United States Patent [19]

Grainger

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[45] **Jan. 30, 1973**

[54] ANTI-POLLUTION HEATING SYSTEM

[76] Inventor: **Lewis M. D. Grainger,** Glen Allen, Va. 73060

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[21] Appl. No.: **182,456**

[52] **U.S. Cl.**.....**126/116 R,** 122/20 B, 122/136 R, 431/352

[51] **Int. Cl.**.....**F24h 3/00**

[58] **Field of Search**.....431/352, 265, 183; 122/20 B, 122/136 R; 126/116 R

[56] **References Cited**

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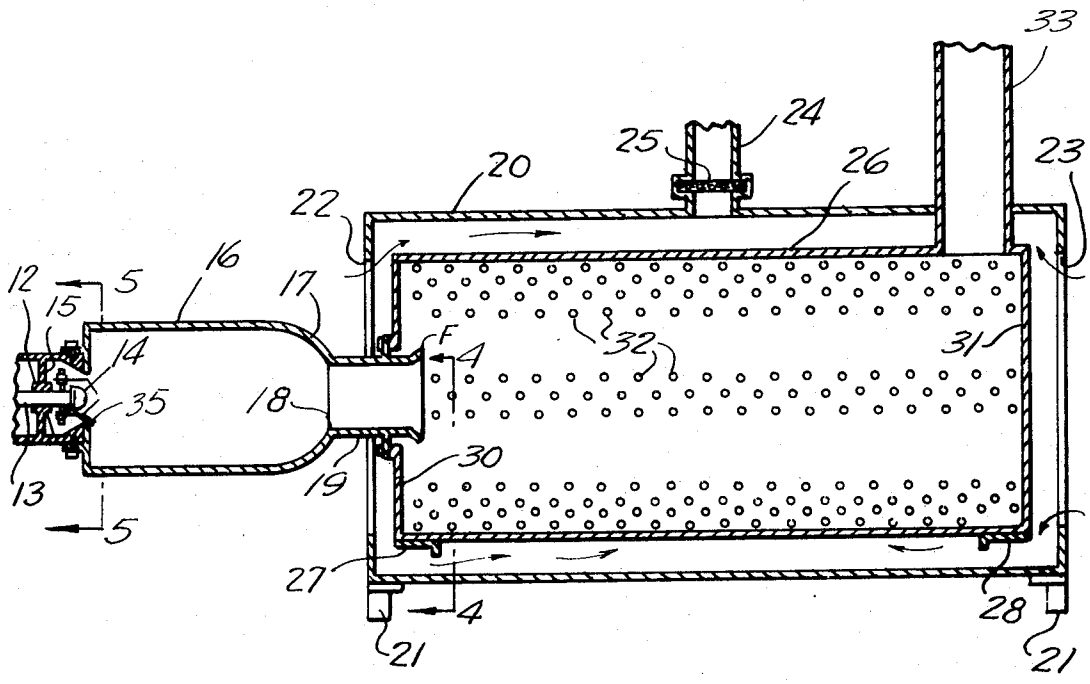
[57] **ABSTRACT**

An anti-pollution heating system in which the flame from a gun type oil burner is fed into a cylindrical chamber somewhat larger in diameter than the outlet of the oil burner. The air feeding the flame is given a swirling motion by a set of stationary vanes in the air passage. The chamber curves inwardly to a reduced diameter outlet to momentarily retard the flow and cause all of the oil to become ignited. The products of combustion pass then into a large chamber where combustion is completed. The large chamber has perforated side walls to permit air to flow therein to provide sufficient oxygen to complete the combustion. A surrounding air chamber conducts air to the heated walls with some of the air flowing into the chamber and the remainder flowing to the air system of a home or other space to be heated. A lip underlies the jet of the oil burner to receive any oil dripping therefrom as the burner is turned off directing the oil into the combustion chamber where it is instantaneously atomized by the heated walls.

