March 18, 1969 A. J. HOFMEYER 3,433,212

CIRCULATING HEATER

Filed May 9, 1966

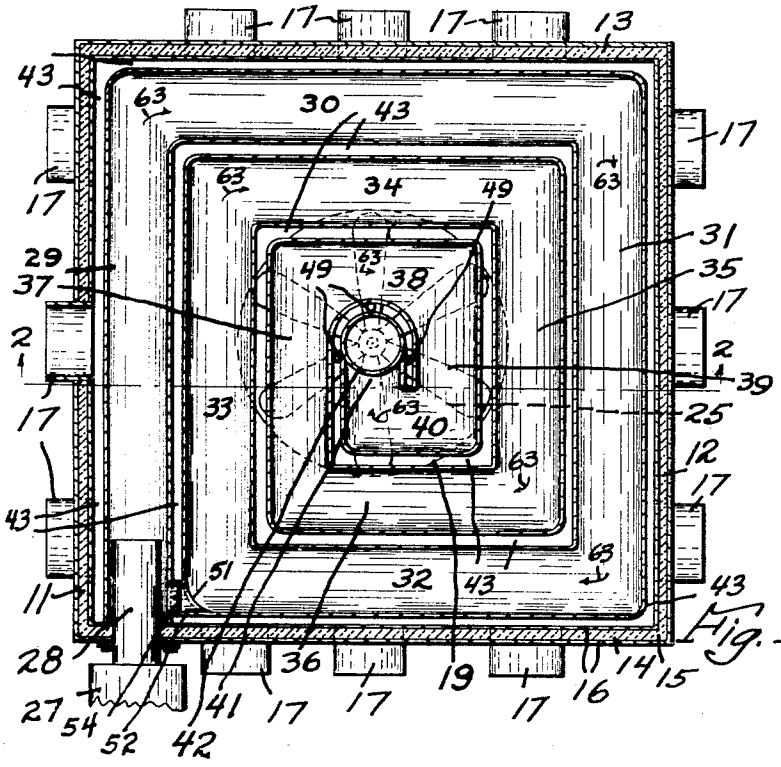


Fig. 1

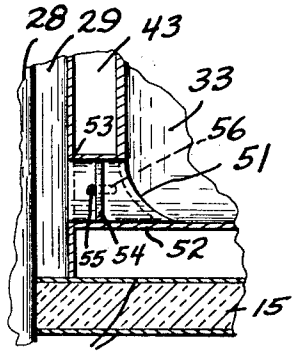


Fig. 3

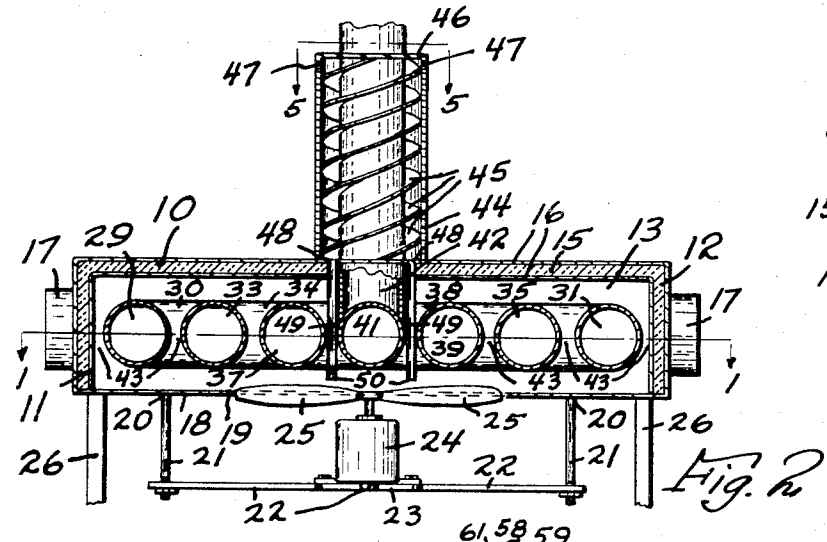


Fig. 2

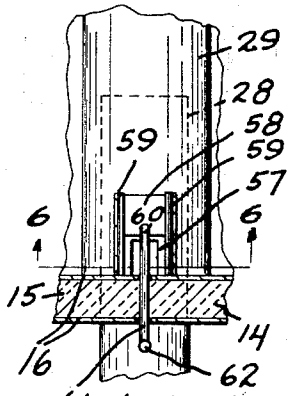


Fig. 4

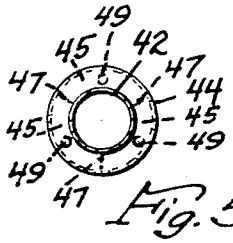


Fig. 5

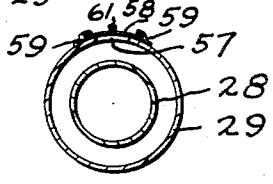


Fig. 6

INVENTOR.
Alloyd J. Hofmeyer
BY
Sam J. Slotky
ATTORNEY

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CIRCULATING HEATER

Alloyd J. Hofmeyer, Sanborn, Iowa 51248

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Int. Cl. F24h 3/02, 3/00

ABSTRACT OF THE DISCLOSURE

A heater having a convolute flue comprising the heat exchanger. An insulating housing encloses the flue which lies substantially horizontally. A fan beneath the flue blows air over the flue and outward through ducted openings in the housing.

My invention relates to a circulating heater.

An object of my invention is to provide a heater unit in which a large proportion of the heat will be saved and transferred to the necessary spaces without said heat passing through the flue pipe or chimney.

A further object of my invention is to provide a completely fireproof arrangement.

A further object of my invention is to provide a flue pipe which is efficiently cooled.

A further object of my invention is to provide a circulating heater which is efficient in operation and which includes adjustable features for relieving the vacuum within the unit.

With these and other objects in view, my invention consists in the construction, arrangement, and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

FIGURE 1 is a sectional view of the circulating heater taken substantially along the line 1—1 of FIGURE 2,

FIGURE 2 is a sectional view of FIGURE 1 taken substantially along the line 2—2 thereof,

FIGURE 3 is an enlarged detail,

FIGURE 4 is a plan view of a modification,

FIGURE 5 is a sectional view taken substantially along the line 5—5 of FIGURE 2, and

FIGURE 6 is a sectional view taken along the line 6—6 of FIGURE 4.

My invention contemplates the provision of a circulating heater such as an oil burning type which will eliminate the various hazards occasioned by various heaters by being practically completely proof against fire damage and the like, and which will also insure that the minimum amount of heat passes outwardly through the flue pipe, and that the maximum amount of heat is recovered for use.

