

Dec. 8, 1925.

H. W. LASTER

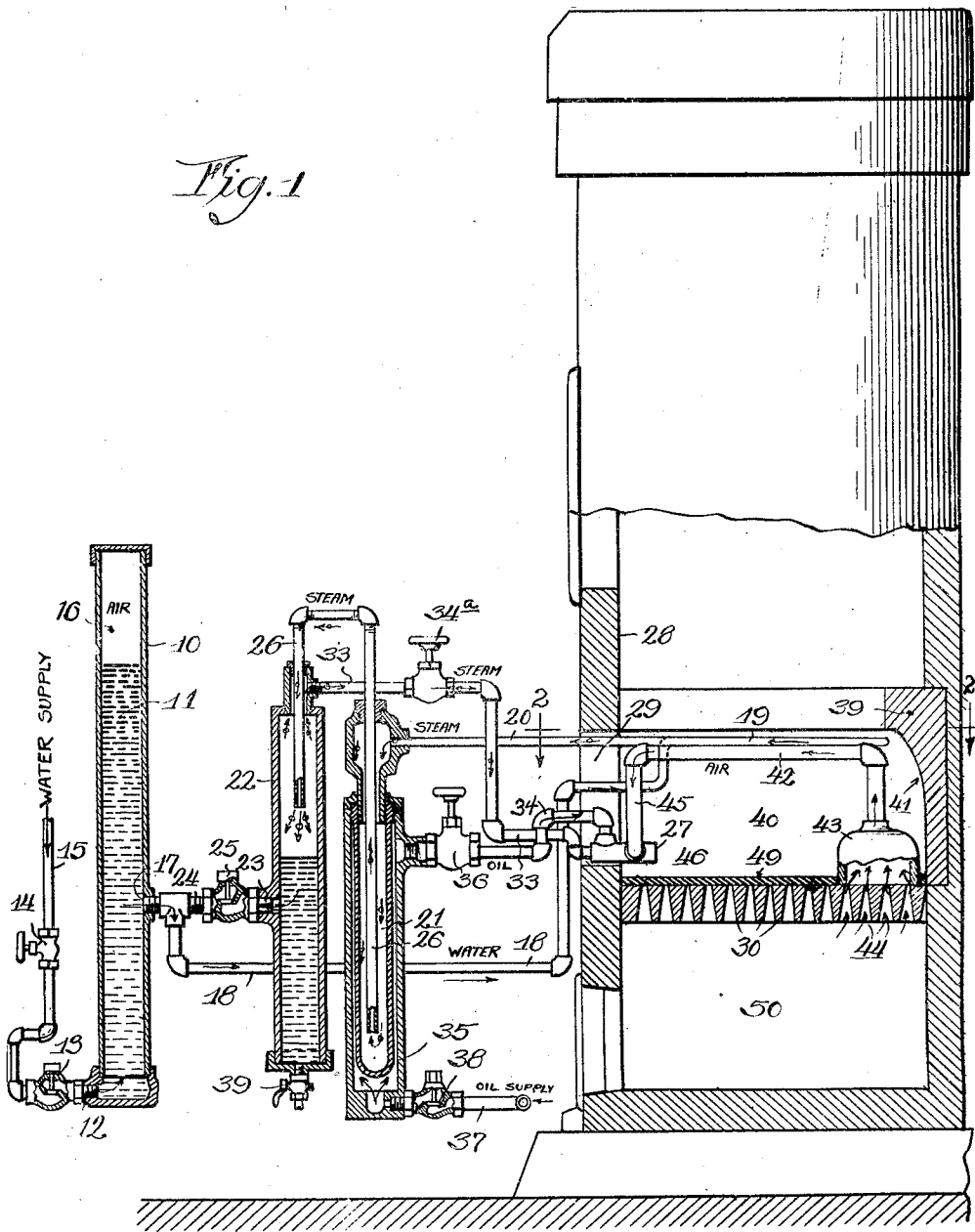
1,564,592

OIL BURNER

Filed Aug. 9, 1924

2 Sheets-Sheet 1

Fig. 1



Inventor
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By *E. Jochum & Co. Attys.*