5 Claims, 9 Drawing Figures



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SHEET 1 OF 2

FIG. 1.

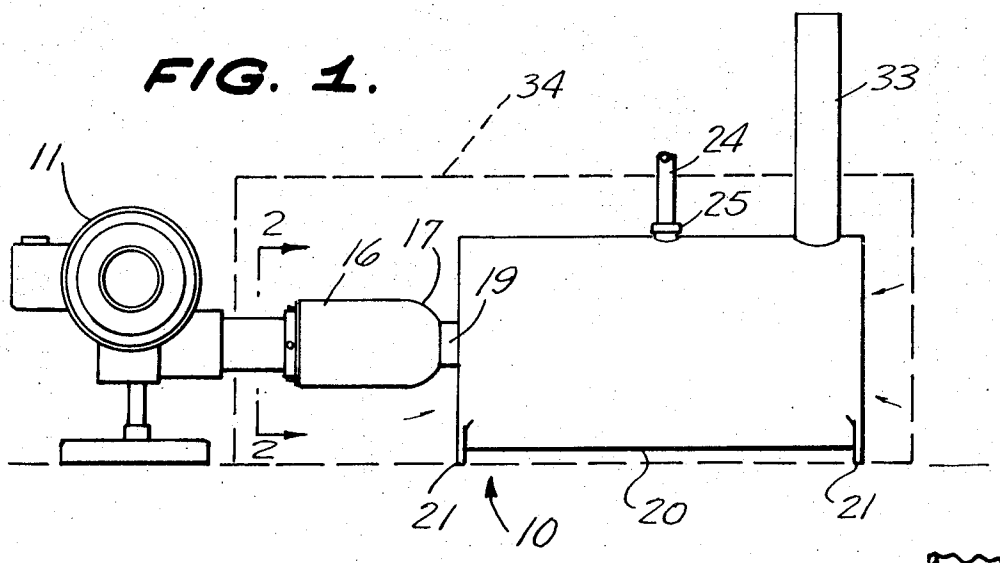

FIG. 3.

