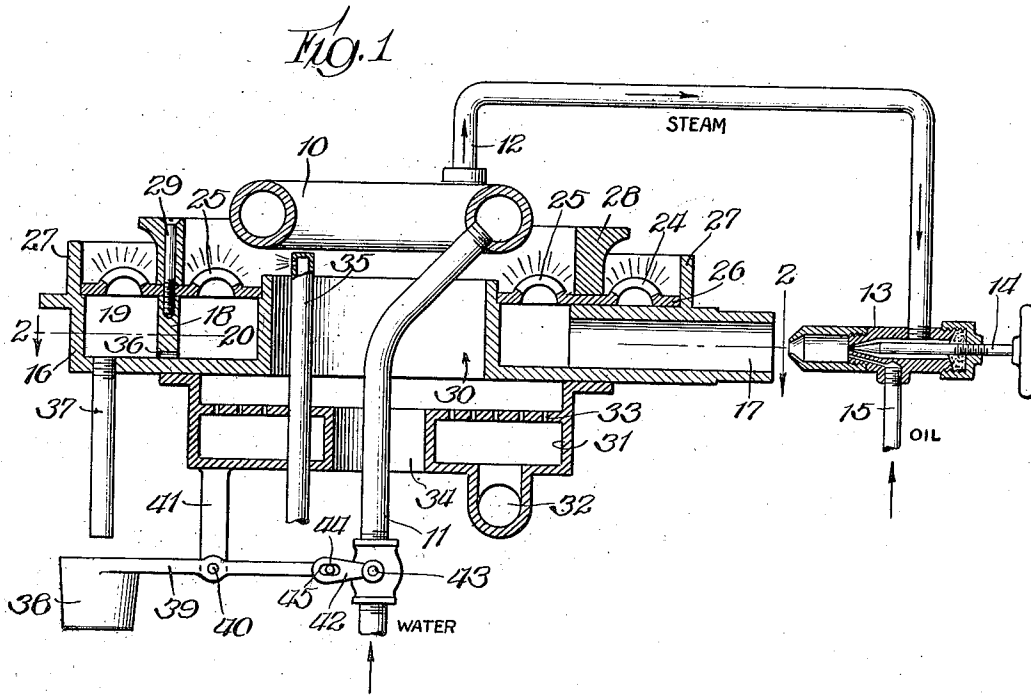
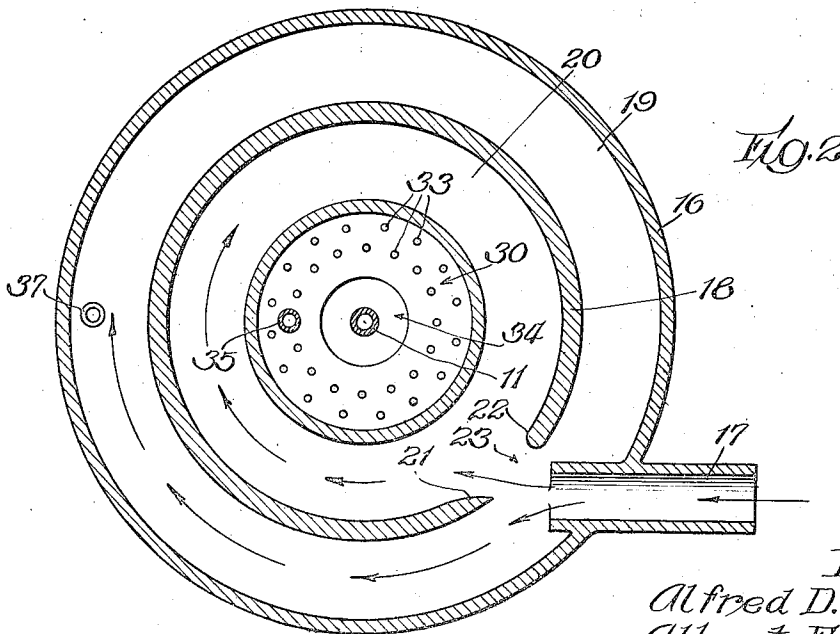


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VAPOR BURNER.
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1,415,215.