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2 Sheets-Sheet 2

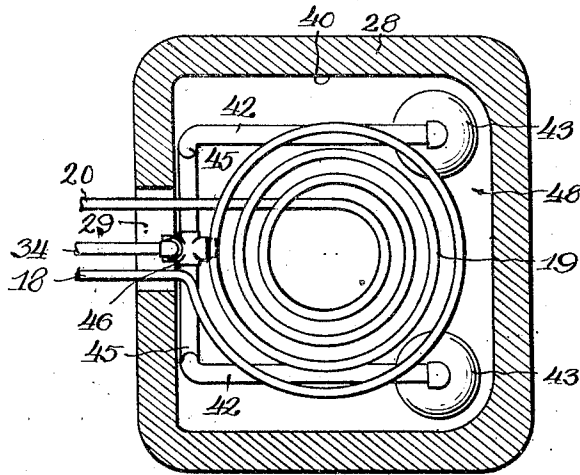


Fig. 2

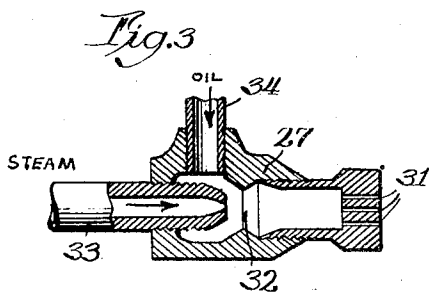


Fig. 3

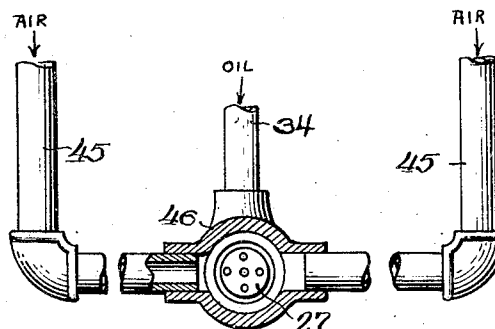


Fig. 4

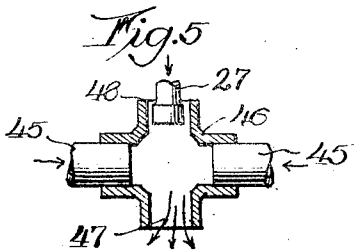


Fig. 5

Inventor,
Harry W. Laster,
Attys

UNITED STATES PATENT OFFICE.

HARRY W. LASTER, OF OAK PARK, ILLINOIS, ASSIGNOR OF THIRTY-THREE AND ONE-THIRD PER CENT TO JOHN E. BYRON, OF CHICAGO, ILLINOIS, AND FIFTEEN AND TWO-THIRDS PER CENT TO MICHAEL J. BOYCE, OF OAK PARK, ILLINOIS.

OIL BURNER.

Application filed August 9, 1924. Serial No. 731,031.

To all whom it may concern:

Be it known that I, HARRY W. LASTER, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Oil Burners, of which the following is a specification.

This invention relates to improvements in oil burners and one of the objects of the same is to provide an improved oil burning apparatus in which means are provided to preheat the oil to thin it so that the oil will atomize freely and more completely.

A further object is to provide an improved burner having associated therewith means for maintaining a water column from which water is supplied, to be generated into steam to be atomized with oil; and also an improved air cushion co-operating with the column of water so that pulsation of the supply of water and steam will be prevented.

A further object is to provide improved means for removing impurities from the water and steam.

A further object is to provide improved means for preheating the air before it is mixed with the fuel.

