May 19, 1931. W. B. STURGIS 1,806,566

OIL BURNER

Filed Nov. 1, 1928

Fig. 1.

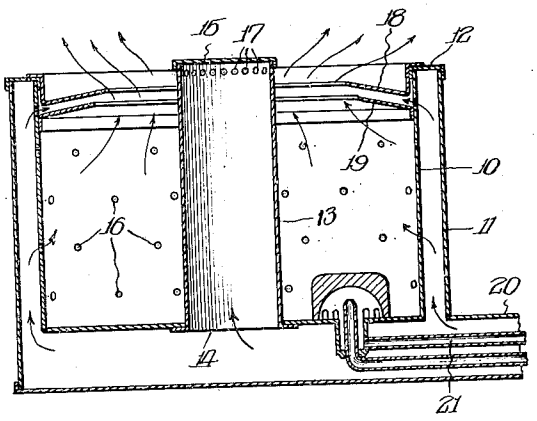


Fig. 2.

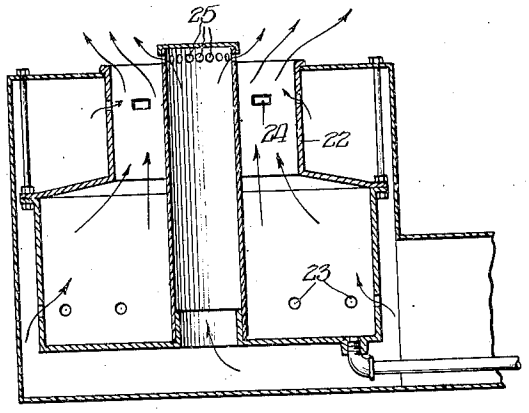
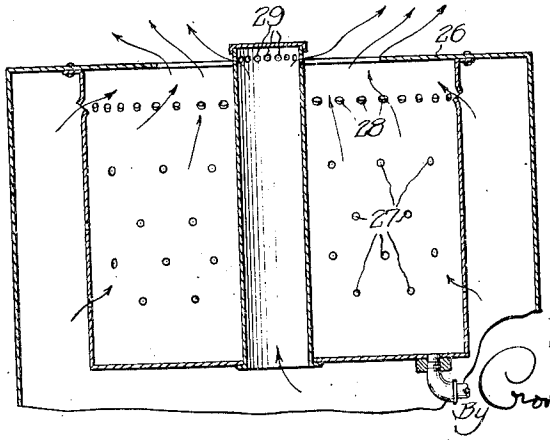


Fig. 3.



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UNITED STATES PATENT OFFICE

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OIL BURNER

Application filed November 1, 1928. Serial No. 316,480.

The present invention pertains to oil burners of the type disclosed in my co-pending application Serial No. 280,241 filed May 24, 1928.

The object of the invention is to produce an oil burner which, while structurally quite different from that disclosed in my earlier application, employs substantially the same principles of flame formation.

Three such oil burners are illustrated in the accompanying drawings, described in the following specification and covered in the appended claims.

In the drawings:

Fig. 1 is a vertical section through the center of an oil burner possessing the features of the invention;

Fig. 2 is a similar view through another such oil burner; and

Fig. 3 is a similar view through still another such oil burner.

The three oil burners shown in the drawings, while structurally quite different from each other, possess certain features in common. Each is characterized by a pot in which the oil is vaporized; a conduit for leading the oil into the bottom of the pot; an air tube in the center of the pot; ports adjacent the bottom of the pot for introducing air into commingling relation with the oil vapor formed from the oil in the bottom of the pot; an annular constriction about the upper edge of the pot for deflecting the upwardly flowing mixture of air and oil vapor inwardly toward the tube; and ports in the tube adjacent the level of such constriction for introducing more air into the mixture of air and oil vapor and blowing the same outwardly, whereby to form a rather flat upwardly divergent cone-shaped flame about the tube immediately above the constriction.

The burner shown in Fig. 1 includes a cylindrical pot 10 which is positioned within a cylindrical shell 11 in spaced relation to both the sidewall and bottom of the latter. The upper edges of the pot and shell are connected by a web 12. A tube 13 is positioned within the pot over an opening 14 in the bottom of the latter, and the upper end of the tube, which is located at about the level of the upper edge of the pot, is closed by a cap 15. The pot is provided, intermediate its upper and lower edges, with a plurality of air ports 16, and the tube is provided, adjacent its upper end, with a plurality of air ports 17. An upwardly convergent cone-shaped ring 18 is positioned within the pot just below the level of the air ports in the tube and just above the level of the uppermost row of air ports in the pot, and another similarly shaped ring 19 of slightly greater inside diameter is arranged beneath the ring 18 preferably just below the level of the uppermost row of air ports in the pot.