In describing my invention, I have used the character 10 to designate an upper insulated wall, the characters 11 and 12 indicating further insulated side walls, the characters 13 and 14 indicating further insulated walls, these walls being suitably insulated by means of the insulation 15 positioned between the metal sheaths 16.

Communicating through the various insulated walls are the various cylindrical tubes 17 to which any pipes etc. can be attached.

The character 18 indicates a bottom wall having the circular opening at 19 and attached as at 20 thereto are the various studs 21 which support the framework 22 which are attached to the centrally positioned plate 23 upon which is secured an electric motor 24 which drives the fan blades 25, such blades being substantially within the opening 19.

The character 26 indicates suitable legs upon which the unit can be supported, or the unit can be suitably suspended from a ceiling or the like. The character 27 indicates an oil burner of the usual construction having the cylindrical tube portion 28 through which the fire will pass and this tube 28 is secured within a cylindrical hollow pipe 29 which merges into the further integral pipe portions 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, and 41. The portion 41 communicates directly to the vertically positioned flue pipe 42 which extends through the upper wall 10.

It should be specifically noted that all of the various pipe portions provide a continuous passageway which is arranged somewhat in a spiral fashion or in other words gradually reduces in size until being connected to the flue pipe it being understood that although these pipes are substantially square in plan view, nevertheless they could be oblong, oval or round as desired. An air space 43 is provided between the various portions of the passageways and the outer walls.

Spaced from the flue pipe 42, is a further cylindrical vertically positioned tube 44, and positioned between the pipes 42 and the tube 44 are the helically arranged baffles or conveyor members 45, there being three of the same, and each baffle unit being pitched so as to provide three different passageways, and attached across the upper end of the tube 44 is the further top wall 46. The character 47 indicates openings in the top wall 46 at the top of the tube 44.