A further object is to provide an improved oil burning apparatus of this character which will be of a simple, durable, and compact arrangement and which will be effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which;

Figure 1 is a view partly in vertical section and partly in elevation of an apparatus of this character constructed in accordance with the principles of this invention and showing the same in connection with a furnace.

Figure 2 is a detail sectional view taken on line 2—2 Figure 1.

Figure 3 is an enlarged detail sectional view of the nozzle.

Figure 4 is a view partly in elevation and partly in section of the nozzle and the means

for supplying preheated air to the nozzle to support combustion.

Figure 5 is an enlarged detail view partly in section and partly in elevation of the coupling at the junction of the nozzle and air pipes.

The apparatus consists of a closed chamber or column 10 for maintaining a column of water 11, which latter may be supplied to the chamber 10 preferably at the bottom thereof through an inlet 12 controlled by a check valve 13. A controlling valve 14 may be provided in the supply pipe 15 for controlling the supply of water to the chamber 10. The water is supplied to this chamber preferably under the city pressure, and when the water enters the chamber 10 it will confine and compress a quantity of air 16 at the top of the chamber 10, so as to form a cushion for the column of water and place the column under fluid pressure. This will cause the water to flow from the chamber 10 through the outlet 17 under pressure to a vaporizing pipe 18 which latter has communication with a vaporizing coil 19.

The other end of the coil 19 has communication with a pipe 20 through which steam is conducted into a chamber 21. Interposed between the chamber 21 and the chamber 10 is a combined steam and water chamber 22 which has communication with the pipe 18 through an outlet 23 in the chamber 22, through the medium of a pipe 24, in which latter may be arranged a check valve 25. The pipe 24 also has communication with the chamber 10. The check valve 25 is set to maintain the water level in the chamber 22 above the outlet 23, until the pressure in the chamber 22 upon the water therein is sufficient to unseat the valve 25 by overcoming the pressure or head on the column of water 11 in the chamber 10. When the valve 25 is unseated water from the chamber 22 will flow through the outlet 23 past the valve 25 and into the vaporizing pipe 18. A pipe 26 telescopes with the chamber 21 and extends therebeyond and is of an external diameter considerably less than the internal diameter of the chamber 21 and into which latter it extends, to form a tortuous passage for the steam from the chamber 21 and which steam enters the chamber 21 through the pipe 20. The pipe 26 extends into the

chamber 21 through one wall thereof to a point in close proximity to but spaced from the opposite wall of the chamber, so as not to interfere with the passage of the steam into the pipe 26 from the chamber 21.

The portion of the pipe 26 which extends into the chamber 22 terminates above the water level in the chamber and forms a communication between the chambers 21 and 22. The steam discharged from the pipe 26 into the chamber 22 will be delivered downwardly and against the water contained in this chamber. This action or contact of the steam with the body of water will operate to separate all impurities from the steam and the water.

A nozzle designated generally by the reference numeral 27 is arranged to discharge into a furnace 28, preferably through the clinker door 29 above the grate bars 30. The nozzle 27 (see particularly Figure 3) may be provided with a plurality of discharge outlets 31 and the interior of the body of the nozzle is preferably of a venturi construction 32. Connected with the nozzle so as to discharge therein is a pipe 33 for conducting steam to the nozzle from the chamber 22. This pipe 33 has communication with the chamber 22 preferably adjacent the top thereof and may be provided with a suitable controlling valve 34 to control the flow of steam therethrough. Connected also with the nozzle 27 and discharging therein is a pipe 34 for supplying oil to the nozzle. As the steam is delivered through the pipe 33 into the nozzle 27 and as it passes through the nozzle, it will be manifest that as the steam expands in the nozzle, it will create a suction in the pipe 34. Oil will then be drawn in through this pipe 34 and will be atomized with the steam and delivered through the discharge outlets 31 of the nozzle, into the fire box of the furnace.