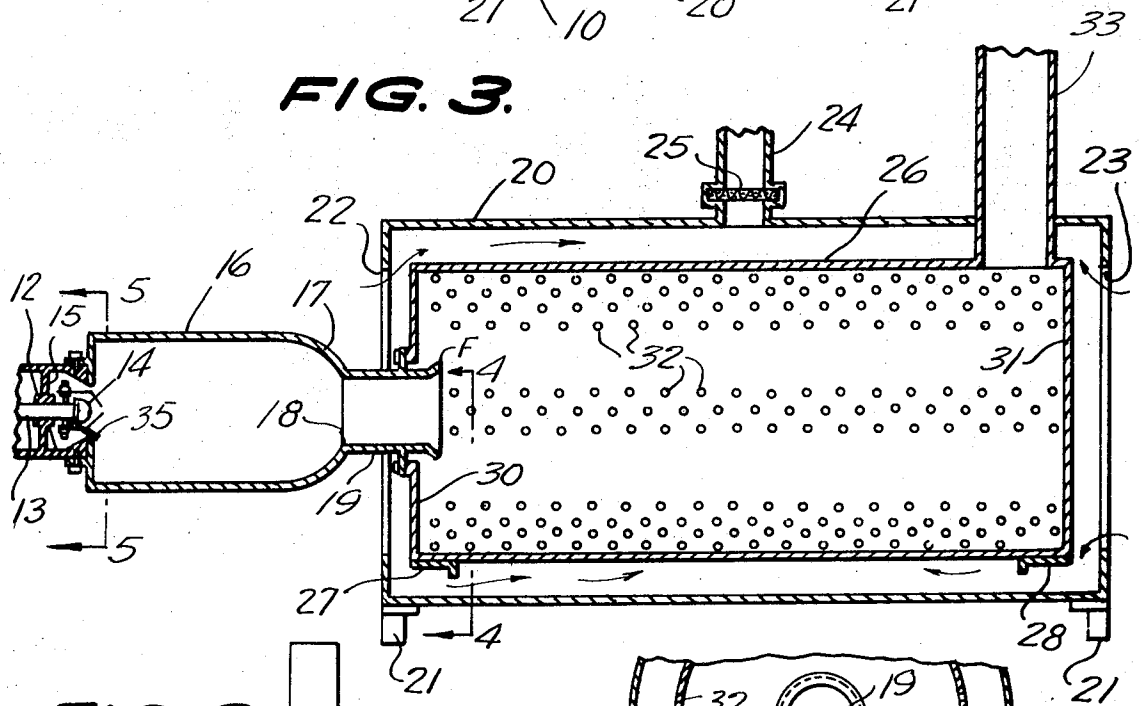

FIG. 2.

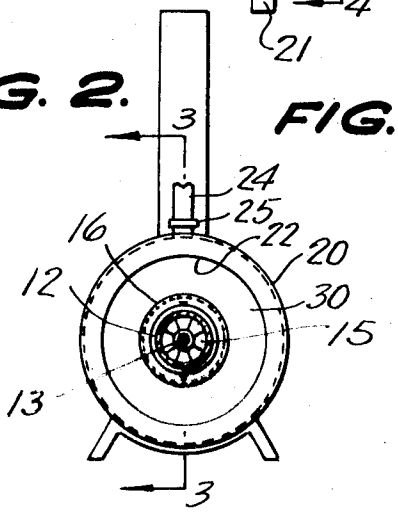

FIG. 4.

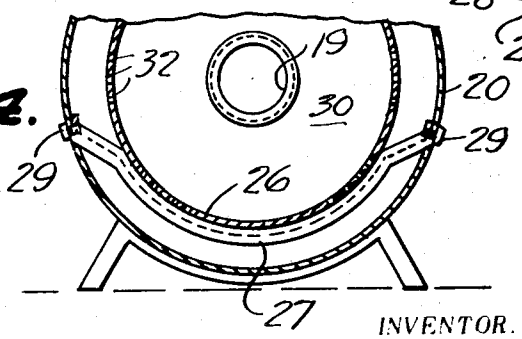

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FIG. 5.

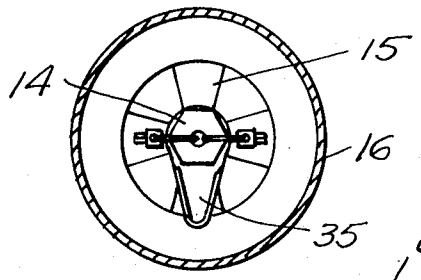

FIG. 6.

FIG. 9.

