May 13, 1941. J. W. MILLER 2,241,470

COMBUSTION APPARATUS

Filed Sept. 11, 1939

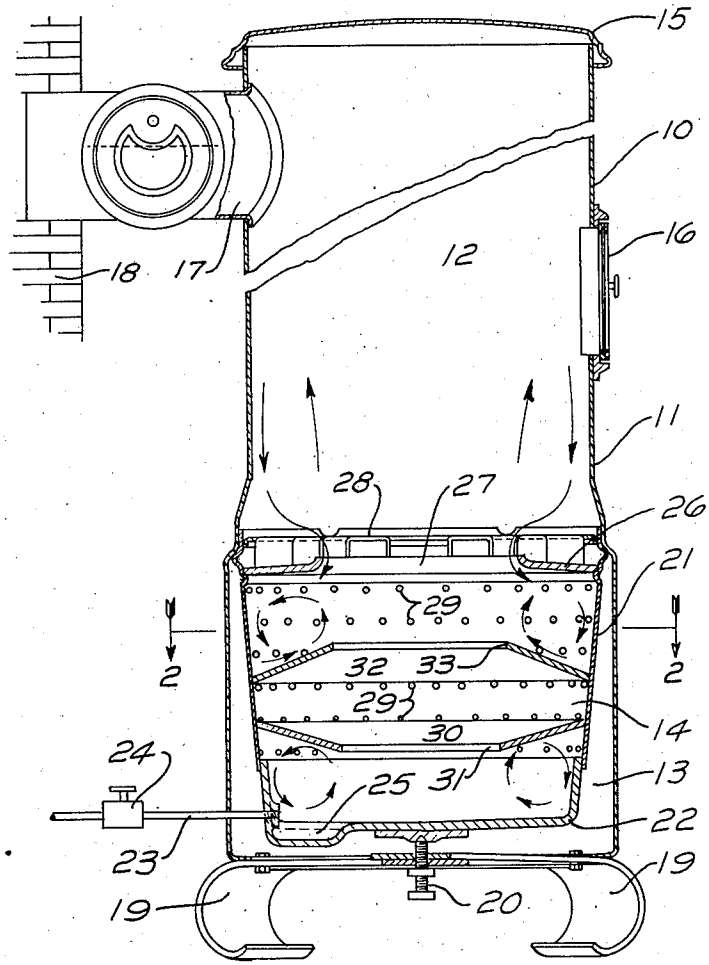


FIG. 1

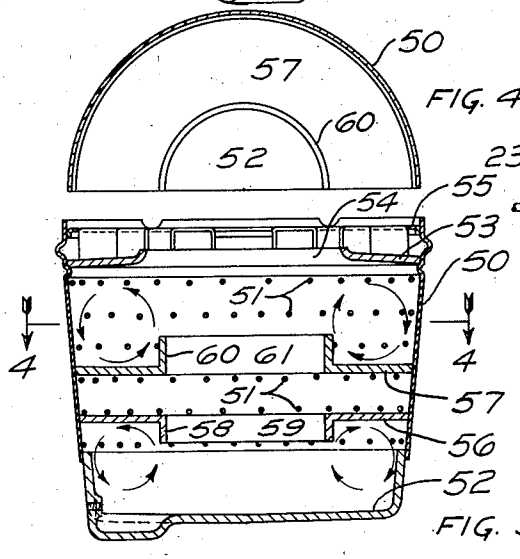


FIG. 4

FIG. 3

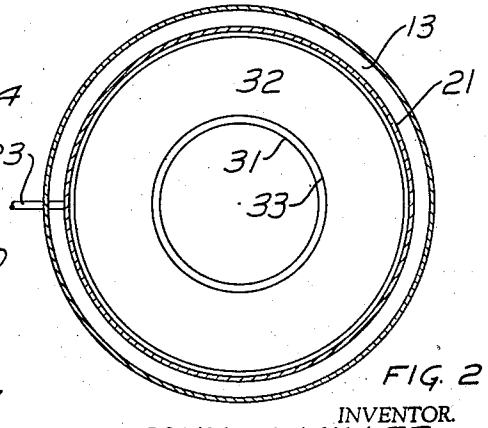


FIG. 2

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COMBUSTION APPARATUS

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7 Claims. (Cl. 158—91)

This invention relates to oil burners of the vaporizing pot type, and more particularly to a novel baffle construction for minimizing eddy currents within the burner.

In oil burners of the vaporizing pot type there is a tendency for eddy currents of air, oil vapor and products of combustion to be produced within the burner and combustion chamber. These eddy currents interfere with the premixing of the fuel vapors with air in advance of combustion. They also interfere with the proper control of the burner. Therefore, it is desirable to eliminate such currents as far as possible while localizing those which do occur. If the eddy currents are confined within a small space they have little effect upon the satisfactory operation of the burner.