Encompassing the chamber 21 is a chamber or passage 35 which is of an interior diameter somewhat greater than the exterior diameter of the chamber 21 and is out of communication with the chamber 21. The pipe 34 has communication with the chamber 35 preferably adjacent the top thereof and remote from the end of the chamber 21, and which latter chamber telescopes with the chamber 35.

A control valve 36 may be provided in the pipe 34 for controlling the supply of oil to the nozzle 27.

Oil is supplied to the chamber 35 from any suitable source of supply through a pipe 37, which has communication with the chamber 35 preferably at the bottom of the latter. As the oil enters the chamber 35 through the pipe 37, it will flow between the walls of the chambers 31 and 35 and around the chamber 21 and as the latter is heated

by the steam from the coil 19, it will be manifest that the oil in flowing through the chamber 35 will be heated before it enters the pipe 34 to be delivered to the nozzle 27.

A check valve 38 may be provided in the pipe 37, and if desired a clean out valve or cock 39 may be provided for the steam and water chamber 22 to remove sediment therefrom.

It is thought the operation of this portion of the apparatus will be clearly understood from the foregoing description but briefly stated it is as follows.

Water is supplied to the chamber 10 through the pipe 15, and the column of water will compress the air 10 so that when the valve 14 is closed the column of water 11 will be under a constant pressure. The pressure upon the column of water 11 causes the water to flow through the outlet 17 into the pipe 18, and to the coil 19 where it is converted into steam. The steam or vapor then passes through the pipe 20 into the chamber 21, and through the pipe 26 to be delivered into the chamber 22, against the water in the chamber 22. The steam contacting with this body of water will cause the impurities to be separated and deposited or precipitated in the chamber 22, from which they may be removed through the clean out cock 39.

Under normal conditions the valve 25 will be maintained closed by the pressure of the column of liquid 11 and of the air 16, against the pressure of the steam in the chamber 22 upon the water in the latter. As the column of liquid 11 is consumed and as the height of the column falls, aided by the expansion of the air 16, until the column 11 is of such a height that water will not be supplied therefrom to the pipe 18, through the outlet 17, the valve 25 will be unseated by the pressure in the chamber 22, so as to allow the water in the chamber 22 to flow through the outlet 23 into the pipe 18, thereby maintaining a supply of water to the coil 19 to be vaporized.

The water is replenished in the chamber 22 by condensation. As the steam is flowing through the chamber 21 to the chamber 22, oil will be supplied to the chamber 35 through the pipe 37 and will be drawn through the pipe 34 to the nozzle 27 by the suction created in the nozzle by the steam passing through the venturi 32.

It will be noted that before any of the steam which has been generated in the coil 19, reaches the nozzle 27, it must be delivered into the chamber 22. The delivery of the steam into the chamber 22 and the contact of the steam with the water in this chamber will operate as a separator for separating the impurities from the steam and the water.

After the apparatus has been once ad-

justed to supply the desired and proportionate quantities of steam and oil to the nozzle, it will be manifest that the apparatus will be automatic in its action, and the water in the chamber 22 will serve as a reserve supply of water to be automatically used when the supply 11 in the column or chamber 10 has been sufficiently reduced or consumed.

Fire brick 39 are preferably arranged within the fire box 40 above the grate bars 30, and are preferably provided with a curved or arched face 41 so shaped that the products of combustion issuing from the nozzle 27 will be directed against the faces 41 to cause the products of combustion to swirl about in the fire box.

Any suitable means may be provided for preheating and supplying heated air to support combustion within the fire box. A suitable and efficient means consists of pipes 42 connected to the inlet ends of each of which is an open bell shaped member 43. These members 43 rest upon the grate bars 30 and have communication with some of the openings 44 between the grate bars. The members 43 are preferably located at the rear of the grate and on opposite sides of the fire box 40. The pipes 42 arch above the grate bars and extend forwardly to the front of the fire box. The forward ends of these pipes 42 extend downwardly as at 45 (see particularly Figure 4) and terminate adjacent the nozzle 27. The pipes 45 are connected with a cross like coupling 46 so that air in the pipe will be discharged thereunto and then into the fire box through the opening 47 arranged in alinement with the opening 48 and into which latter opening the nozzle 27 projects. The fuel being discharged from the nozzle passes out of the opening 47 into the fire box and will entrain or create a forced draft for the air through the pipes 42.