Patented May 9, 1922.



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UNITED STATES PATENT OFFICE.

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VAPOR BURNER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, ALFRED D. ANTOINE, of Chicago, and ALBERT E. GEBERT, of Wilmette, county of Cook, and State of Illinois, citizens of the United States, have invented certain new and useful Improvements in Vapor Burners, of which the following is a specification.

This invention relates to improvements in vapor burners of the type embodying a flash boiler or chamber into which water is delivered to be immediately converted into steam, and which steam atomizes the oil and is delivered therewith into a chamber from which the mixture is burned through burner openings, the flame from the burner serving also to heat the flash boiler or chamber, and one of the objects of the invention is to provide an improved device of this character which will be simple and compact in construction and efficient in operation, and which will consume a minimum amount of oil.

A further object is to provide improved means for preventing flooding of the burner when the flame is extinguished and the steam generating chamber or boiler becomes cooled.

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 drawing illustrating this invention and in which

Figure 1 is a vertical sectional view.

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

Referring more particularly to the drawing the numeral 10 designates a vapor generating chamber preferably of the flash type and embodies preferably an annular chamber of any desired size and configuration. Delivering into the chamber 10 is a water pipe 11, which receives its supply from any suitable source and as the water flows through the pipe 11, it will be delivered into the generating chamber 10 under a pressure.

Leading from the chamber 10, at any suitable point is a steam outlet pipe 12, which connects with an injector nozzle 13, of any desired construction, and which nozzle is

provided with a controlling needle valve 14. Delivering also into the nozzle 13, is an oil delivery pipe 15, which receives its supply from any suitable source and the delivery of the steam and oil is preferably controlled by the needle valve 14, so that, when the valve 14 is adjusted to open the delivery outlet of the nozzle, steam entering the nozzle 13 from the pipe 12, will atomize the oil which is being delivered from the pipe 15, and the combined steam and oil will be delivered into a burner chamber 16, through an inlet opening 17. The chamber 16 is of any desired size and configuration but is preferably of an annular construction and is disposed at any desired or suitable distance beneath the generating chamber 10.

The chamber 16, is preferably of a size somewhat larger than the external diameter of the generating chamber 10, and is preferably provided with a partition 18, arranged therein so as to divide the chamber into two compartments 19—20. The extremities 21—22 of the partition 18, preferably terminate short of each other to form an opening 23 which is arranged in front of the inlet opening 17. The extremity 21 of the partition 18, is preferably tapered and preferably stands in a line substantially at the center of the opening 17, so that when the combined mixture of steam and oil is delivered through the inlet opening 17, it will be divided and a portion of the vapor will be delivered through the opening 23 into the compartment 20, while another portion will be delivered into the compartment 19. The vapor fills these compartments and passes from the compartment 19, through suitable burner openings 24, while the vapor from the compartment 20, passes through suitable burner openings 25. These burner openings 24—25 may be of any desired size and configuration and are preferably formed in an annular member 26, which is preferably separate from the wall of the chamber 16 and the partition 18, and is adapted to rest thereupon. If desired an upwardly projecting annular flange 27, may be provided on the chamber 16 to project above the member 26, and within which flange 27 the member 26 with the burner openings 24—25 arranged therein is located.

If desired another annular member 28, of any desired size and configuration may be

provided upon the member 26, between the burner openings 24—25 and projects for any desired distance thereabove, and when the member 28 is employed the member 28, and the element 26 may be held securely in position in any suitable manner such as by means of fastening devices 29, in the form of bolts which preferably pass through the member 28, and through the element 26 into the partition 18. The upper extremity of this member 28 preferably terminates below the upper portion of the generating chamber 10, and the water supply pipe 11, preferably passes through the opening 30, formed by the annular chamber 16, and is disposed within the annular member 28, the latter being preferably spaced for some distance beyond the periphery of the generating chamber 10.

Arranged below the chamber 16, and supported in any suitable manner is a gas chamber 31, which receives its supply from any suitable source and through the inlet opening 32. The chamber 31, is provided with burner openings 33, arranged beneath the chamber 16, so that the flame from the burner openings 33 will impinge the chamber 16, to heat the same, at the same time the products of combustion from the burner openings 33 will pass through the opening 30, of the chamber 16, and will impinge the generating chamber 10.

