lower layer of the primary oil supply combustion chamber (**21**) is composed of two or more supporting feet (**212**).

6. The athermal radiation type oil burner according to claim **5**, characterized in that: the supporting feet (**212**) are provided with multiple through holes (**51**).

7. A method for reducing greenhouse gas (CO2) emissions, comprising the following step: the athermal radiation type oil burner according to any of claims **1-6** is installed on a stove (A).

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