A covering 49 preferably in the form of sheet metal is placed upon the grate bars 30 so as to close all of the openings 44 between the grate bars, with the exception of the openings that communicate with the bell shaped members 43.

With this construction it will be manifest that any air which enters the fire box 40 will flow from the ash pit 50 through the openings 44, bell shaped members 43, into the pipes 42 and through the pipes 45 to be discharged through the opening 47 in the coupling 46. This will cause the air to be preheated before it is delivered into the fire box, and will create a forced draft through the pipes 42. Furthermore by preheating the air a roaring sound of the nozzle will be prevented.

The pipes 42 are preferably arranged that they will serve as a support for the vaporizing coil 19.

With this improved apparatus the oil supply is heated so as to thin the oil before it is delivered to the nozzle, with the result that the oil will atomize more freely and completely.

By the provision of the water column which is maintained under air pressure, the air will serve as a cushion and will prevent pulsation of the supply of water and steam, and especially of steam.

While the preferred form of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts within the scope of the claims without departing from the spirit of this invention.

What is claimed as new is:—

1. An oil burning apparatus including means for maintaining a column of water, air cushioning means for the water column, a nozzle, a heating coil leading from the water column to vaporize the water, a receiver also connected with said coil for maintaining a reserve supply of water, means automatically controlling the delivery of the water from the reserve supply to the heating coil, means for delivering vapor to the nozzle, means for delivering oil to the nozzle, and means for preheating the oil before it is delivered to the nozzle.

2. An oil burning apparatus including means for maintaining a column of water, a vaporizer connected at one end with the said water column, a combined steam and water chamber with which the vaporizer also has communication, a valved connection between the said water column and the said chamber, a nozzle, a connection between the said chamber and the nozzle to deliver vapor to the latter, and means for supplying oil to the nozzle.

3. An oil burning apparatus including means for maintaining a column of water, a vaporizer connected at one end with the said water column, a combined steam and water chamber with which the vaporizer also has communication, a valved connection between the said water column and the said chamber, a nozzle, a connection between the said chamber and the nozzle to deliver vapor to the latter, and means for supplying oil to the nozzle, the said connection between the vaporizer and the said chamber including means for preheating the oil before it is delivered to the said nozzle.

4. An oil burning apparatus including means for maintaining a column of water, a vaporizer connected at one end with the said water column, a combined steam and water chamber with which the vaporizer also has communication, a valved connection between the said water column and the said chamber, a nozzle, a connection between the

said chamber and the nozzle to deliver vapor to the latter, means for supplying oil to the nozzle, and means individual to the vapor and the oil supplies for controlling them.

5 5. An oil burning apparatus including means for maintaining a column of water, a vaporizing pipe leading from the said water column, a combined water and steam chamber, automatically operating means
10 normally closing the connection between the said pipe and the water and steam chamber, said chamber having communication with the said vaporizing pipe above the water level in the chamber, a nozzle, a connection
15 between the nozzle and the said chamber above the water level in the chamber, and means for supplying oil to the nozzle.

6. An oil burning apparatus including means for maintaining a column of water,
20 a vaporizing pipe leading from the said water column, a combined water and steam chamber, a connection between the said pipe and the water column and chamber, said chamber having communication with the
25 said vaporizing pipe above the water level in the chamber, a nozzle, a connection between the nozzle and the said chamber above the water level in the chamber, and means for supplying oil to the nozzle, a portion of
30 the connection between the said vaporizing pipe and the said chamber serving to preheat the oil before it reaches the nozzle.