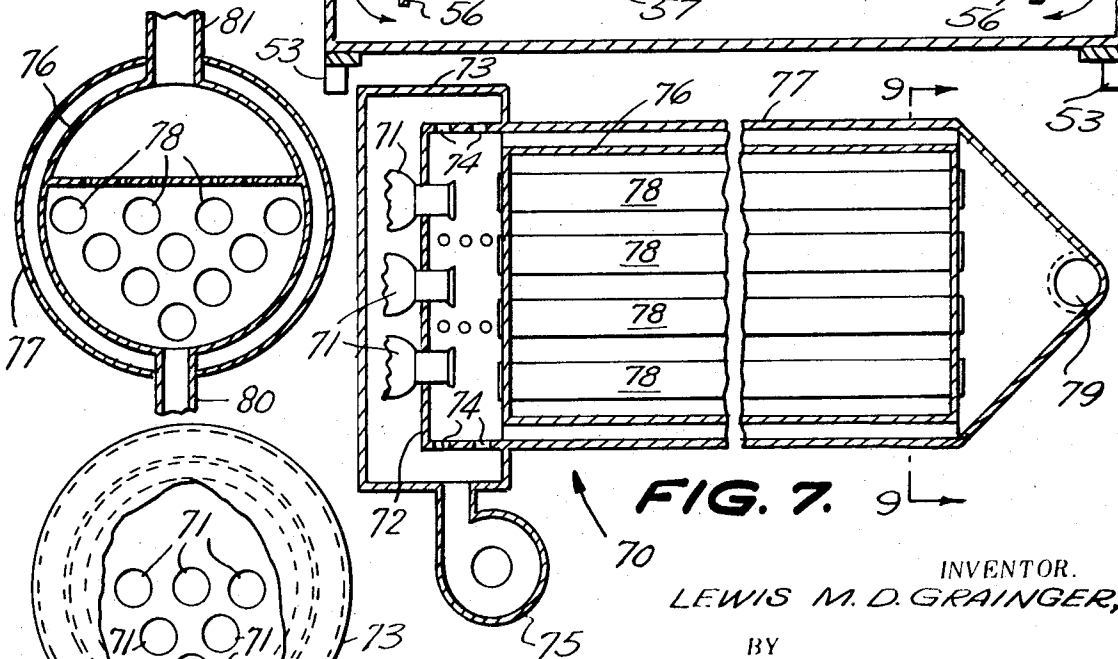

FIG. 7.

FIG. 8.

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ANTI-POLLUTION HEATING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to oil burner heating systems for air, hot water, and steam.

2. Summary of the Invention

An anti-pollution oil burning heating system in which a gun type oil burner is provided with a device for causing the air fed thereto to have a swirling motion as it leaves the gun. A combustion chamber of a diameter greater than the outlet diameter of the oil burner is secured to the burner and receives the products of combustion therefrom. The outlet of the combustion chamber is reduced in diameter and curves inwardly to momentarily retard the flow of gases from the combustion chamber to insure that all oil therein is ignited. A substantially larger secondary combustion chamber is secured to the combustion chamber and receives the products of combustion therefrom. The secondary combustion chamber is perforated to receive air through its walls and is surrounded by an air housing directing air thereto. The secondary combustion chamber provides a heating exchange for air flowing thereover and some of this air is directed to the heating system of the home or other enclosure to be heated.

A lip is provided under the oil jet of the oil burner to catch any drip following the operation of the burner and direct this into the combustion chamber where it is instantaneously vaporized by the heat of the combustion chamber.

In one modified form of the invention the products of combustion from the secondary combustion chamber are directed through a hot water heat exchanger to heat hot water for hot water heating systems. In another modified form of the invention the products of combustion are fed to a steam boiler to produce steam for a steam heating system.

The primary object of the invention is to provide an anti-pollution oil burner heating system for hot air, hot water and steam units.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of the invention;

FIG. 2 is a transverse sectional view taken along the line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is an enlarged fragmentary longitudinal sectional view taken along the line 3—3 of FIG. 2, looking in the direction of the arrows;

FIG. 4 is a fragmentary transverse sectional view taken along the line 4—4 of FIG. 3, looking in the direction of the arrows;

FIG. 5 is an enlarged transverse sectional view taken along the line 5—5 of FIG. 3, looking in the direction of the arrows;

FIG. 6 is a fragmentary longitudinal sectional view of a modified form of the invention;

FIG. 7 is a fragmentary horizontal sectional view of another modified form of the invention, looking upwardly;

FIG. 8 is a fragmentary end elevation of the structure illustrated in FIG. 7 shown partially broken away for convenience of illustration; and

FIG. 9 is a transverse sectional view taken along the line 9—9 of FIG. 7, looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, wherein like reference characters indicate like parts throughout the several figures, the reference numeral **10** indicates generally, an anti-pollution, oil burning, hot air heating system constructed in accordance with the invention.