The various helical members terminate at 47 (see FIGURE 5) and communicating at 48 to each of the helical passageways are the tubes 49 which extend downwardly, these tubes having the open ends 50 just adjacent to the fan blades 25.

Communicating with the passageway 33 at 51 is a tube 52 which communicates at 53 to the passageway 29, and positioned within this tube is the disc shaped valve 54 which is attached to the rod 55 to which is attached the handle portion 56 for rotating the valve 54 to the angle desired, the handle portion 56 being located beneath the wall 18.

A modified form of construction is shown in FIGURES 4 and 6 which construction can be used as desired, and the purpose of which will be explained later. In this construction the pipe 29 will include a rectangular opening 57, the character 58 indicating an arcuate member adapted to uncover or cover the opening 57, the member 58 being held between the round bars 59 which are attached to the pipe 29, and attached at 60 to the member 58 is the rod 61 which passes through the wall 14 and terminates in the knob 62 whereby the closure member 58 can be regulated as desired.

In describing how my invention operates, it will be noted that the oil burner flame and heat emitted through the member 28 will pass in the direction of the arrows 63 completely around through the various pipes until it reaches the flue 42, where any unburned gases will be emitted, and due to this complete spiral passage of the heat thus generated, the heat will be generated in a relatively flat plane. Meanwhile, the fan 24, 25 will be drawing the outside air through the opening 19, which air will circulate completely around the various pipes above described, and this warm air will be emitted outwardly through the pipes 17 to the location desired by means of pipes, or directly when the pipes are not used.

Due to the insulating features, the heater is constantly protected from fire damage and the like.

The spacing between the various passageways provides for more complete circulation of the air which is to be heated to thereby considerably increase the efficiency of the unit.

In order to prevent turbulence at the end of the burner 28, it is desirable to inject additional air or gases into the pipe 29 behind the end of the burner. This prevents the

combustion gases from blowing back into that space. Furthermore, and perhaps more importantly, with my preferred embodiment, a more complete combustion can be obtained by recirculating the gases over the combustion chamber from the tube **33**. Therefore, the tube **52** provides an important function in permitting this action. The butterfly valve or flap **54** is controllable to provide the proper amount of recirculation. In the embodiment of FIGURES 4 and 6, the valve **58** provides a similar function except that instead of providing for re-circulation, it provides for the injection of fresh air carrying added oxygen for better combustion.

In some instances when desired the motor **24** can be reversible to provide similar effects in a reverse direction.

The tubes **49** will draw the air directly from the fan **25**, which colder air will then pass quickly upwardly into the helically arranged baffles **45** whereby these three streams of colder air in passing about the flue pipe **42** will efficiently cool down the flue pipe to a considerable degree to thereby increase the safety features of the unit.

It will now be noted that I have provided the advantages mentioned in the objects of my invention with further advantages being apparent.

I claim as my invention:

1. A circulating heater comprising an insulated enclosure, a spiral passageway having an inner terminal centrally of said enclosure and an outer terminal near the outer wall of said enclosure, flue means connected to and in open communication with said inner terminal, burner means in said outer terminal, means for directing the flow of air over said passageway and thence outwardly of said enclosure whereby heat exchange takes place between the gas inside said passageway and the air within said enclosure but outside of said passageway, and tube means extending between convolutions of said passageway, one end of said tube being adapted to discharge

in the region of said burner whereby partially burned gases may be led off and recirculated past said burner for more complete combustion.

2. The device of claim **1** in which controllable flap means is pivotally mounted in said tube means for control of the flow of recirculated gas.

3. A circulating heater comprising a heat insulated enclosure, a spiral passageway mounted within said enclosure and having an inner terminal substantially central of said enclosure, a flue pipe communicating with said inner terminal, burner means within said passageway adapted to cause heated gas to flow therethrough, tube means surrounding said flue pipe, spiral fin means between said tube means and said flue pipe forming spiral duct ways therebetween, fan means fixed to said enclosure adapted to move air through the enclosure and across said spiral passageway and cooling tubes mounted adjacent said fan and terminating at said spiral duct ways whereby cooling air is picked up from said fan and conducted directly to said duct ways for better cooling of said flue pipe.

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JAMES W. WESTHAVER, *Primary Examiner.*

U.S. Cl. X.R.

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