7. An oil burning apparatus including means for maintaining a water column, a
35 nozzle, means for conveying water from the column and vaporizing the water, means for conveying the vapor to the nozzle, the last recited means including means for causing the vapor to impinge a body of water different
40 from the said column for removing impurities in the water, and means for delivering oil to the said nozzle.

8. An oil burning apparatus including means for maintaining a water column, a
45 nozzle, means for conveying water from the column and vaporizing the water, means for conveying the vapor to the nozzle, the last recited means including means for causing the vapor to impinge a body of water different
50 from the said column for removing impurities in the water, means for delivering oil to the said nozzle, the second recited means including an oil heater, means for supplying oil to the oil heater, and means
55 for conducting the heated oil from the said heater to the said nozzle.

9. An oil burning apparatus including means for maintaining a column of water,
60 a conduit for conveying water from the said column and vaporizing the water, a water chamber, a nozzle, a connection between the water chamber and the said conduit for automatically supplying water to the said conduit, means for discharging the vapor
65 into the said chamber and against the body

of water therein, a connection between the said chamber above the water level thereof and the said nozzle, for conveying vapor to the nozzle, and means for supplying oil to the nozzle

70 10. An oil burning apparatus including means for maintaining a column of water, a conduit for conveying water from the said column and vaporizing the water, a water chamber, a nozzle, a connection between the
75 water chamber and the said conduit for automatically supplying water to the said conduit, means for discharging the vapor into the said chamber and against the body of water therein, a connection between the
80 said chamber above the water level thereof and the said nozzle for conveying vapor to the nozzle, and means for supplying oil to the nozzle, a portion of the last recited connection serving as a heater to preheat the oil
85 before it is delivered to the said nozzle.

11. An oil burning apparatus including a water chamber for receiving and condensing vapor produced from a separate water
90 supply to produce a quantity of water in said chamber, a vaporizing pipe, said pipe having an outlet having communication with the said chamber above the water level therein, a nozzle, means for conveying and
95 delivering vapor from the said chamber to the said nozzle, and means for supplying oil to the nozzle.

12. An oil burning apparatus including a water chamber for receiving and condensing
100 vapor therein produced from a separate water supply to produce a quantity of water in said chamber, a vaporizing pipe, said pipe having an outlet having communication with the said chamber above the water level
105 therein, a nozzle, means for conveying and delivering vapor from the said chamber to the said nozzle, and means for supplying oil to the nozzle, a portion of the last recited means encompassing a portion of the said
110 vaporizing pipe for preheating the oil.

13. An oil burning apparatus including a water chamber, a vaporizing conduit leading
115 from the chamber and back into the chamber and causing the vapor to impinge the water therein and above the water level in the chamber, a nozzle, means for conveying vapor from the said chamber to the nozzle, and means for delivering oil to the
120 nozzle, the last said means including provisions for conducting the vapor through the supply of oil and out of commingling relation therewith during the passage of the oil to the said nozzle.

14. An oil burning apparatus including means for maintaining a column of water
125 under fluid pressure, a nozzle, means for conveying water from the column and vaporizing the water, means for conveying the vapor to the nozzle, the last recited means including means for impinging the vapor
130

against a body of water different from the said column for removing impurities in the fluid, and means for delivering oil to the said nozzle.

15. An oil burning apparatus including means for maintaining a column of water under fluid pressure, a nozzle, means for conveying water from the column and vaporizing the water, means for conveying the vapor to the nozzle, the last recited means including means for impinging the vapor against a body of water for removing impurities in the fluid, means for delivering oil to the said nozzle, and means for preheating the oil by the vapor before the latter is discharged against the said body of water.

16. An oil burning apparatus including a closed water chamber for maintaining a column of water under air pressure, a second water chamber, a communication between the chambers, a normally closed and automatically actuated valve for controlling said communication, a vaporizing pipe leading from the chambers and discharging into the said second water chamber above the liquid level therein, a nozzle, a communication between the nozzle and the said second water chamber above the water level in the latter, and an oil supply conduit leading to the nozzle.