The hot air heating system **10** includes a gun type oil burner **11** of generally conventional design having an outlet tube **12**, an oil supply pipe **13** extending centrally down the outlet tube **12**, and a burner nozzle **14** mounted on the oil supply tube **13**. A vane air deflector **15** is mounted in the outlet tube **12** on the oil supply tube **13** to cause the air flowing toward the nozzle **14** to be given a swirling motion to aid in the completion of the combustion.

A generally cylindrical primary combustion chamber **16** is secured to the oil burner outlet tube **12** and has a diameter substantially greater then that of the tube **12**. The combustion chamber **16** curves inwardly at **17** to a reduced diameter outlet **18** which opens into a neck **19** extending from the primary combustion chamber **16**. The downstream end of the neck **19** is outwardly flared at F to prevent blockage of the outlet end of the neck **19** by carbon buildup and the like.

A generally cylindrical air housing **20** is supported on legs **21** at its opposite ends and has a large circular opening **22** at one end thereof and a large circular opening **23** at the opposite end thereof. A heated air conduit **24** is connected to the housing **20** and has a filter **25** mounted therein to filter the heated air passing upwardly through the conduit **24**.

A generally cylindrical secondary combustion chamber **26** is positioned within the housing **20** and supported on a pair of semi-circular brackets **27, 28** at its opposite ends. The brackets **27, 28** are secured to the housing **20** by bolts **29** and are arranged to support the secondary combustion chamber **26** concentrically with the housing **20**. The secondary combustion chamber **26** has an inlet end wall **30** and an outlet end wall **31** spaced inwardly respectively from the openings **22, 23** of the housing **20** to permit a free flow of air therethrough.

The secondary combustion chamber **26** is provided with a plurality of air inlet bores **32** throughout its length to permit additional air to flow into the secondary combustion chamber **26** as required to completely burn all pollutents resulting from the oil burner **11**. A stack **33** extends upwardly from the secondary combustion chamber **26** through the wall of the housing **20** to the atmosphere.

A conventional cover **34** may surround the primary combustion chamber **16** and housing **20** as illustrated in FIG. **1** if desired. It should be understood that in the event that insufficient air is available within the area where the system **10** is located to support complete pollution free combustion then conventional air blowers will be provided to supply the required air from the atmosphere.

In the use and operation of the invention as illustrated in FIGS. **1** through **5** the oil burner **11** is operated in a conventional manner with the air sup-

plied thereto being given a highly swirling motion by the vanes **15**. The swirling air and burning oils supplied from the nozzle **14** are retained momentarily in the primary combustion chamber **16** to insure the ignition of all of the oil prior to the flow therefrom through the neck **18** into the secondary combustion chamber **26**. Combustion is completed in the secondary combustion chamber **26** as additional air is supplied thereto through the bores **32** in its surface. The walls of the secondary combustion chamber **26** become quite hot and heat the air coming in contact therewith within the housing **20**. The heated air passes up through the conduit **24** as well as through the bores **32** to provide the heat for the home or other space to be heated. The products of combustion from the secondary combustion chamber **26** then pass up through the stack **33** with all pollutents completely burned therefrom. A lip **35** is secured to the nozzle **14** in underlying relation thereto as can be seen in FIGS. **3** and **5** to catch any drip from the nozzle **14** and direct it into the primary combustion chamber **16**. The heat of the walls of the primary combustion chamber **16** will instantaneously vaporize and burn the oil dripping from the nozzle **14** immediately following the shutoff of the oil burner **11**. In the absence of the lip **35**, in prior art devices, oil will drip into the tube **12** and from there into the furnace accumalating to create wastage, pollution and possible explosion on restart of the burner.

Referring now to FIG. **6** a hot water heating system is indicated generally at **50**. The hot water heating system **50** utilizes a primary combustion chamber **51** identical to the primary combustion chamber **16** which is fed in the identical manner by an oil burner as illustrated in FIG. **1**.