It is accordingly an object of this invention to provide a novel baffle means for vaporizing pot type burners whereby eddy currents formed within the combustion chamber and burner are localized and prevented from descending into the lower levels of the burner. Another object is to confine the eddy currents within a definite path of limited area.

Broadly the invention comprises a burner having a centrally apertured top wall, and a pair of vertically separated centrally apertured annular baffles within the burner. The baffles are so constructed and arranged that the upper edge of the inner rim of the upper baffle is higher than the outer rim of the baffle, while the lower edge of the inner rim of the lower baffle is lower than the outer rim of the baffle. Eddy currents formed in the upper part of the burner and combustion chamber are prevented from descending into the lower part of the burner, while eddy currents formed in the lower part of the burner are prevented from rising into the upper part, and from spreading at random within the lower part.

The construction and operation of preferred forms of the invention will become more apparent in the following specification when read in connection with the accompanying drawing, wherein—

Figure 1 is a cross-sectional view of a radiant heater including a burner embodying the invention;

Figure 2 is a cross-sectional view of Figure 1 taken on substantially the line 2—2 of Figure 1;

Figure 3 is a cross-sectional view of a burner embodying a modified form of the invention; and

Figure 4 is a fragmentary cross-sectional view taken on substantially the line 4—4 of Figure 3.

Referring now more specifically to the drawing, and particularly to Figures 1 and 2, the invention is shown incorporated in a radiant heater 10. The heater comprises an outer casing 11 having an upper portion 12 constituting a combustion chamber and a lower portion 13 forming an air jacket surrounding a burner 14.

The combustion chamber has a top wall 15, a door 16 to permit access to the interior of the burner to allow ignition of the fuel, and a flue outlet 17 connected to a chimney 18. The casing 11 is supported on legs 19 bolted thereto. The legs in this instance are metal strips, crossed at the center leaving large openings between them to permit air to enter the burner. The legs receive a threaded burner supporting screw 20.

The burner includes a sheet metal side wall 21 of generally frusto-conical shape and a bottom wall 22 forming an oil pan. A pipe 23 leads to any suitable source of fuel supply (not shown) and is provided with a suitable control valve 24. Directly below the fuel inlet is a depression 25 adapted to contain a small pool of oil to facilitate lighting of the fuel.

Adjacent the upper edge of the burner 14 is a top wall 26 having a large central aperture 27 therein through which air and vapors from the burner may flow to the combustion chamber. Resting on the top wall is an anti-explosion baffle 28.

The side wall 21 of the burner is provided with a number of small air inlet openings 29. These openings are preferably arranged in vertically spaced horizontal rows and are substantially uniformly spaced in each row.

Located above the lowermost row of air inlet openings is a lower baffle 30 having a large central aperture 31. The baffle 30 is frusto-conical in shape and converges downwardly, whereby the lower edge of the rim of the opening is considerably lower than the outer rim of the baffle.

Above the baffle 30, and preferably located high enough to include two rows of air inlet openings 29 between it and baffle 30, is an upper baffle 32. This baffle is shaped much the same as baffle 30 and has a large central opening 33, but converges upwardly rather than downwardly, as in the case of baffle 30. Thus, the inner rim of baffle 32 is higher than its outer rim.

The apertures 31 and 33 in baffles 30 and 32 are preferably somewhat smaller than the aperture 27 in the top wall 26.

The fire produced within the apparatus just described may be varied throughout a rather wide range by simply regulating the supply of oil through the medium of the control valve 24. Normally at low fire the oil is confined to a small pool in the depression 25 and combustion takes place immediately above the pool and below the baffle 30. Air for combustion is admitted through the bottom row of air inlet openings 29. Any eddy currents that form below the baffle 30 are confined there due to the downward inclination of the baffle. Such eddy currents tend to roll in the direction shown by the arrows below baffle 30 and because of their limited extent to not interfere appreciably with the operation of the burner.

The warm gases issuing from the fire below the baffle rise upwardly through the apertures **31**, **33** and **27** into the combustion chamber **12**. The outer envelope of gas is continually cooling, particularly when it comes in contact with the side walls of the combustion chamber. These cool gases being heavier than the warmer gases in the center tend to flow downwardly as indicated by the arrows above the top wall **26**, and drop into the burner. Due to the upward inclination of baffle **32**, the cool gases are caught and more or less confined within the compartment of the burner between baffle **32** and top wall **26**, and circulate as shown by the arrows. Some of these gases may be picked up by the warmer gases issuing from the lower part of the burner and carried upward again, but they are prevented from going lower in the burner. Thus, all eddy currents forming in the apparatus are confined in such a manner that they do not interfere with the premixing of fuel vapors with the air in advance of combustion.