The air used in the burner enters the shell through a pipe 20. Part of the air flows upwardly in the space between the sidewalls of the pot and shell and enters the pot by way of the ports 16, while the remainder flows upwardly in the tube and is discharged outwardly over the uppermost ring 18 by the ports 17. The oil used in the burner enters the pot through a pipe 21 and spreads out over the bottom of the pot in a thin film. The oil on the bottom is vaporized by the heat from the flame above the pot and flows upwardly in the pot, mixing with the air entering through the ports 16. When the mixture of air and oil vapor reaches the constriction formed about the upper edge of the pot by the rings 18 and 19, it is deflected inwardly and caused to flow upwardly at an increased speed closely adjacent the tube. As the mixture, in flowing upwardly, reaches the upper edge of the constriction, it meets the air flowing outwardly from the ports 17 in the tube and thoroughly mixes with the same, forming an upwardly and outwardly directed cone-shaped flame about the tube immediately above the constriction.

The constriction about the upper edge of the pot, and the lateral discharge of the air from the top of the tube into the mixture of air and oil vapor flowing upwardly past such constriction closely adjacent to the tube, produces a thorough mixture of all of the air necessary for complete combustion in a very advantageously shaped flame.

In the burner shown in Fig. 2, the constriction about the upper edge of the pot is vertically elongated, in the form of a cylindrical throat 22, and the preliminary rich mixture of air and oil vapor is caused by the throat to flow upwardly in close proximity to the tube for a substantial distance. The first air to mix with the oil vapor enters the pot through ports 22 in the side wall below the throat, and, as the mixture of air and oil vapor flows upwardly through the throat, more air is directed into such flow by ports 24 in the throat. When the resulting still rich mixture, in moving upwardly in the throat, reaches the upper end of the same, more air is directed into it by ports 25 in the upper end of the tube, thereby producing substantially the same desirable flame formation as that given by the structure shown in Fig. 1.

In the burner shown in Fig. 3, the constriction about the upper edge of the pot consists merely of a thin centrally apertured plate 26 through which the preliminary mixture of air and oil vapor is caused to flow upwardly in close proximity to the tube. The first air to mix with the oil vapor enters the pot through ports 27, and, as the mixture approaches the constriction, more air is directed into it by ports 28 which are located just below the constriction and are preferably pointed upwardly a little to facilitate the upward movement of the mixture through the constriction. When the resulting mixture, in moving upwardly, passes the constriction, the final supply of air is directed into it from ports 29 in the upper end of the tube, as in the previously described forms, and complete combustion occurs in a rather flat upwardly divergent cone-shaped flame.

I claim:

1. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube positioned centrally in the pot to form with the side wall a mixing chamber for the fuel and having the lower end thereof opening through the pot to receive air, means for delivering air into the chamber in such quantity as to effect only aeration of the fuel during normal operation of the burner, a wall extending inwardly from the upper marginal part of the side wall and having its inner edge spaced from the tube to form therearound a restricted outlet for the aerated fuel, and means adjacent the inwardly extending wall for delivering jets of air inwardly against the tube in order to force the aerated fuel to flow inwardly and impinge against the tube as it rises from the chamber and passes upwardly through the outlet, the tube having openings therein above the inwardly extending wall for directing jets of air across the outlet in such quantity as to support combustion of the aerated fuel over said inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

2. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube positioned centrally in the pot to form with the side wall a mixing chamber for the fuel and having the lower end thereof opening through the pot to receive air, means for delivering air into the chamber in such quantity as to effect only aeration of the fuel in said chamber during normal operation of the burner, and a wall extending inwardly from the upper marginal part of the pot and having its inner edge spaced from the tube to form therearound a restricted outlet for the aerated fuel, the side wall of the pot having perforations therein directly beneath the inwardly extending wall for delivering jets of air towards the tube in order to force the aerated fuel to flow inwardly against the tube as it rises from the chamber and passes upwardly through the outlet, the upper end of the tube terminating adjacent the inwardly extending wall and having openings therein for directing jets of air across the outlet and above the inwardly extending wall in such quantity as to support combustion of the aerated fuel over said inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

3. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube positioned centrally in the pot to form with the side wall a mixing chamber for the fuel and having the lower end thereof opening through the pot to receive air, means for delivering air into the chamber in such quantity as to effect only aeration of the fuel in said chamber during normal operation of the burner, a pair of vertically spaced walls extending inwardly from the upper part of the pot and having their inner edges spaced from the tube to form therearound a restricted outlet for the aerated fuel, and means for delivering air between said inwardly extending walls and against the tube in order to force the aerated fuel to flow inwardly against the tube as it rises from the chamber and passes upwardly through the outlet, the tube having openings therein above the uppermost inwardly extending wall for directing jets of air across the outlet in such quantity as to support combustion of the aerated fuel over said uppermost inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

4. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube positioned centrally in the pot to form with the side wall a mixing chamber for the fuel and having the lower end thereof opening through the pot to receive air, means for delivering air into the chamber in such quantity as to effect only aeration of the fuel in said chamber during normal operation of the burner, and a pair of vertically spaced walls extending inwardly from the upper marginal part of the side wall of the pot and having their inner edges spaced from the tube to form therearound a restricted outlet for the aerated fuel, the upper marginal part of the side wall having perforations therein for delivering jets of air between the inwardly extending walls and against the tube in order to force the aerated fuel to flow inwardly against the tube as it rises from the chamber and passes upwardly through the outlet, the upper end of the tube terminating adjacent the uppermost inwardly extending wall and having openings therein for directing jets of air outwardly across the outlet in such quantity as to support combustion of the aerated fuel over the uppermost inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

5. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube positioned centrally in the pot to form with the side wall a mixing chamber for the fuel and having its lower end opening through the pot to receive air, a pair of vertically spaced walls extending inwardly from the upper part of the pot and having their inner edges spaced from the tube to form therearound a restricted outlet for the mixing chamber, the side wall of the pot having perforations therein beneath the lowermost inwardly extending wall for delivering air into the chamber in such quantity as to effect only aeration of the fuel in said chamber during normal operation of the burner, and means for delivering air between said inwardly extending walls and against the tube in order to force the aerated fuel to flow inwardly against the tube as it rises from the chamber and passes upwardly through the outlet, the tube having openings therein above the uppermost inwardly extending wall for directing jets of air across the outlet in such quantity as to support combustion of the aerated fuel over said uppermost inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

6. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube positioned centrally in the pot to form with the side wall a mixing chamber for the fuel and having its lower end opening through the pot to receive air, and a pair of vertically spaced walls extending inwardly from the upper marginal part of the side wall of the pot and having their inner edges spaced from the tube to form around said tube a restricted outlet for the mixing chamber, the side wall of the pot having perforations in the lower portion thereof for delivering air into the chamber in such quantity as to effect only aeration of the fuel in said chamber during normal operation of the burner, and having perforations in the upper portion thereof for delivering air between the inwardly extending walls and towards the tube in order to force the aerated fuel to flow inwardly against the tube as it rises from the chamber and passes upwardly through the outlet, the upper end of the tube terminating adjacent the uppermost inwardly extending wall and having openings therein for directing jets of air across the outlet in such quantity as to support combustion of the aerated fuel over said uppermost inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

7. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube arranged centrally in the pot to form with the side wall a mixing chamber for the fuel and having its lower end opening through the pot to receive air, and a wall extending inwardly from the upper marginal part of the side wall and having its inner edge spaced from the tube to form therearound a restricted outlet for the mixing chamber, the side wall of the pot having perforations therein beneath the inwardly extending wall for delivering air into the chamber in such quantity as to effect only aeration of the fuel during normal operation of the burner, the upper end of the tube terminating adjacent the inwardly extending wall and having openings therein above said wall for directing jets of air across the outlet in such quantity as to support combustion of the aerated fuel over said inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

8. In a burner of the character described, the combination of a pot consisting of a continuous side wall and a bottom, means for delivering fuel in fluid form into the pot, a vertically extending tube arranged centrally in the pot and having the upper end thereof terminating adjacent the upper marginal part of the side wall and its lower end opening through the pot to receive air, the portion

of the tube within the pot being imperforate and forming with the pot a mixing chamber for the fuel, and a wall extending inwardly from the upper marginal part of the side wall and having its inner end spaced from the tube to form therearound a restricted outlet for the mixing chamber, the side wall of the pot having perforations therein beneath the inwardly extending wall for delivering air into the chamber in such quantity as to effect only aeration of the fuel during normal operation of the burner, the upper end of the tube terminating adjacent the inwardly extending wall and having openings therein above said wall for directing jets of air across the outlet in such quantity as to support combustion of the aerated fuel over said inwardly extending wall and cause the resulting flames to spread outwardly from the top of the pot.

In witness whereof I have hereunto subscribed my name.

WILLIAM B. STURGIS.