A generally cylindrical housing **52** is supported on legs **53** and has large circular openings **54**, **55** at opposite ends thereof. Brackets **56** at opposite ends of the housing **52** support a generally cylindrical secondary combustion chamber **57** thereon spaced inwardly from the openings **54**, **55**. The secondary combustion chamber **57** is connected at **58** to the primary combustion chamber **51** to receive the products of combustion therefrom. The cylindrical wall of the secondary combustion chamber **57** is provided with a plurality of bores **59** opening therethrough to admit additional air to the secondary combustion chamber as required to totally complete the combustion of the products of combustion from the primary combustion chamber **51**.

A hear exchanger **60** is positioned on top of the housing **52** and has a water coil **61** positioned therein. A water inlet pipe **62** extends to the bottom of the coil **61** and a water outlet pipe **63** extends from the top thereof to a water pump **64**. The water pump **64** circulates the water from the hot water coil **61** through the area to be heated. A stack **65** is positioned on top of the heat exchanger **62**, receive the products of combustion to expel them to the atmosphere.

The use and operation of the modification illustrated in FIG. **6** is identical to that of the preferred form of the invention illustrated in FIGS. **1** through **5** with the exception that the products of combustion heat water for a domestic hot water system rather then the air heated in the preferred form of the invention.

In FIGS. **7** through **9** a steam boiler system is indicated generally at **70**. In the system **70** a plurality of primary combustion chambers **71** identical to the primary combustion chamber **16** are connected to a secondary combustion chamber **72** which is enclosed in an air housing **73**. Bores **74** open from the air housings **73** into the secondary combustion chamber **74** to admit additional air to complete the combustion from the primary combustion chamber **71** with the additional air being supplied by a blower **75**. A steam boiler **76** is positioned in a housing **77** extending from the secondary combustion chamber **72** and has a plurality of fire tubes **78** positioned therein to conduct the products of combustion through the boiler **76** to a stack **79** leading to the atmosphere. An inlet pipe **80** and an outlet pipe **81** are provided for the steam boiler **76** to feed a steam system.

In the use and operation of the modification illustrated in FIGS. **6** through **9** it is identical to that of the structure illustrated in FIGS. **1** through **5** with the exception that hot water and steam substituted for the air which is heated in the preferred form of the invention.

Having thus described the preferred embodiments of the invention it should be understood that numerous structural modifications and adaptations such as by preheating the fuel oil by conventional means, may be restored to without departing from the spirit of the invention.

What is claimed is:

1. An anti-pollution oil burning heating system comprising a gun type oil burner having an outlet tube, means in said tube for creating a swirling movement of the air passing therethrough, a primary combustion chamber secured to said tube to receive the products of combustion therefrom, said primary combustion chamber having a diameter greater than the diameter of said tube and having a reduced diameter outlet at the end thereof opposite said tube, a secondary combustion chamber secured to the outlet of said primary combustion chamber to receive products of combustion therefrom, said secondary combustion chamber having a diameter substantially greater than the diameter of said primary combustion chamber, a plurality of bores formed in the wall of said secondary combustion chamber to admit additional air thereto for completing the combustion of materials received from said primary combustion chamber, and means attached to said secondary combustion chamber for heating a fluid medium.

2. A device as claimed in claim **1** wherein a housing surrounds said secondary combustion chamber for containing air to be heated as the fluid medium.

3. A device as claimed in claim **1** wherein a hot water heating coil constitutes means for heating a fluid medium attached to said secondary combustion chamber.

4. A device as claimed in claim **1** wherein a steam boiler is attached to said secondary combustion chamber and constitutes the means for heating a fluid medium.

5. A device as claimed in claim **1** wherein said oil burner includes a spray nozzle and a lip is secured to said spray nozzle underlying said spray nozzle for directing oil dripping from said spray nozzle after shutoff of said oil burner to direct the dripping oil into said primary combustion chamber for instantaneous vaporation.

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