17. An oil burning apparatus including a closed water chamber for maintaining a column of water under air pressure, a second water chamber, a communication between the chambers, a normally closed and automatically actuated valve for controlling said communication, a vaporizing pipe leading from the chambers and discharging into the said second water chamber above the liquid level therein, a nozzle, a communication between the nozzle and the said second water chamber above the water level in the latter, and an oil supply conduit leading to the nozzle, a portion of the said oil supply conduit encompassing a portion of the said vaporizing pipe.

18. An oil burning apparatus including means for maintaining a column of water under air pressure, a second water chamber, a communication between the chambers, a normally closed and automatically actuated valve for controlling said communication, a vaporizing pipe leading from the chambers and discharging into the said second water chamber above the water level therein, a nozzle, a communication between the nozzle and the said second water chamber above the water level in the latter, an oil supply leading to the nozzle, and means for preheating a supply of air to be delivered to the nozzle.

19. An oil burning apparatus including means for maintaining a column of water under air pressure, a second water chamber, a communication between the chambers, a

normally closed and automatically actuated valve for controlling said communication, a vaporizing pipe leading from the chambers and discharging into the said second water chamber above the water level therein a nozzle, a communication between the nozzle and the said second water chamber above the water level in the latter, an oil supply leading to the nozzle, means for preheating the oil before it is delivered to the nozzle, and means for preheating a supply of air to be delivered to the nozzle.

20. An oil burning apparatus including a water chamber, a vaporizing pipe leading from the chamber and discharging back into the chamber above the water level to cause the vapor to impinge the water therein, a nozzle, means for conveying vapor from the said chamber to the nozzle, and means for delivering a supply of preheated oil to the nozzle, the last recited means including an oil receiving chamber or conduit into which a portion of the said vaporizing pipe telescopes.

21. In combination with a heater having a fire chamber and a grate, an oil burning apparatus including means for vaporizing and discharging fuel into the fire box and including a nozzle, air pipes covering portions of the grate bars and having open communication with the spaces between the grate bars, and means covering the remaining area of the grate bars to close the spaces therebetween, to prevent the passage of air through the last recited spaces, the said air pipes terminating and having discharge outlets adjacent the said nozzle.

22. In combination with a heater having a fire chamber and a grate, an oil burning apparatus including means for vaporizing and discharging fuel into the fire box and including a nozzle, air pipes covering portions of the grate bars and having open communication with the spaces between the grate bars, and means covering the remaining area of the grate bars to close the spaces therebetween to prevent the passage of air through the last recited spaces, the said air pipes terminating and having discharge outlets adjacent the said nozzle, the said air pipes serving as a support for the said vaporizing means.

23. In combination with a heater, a grate therein, air pipes having open bell shaped extremities resting upon the grate and having communications with the spaces between the grate bars, means covering the remaining area of the grate to close the spaces between the grate bars to the passage of air therethrough, and a vapor nozzle discharging into the fire box above the grate, said air pipes having discharge outlets adjacent the said nozzle.

24. In combination with a heater, a grate therein, air pipes having open bell shaped

extremities resting upon the grate and having communication with the spaces between the grate bars, means covering the remaining area of the grate to close the spaces between the grate bars to the passage of air therethrough, and a vapor nozzle discharging into the fire box above the grate, said air pipes arching above the grate and nozzle and having discharge outlets adjacent the nozzle.

25. In combination with a heater, a grate therein, air pipes having enlarged inlet ends

resting upon the grate and communicating with the spaces between the grate bars, means covering the remaining area of the grate to close the spaces therebetween, a nozzle, said air pipes arching above the grate and nozzle, and a vaporizing pipe supported by the air pipes, said air pipes having discharge outlets adjacent the said nozzle.

In testimony whereof I have signed my name to this specification, on this 31st day of July, A. D. 1924.

HARRY W. LASTER.