The chamber 31, is also preferably of an annular construction to provide an opening 34 arranged in alinement with the opening 30 of the chamber 16, and through which opening 34, the water supply pipe 11 preferably passes.

A pilot burner 35, is arranged in any suitable convenient position and preferably extends into the opening 30, adjacent the series of burner openings 25, and is provided as a means for initially lighting the burners 25.

In order to start the device, the pilot burner 35, is lighted, after which gas is admitted into the chamber 31. This pilot light will ignite the gas being discharged through the burner openings 33. When thus lighted the flame or products of combustion from the burner openings 33, will heat the chamber 16 and also the generating chamber 10, as well as a portion of the water supply pipe 11.

When the chamber 16, is heated to a sufficient degree of temperature, the needle valve 14 is opened. The heat of the generating chamber 10 will convert the water which is delivered to the chamber 10 into steam and the steam will flow through the pipe 12, to the injector nozzle 13. As it flows through the nozzle 13 it will atomize the oil and will be delivered with the oil into the inlet opening 17 of the chamber 16, and also into the compartments 19—20. As the vapor

passes through the burner openings 24—25, it will be ignited and will continue to burn as long as the steam and oil is supplied to the chamber 16.

As the temperature of the generating chamber 10 rises it will be manifest that the water being delivered through the pipe 11, will be immediately converted or flashed into steam with the result that there will be no accumulation of water in the generating chamber 10.

The flange 27 and the member 28, are provided as a means for radiating heat from the burners 24—25, and to that end these elements may be constructed of any suitable heat conducting material. Obviously the flange 27 and member 28, will also assist in maintaining the chamber 16 at a high degree of temperature.

In the event that the flame should be extinguished or the chambers 16 and 10 become cooled, it will be manifest that the pressure upon the water flowing through the pipe 11 would flood the generating chamber 10, and the water would flow from this chamber through the pipe 12 into the injector nozzle 13, and be delivered therefrom through the opening 17 into the compartments 19 and 20. As a means for taking care of such flooding of the burner the partition 18 may be provided with any suitable number of openings 36, in the bottom thereof forming communication between the compartments 19 and 20, so as to allow the water to flow from the compartment 20 into the compartment 19, and from which latter compartment the water may be delivered through a suitable outlet pipe 37. In order to induce such a circulation of the water in the event that it should accumulate in these compartments 19 and 20, the burner, when it is installed, is preferably set at a slight inclination.

As a means for utilizing this flow of water for automatically shutting off the supply of water, there may be provided a suitable receptacle 38, which is disposed in a position beneath the outlet pipe 37, to catch the water delivered therefrom. This receptacle 38, is preferably connected with an arm 39, pivotally supported intermediate its ends as at 40 upon a suitable support 41. The other end of the arm 39, is preferably connected with a handle 42 of a valve 43 in the pipe 11, so that when a sufficient amount of water has accumulated in the receptacle 38, the arm 39 will be rocked about its pivot 40, to close the valve 43. The connection between the arm 39 and the valve 43, is preferably formed by a pin and slot connection 44—45.

Obviously any other means for automatically controlling the valve 43, which is suitable for the purpose, may be provided.

While the preferred form of the invention has 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. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber disposed beneath the generating chamber and operating to heat the latter, an injector nozzle, means connecting the nozzle with the said generating chamber, means for connecting the nozzle with an oil supply, means whereby vapor from said nozzle will discharge into the said burner chamber, and a liquid discharge outlet leading from the burner chamber.

2. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber disposed beneath the generating chamber and operating to heat the latter, an injector nozzle, means connecting the nozzle with the said generating chamber, means for connecting the nozzle with an oil supply, means whereby vapor from said nozzle will discharge into the said burner chamber, an additional burner below the said burner chamber for initially heating the latter and the generating chamber, a liquid overflow leading from the said burner chamber, and means for delivering a supply of a different kind of fuel to the said additional burner.

3. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber disposed beneath the generating chamber and operating to heat the latter, an injector nozzle, means for connecting the nozzle with the said generating chamber, means for connecting the nozzle with an oil supply, means whereby vapor from said nozzle will be discharged into the said burner chamber, a liquid discharge outlet leading from the burner chamber, and means whereby such discharge of liquid will automatically control the supply of water to the steam generating chamber.

4. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the generating chamber and having two series of burner openings, a partition in said chamber dividing the same into two compartments one of which compartments has communication with each of the series of burner openings, a fuel supply inlet for the chamber, one end of the said partition being disposed adjacent and extending in a direction across the said inlet whereby the fuel will be divided and directed into each of the compartments, an

injector nozzle delivering into the said inlet, means connecting the nozzle with the steam generating chamber, and means whereby the nozzle may be connected with a source of supply of oil.

5. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the generating chamber and having two series of burner openings, a partition in said chamber dividing the same into two compartments one of which compartments has communication with each of the series of burner openings, a fuel supply inlet for the chamber, one end of the said partition being disposed adjacent and extending in a direction across the said inlet whereby the fuel will be divided and directed into each of the compartments, an injector nozzle delivering into the said inlet, means connecting the nozzle with the steam generating chamber, means whereby the nozzle may be connected with a source of supply of oil, an initial heating burner disposed below the first recited burner and the generating chamber, and means whereby a supply of fuel may be delivered to the second recited burner.

6. A device of the character described embodying a steam generating chamber, means for supplying water to the chamber, a burner disposed beneath the chamber for heating it, an injector nozzle discharging into the burner, means connecting the nozzle with the said chamber, means for delivering a supply of fuel to the nozzle, and one or more upstanding heat radiating flanges connected with and encompassing the burner and against which flange or flanges the flame is directed.

7. A device of the character described embodying a steam generating chamber, means for supplying water to the chamber, a burner disposed beneath the chamber for heating it, an injector nozzle discharging into the burner, means connecting the nozzle with the said chamber, means for delivering a supply of fuel to the nozzle, one or more upstanding heat radiating flanges connected with and encompassing the burner and against which flange or flanges the flame is directed, an initial heating burner disposed below the first said burner and means whereby a fuel may be delivered to the second recited burner.

8. A device of the character described embodying an annular steam flashing chamber, means for directing a supply of water to the chamber, an annular burner below the chamber for heating it, an injector nozzle discharging into the burner, means connecting the nozzle with the said chamber, means whereby a supply of oil may be delivered to the nozzle, an annular heating burner beneath the first recited burner for initially

heating the latter, and means for supplying a fuel to the second recited burner, the first recited means being disposed within the openings in the said annular parts.

5 9. A device of the character described embodying an annular steam flashing chamber, means for directing a supply of water to the chamber, an annular burner below the chamber for heating it, an injector nozzle
10 discharging into the burner, means connecting the nozzle with the said chamber, means whereby a supply of oil may be delivered to the nozzle, an annular heating burner beneath the first recited burner for
15 initially heating the latter, means for supplying a fuel to the second recited burner, and an annular heat radiating flange extending above the first recited burner, the openings of the first recited burner being
20 disposed between the said flange and the inner periphery of the burner.

10. A device of the character described embodying an annular steam flashing chamber, means for directing a supply of water
25 to the chamber, an annular burner below the chamber for heating it, an injector nozzle discharging into the burner, means connecting the nozzle with the said chamber, means whereby a supply of oil may be delivered to the nozzle, an annular heating
30 burner beneath the first recited burner for initially heating the latter, means for supplying a fuel to the second recited burner, an annular heat radiating flange extending above the first recited burner, the openings
35 of the first recited burner being disposed between the said flange and the inner periphery of the burner, and a pilot light arranged within the inner periphery of the
40 first recited burner.

11. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the generating chamber
45 and having two series of burner openings, a partition in said chamber dividing the same into two compartments one of which compartments has communication with each of the series of burner openings, a fuel supply inlet for the chamber, one end of the
50 said partition being disposed adjacent and extending in a direction across the said inlet whereby the fuel will be divided and directed into each of the compartments, an injector nozzle delivering into the said inlet,
55 means connecting the nozzle with the steam generating chamber, and means whereby the nozzle may be connected with a source of supply of oil, there being a communicating opening between the said compartments and
60 through the partition for the passage of liquid, there being also a liquid discharge outlet from one of the compartments.