By suitably regulating the fuel supply the fire may be caused to move up out of the bottom compartment into the compartment between baffles **30** and **32**, or into the compartment between baffle **32** and top wall **26**. In each case air for combustion is supplied by the openings **29** in the compartment in which the fire is primarily located, as well as from those in the compartments below it. When thus operating, the lower compartment or compartments become pre-mixing chambers.

At high fire there is substantially no visible flame in the burner **14**. The lower limit of the flame is at the rim of aperture **27**, and the fire is located in the combustion chamber. Under such conditions it is very difficult for eddy currents from the combustion chamber to enter the burner.

A modified form of the invention is shown in Figures 3 and 4. Only the burner is shown as it is adapted for use in various types of heating apparatus, including a heater of the kind shown in Figures 1 and 2.

Except for the different shape of the baffles, the burner of Figures 3 and 4 is identical with that shown in Figures 1 and 2. It comprises a side wall **50** having a plurality of vertically spaced horizontal rows of air inlet openings **51**, and a bottom wall **52**. The burner has a top wall **53** with a large central aperture **54**. Resting on the top wall is an anti-explosion baffle **55**.

Within the burner is a pair of baffles **56** and **57**. The baffles **56** and **57** are flat and horizontally arranged except for a downwardly extending annular flange **58** defining a central aperture **59** in the lower baffle **56**, and an upstanding annular flange **60** outlining a central aperture in the upper baffle **57**. It will be apparent that although differently shaped, the baffles **56** and **57** have remote edges at their inner rims below and above their respective outer rims.

The effect of the baffles in the device of Figures 3 and 4 is the same as those of Figures 1 and 2, and the operation is essentially the same also. Thus, upper baffle **57** prevents eddy currents from dropping into the lower part of the burner, and lower baffle **56** confines eddy currents forming below it to the bottom of the burner.

It will be apparent from the foregoing description that the invention provides a novel means for reducing the ill effects of eddy currents by reducing their tendency to form, while confining those that do form to as limited a zone as possible.

The scope of the invention is indicated in the appended claims.

I claim:

1. A burner of the vaporizing pot type comprising a side wall having a plurality of vertically spaced horizontal rows of air inlet openings therein, a bottom wall, and a pair of vertically spaced apart annular baffle plates within the burner, the upper baffle having the upper edge of its inner rim located at a level above its outer rim and the lower baffle having the lower edge of its inner rim located at a level below its outer rim.

2. A burner of the vaporizing pot type comprising a side wall having a plurality of vertically spaced horizontal rows of air inlet openings therein, a bottom wall, and a pair of vertically spaced apart annular baffle plates within the burner, the upper baffle having the upper edge of its inner rim located at a level above its outer rim, and the lower baffle having the lower edge of its inner rim located at a level below its outer rim, said baffles being spaced apart sufficiently to include at least one row of air inlet openings between them.

3. A burner of the vaporizing pot type comprising a side wall having a plurality of vertically spaced horizontal rows of air inlet openings therein, a bottom wall, and a pair of vertically spaced apart annular frusto-conical baffle plates within the burner, the upper baffle converging upwardly and the lower baffle converging downwardly.

4. A burner of the vaporizing pot type comprising a side wall having a plurality of vertically spaced horizontal rows of air inlet openings therein, a bottom wall, and a pair of vertically spaced apart annular baffle plates within the burner, the upper baffle having an upwardly extending annular flange at its inner rim and the lower baffle having a downwardly extending annular flange at its inner rim.

5. A burner of the vaporizing pot type comprising a side wall having a plurality of vertically spaced horizontal rows of air inlet openings therein, a bottom wall, a top wall for the burner having a large central aperture therein, and a pair of vertically spaced apart centrally apertured baffle plates within the burner below the top wall, the upper edge of the inner rim of the upper baffle being at a level above that of its outer rim, and the lower edge of the inner rim of the lower baffle being at a level below that of its outer rim.

6. A burner of the vaporizing pot type comprising a side wall having a plurality of vertically and horizontally spaced air inlet openings therein, a bottom wall, and a pair of vertically spaced apart annular baffle plates within the burner, the upper baffle having the upper edge of its inner rim located at a level above its outer rim, and the lower baffle having the lower edge of its inner rim located at a level below its outer rim.

7. The combination set forth in claim 6, wherein the baffles are spaced apart sufficiently to include a plurality of the air inlet openings between them.

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