12. A device of the character described embodying a steam generating chamber, means

for supplying water thereto, a burner chamber beneath the generating chamber and having two series of burner openings, a partition in said chamber dividing the same into two compartments one of which compartments
70 has communication with each of the series of burner openings, a fuel supply inlet for the chamber, one end of the said partition being disposed adjacent and extending in a direction across the said inlet whereby the
75 fuel will be divided and directed into each of the compartments, an injector nozzle delivering into the said inlet, means connecting the nozzle with the steam generating chamber, means whereby the nozzle may be
80 connected with a source of supply of oil, there being a liquid discharge outlet from one of the compartments, and means whereby such discharge of liquid will automatically control the supply of water to the
85 steam generating chamber.

13. A device of the character described embodying a steam flashing chamber, an annular burner for heating the same, said burner embodying two series of burner openings one encompassing the other, an annular
90 heat radiating flange projecting above the burner and disposed between the said series of burner openings, means for supplying water to the flashing chamber, a nozzle discharging into the burner, means connecting the nozzle with the said flashing chamber, and means whereby a fuel may be supplied to the nozzle.

14. A device of the character described embodying a steam flashing chamber, an annular burner for heating the same, said burner embodying two series of burner openings one encompassing the other, an annular
105 heat radiating flange projecting above the burner and disposed between the said series of burner openings, means for supplying water to the flashing chamber, a nozzle discharging into the burner, means connecting the nozzle with the said flashing chamber, means whereby a fuel may be supplied to the nozzle, an additional burner beneath the first recited burner for heating it, and means for supplying a different fuel to the said
110 additional burner.

15. A device of the character described embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the said generating chamber and having two series of burner openings, a partition in said chamber dividing the same into two compartments one of which compartments has communication with each of the series of burner openings, said compartments having communication with each other adjacent the bottom thereof, a fuel supply inlet in the outer wall of one of the compartments for discharging fuel against the said partition, an injector nozzle delivering into the said inlet, means connecting the
130

nozzle with the steam generating chamber, and means whereby the nozzle may be connected with a source of fuel supply.

16. A device of the character described
5 embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the said generating chamber and having two series of burner openings, a partition in said chamber dividing
10 the same into two compartments one of which compartments has communication with each of the series of burner openings, said compartments having communication with each other adjacent the bottom thereof, a fuel
15 supply inlet in the outer wall of one of the compartments for discharging fuel against the said partition, an injector nozzle delivering into the said inlet, means connecting the nozzle with the steam generating chamber,
20 means whereby the nozzle may be connected with a source of fuel supply, and a liquid discharge outlet leading from one of the said compartments.

17. A device of the character described
25 embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the said generating chamber and having two series of burner openings, a partition in the said chamber dividing
30 the same into two compartments one of which compartments has communication with each of the series of burner openings, said

compartments having communication with each other adjacent the bottom thereof, a fuel supply inlet in the outer wall of one
35 of the compartments, an injector nozzle delivering into said inlet, means connecting the nozzle with the steam generating chamber, and means whereby the nozzle may be connected with a source of fuel supply.

18. A device of the character described
40 embodying a steam generating chamber, means for supplying water thereto, a burner chamber beneath the said generating chamber and having two series of burner openings, a partition in the said chamber dividing
45 the same into two compartments one of which compartments has communication with each of the series of burner openings, said compartments having communication
50 with each other adjacent the bottom thereof, a fuel supply inlet in the outer wall of one of the compartments, an injector nozzle delivering into said inlet, means connecting the
55 nozzle with the steam generating chamber, means whereby the nozzle may be connected with a source of fuel supply, and a liquid discharge outlet leading from one of the said compartments.

In testimony whereof we have signed our
60 names to this specification, on this 25th day of March, A. D. 1921.

ALFRED D. ANTOINE.
ALBERT E. GEBERT.