Dec. 22, 1936. O. L. BOCK 2,065,265

OIL BURNER

Filed Jan. 16, 1933

FIG. 1.

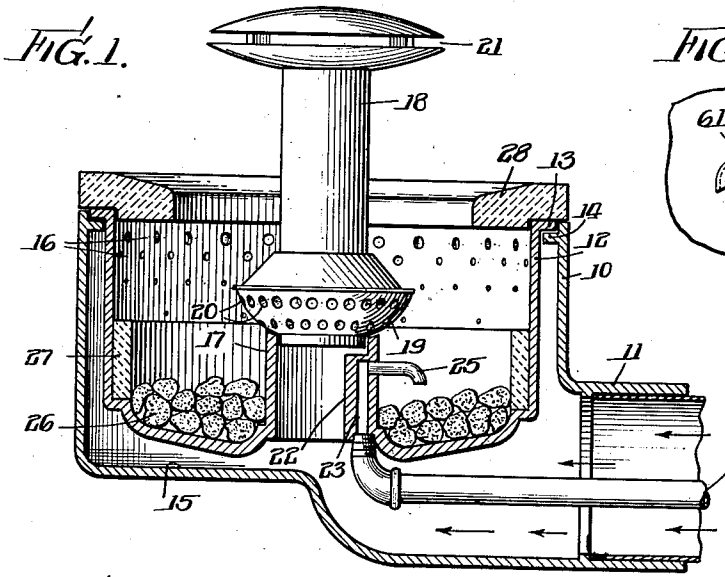


FIG. 4.

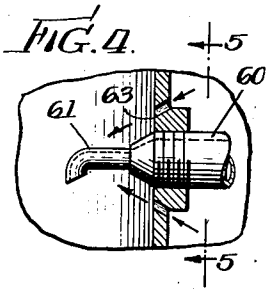


FIG. 5.

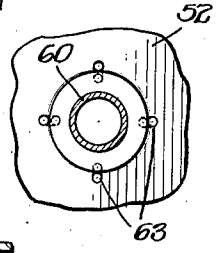


FIG. 2.

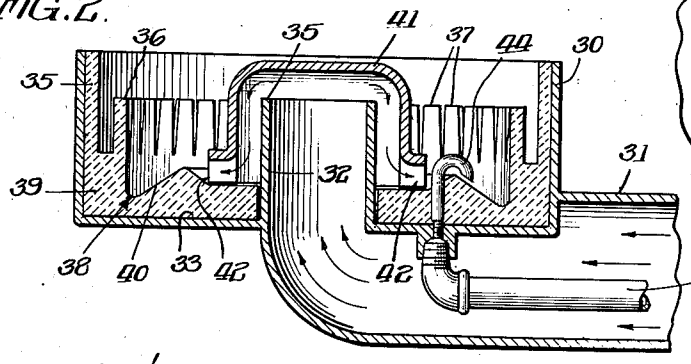


FIG. 3.

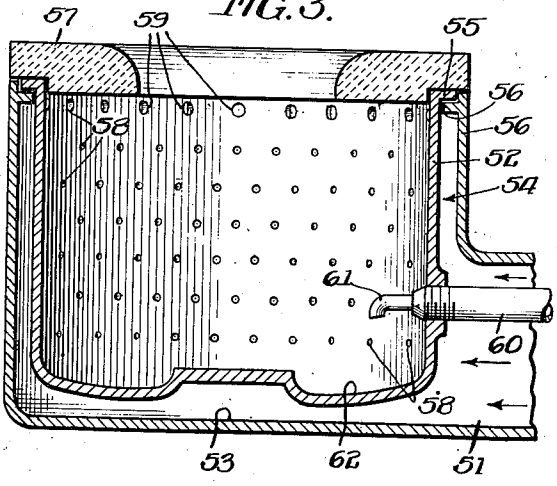
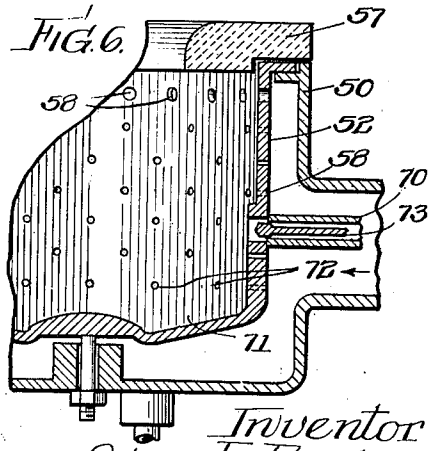


FIG. 6.



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UNITED STATES PATENT OFFICE

2,065,265

OIL BURNER

Oscar L. Bock, Madison, Wis.

Application January 16, 1933, Serial No. 651,989

1 Claim. (Cl. 158—92)

This invention relates to oil burners, and to the structure for introducing fuel to the hearth of said burners. This application is a continuation in part of application Serial No. 601,697, filed March 28, 1932, patented April 28, 1936, No. 2,038,522, as to all subject matter common to these two applications.

The primary object of the invention is to provide a new and efficient burner having certain parts thereof located in a particular position to increase the efficiency of the burner, and to prevent the clogging or carbonizing of the fuel inlet supply line.

A further object is to provide a new and improved oil burner by locating the fuel supply line in a particular position to deliver fuel to the heated combustion zone, but at the same time have the fuel line removed from the heated combustion zone and above the said zone and adjacent the air stream so that the burner hearth may at all times attain a heat sufficient to vaporize the oil, and still prevent the heat from coming in close contact with the fuel line and clogging the fuel line by carbonization.

Numerous other objects and advantages will be apparent throughout the progress of the following specification.

The accompanying drawing illustrates a selected embodiment of the invention and the views therein are as follows:

Fig. 1 is a detail sectional view of one type of burner and embodying the invention.

Fig. 2 is a detail sectional view of another type of burner and having the invention applied thereto.

Fig. 3 is another modified form of burner showing the invention.

Fig. 4 is a detail sectional view of a part of the burner shown in Fig. 3 showing additional cooling means for the inlet supply line.

Fig. 5 is a detail sectional view on the line 5—5 of Fig. 4.

Fig. 6 is a detail sectional view of another modified form of burner embodying the invention and provided with a clean-out rod.

The burner shown in Fig. 1 comprises an outer casing or jacket 10 which is preferably cylindrical and has an integral spout or a pipe 11 operatively connected thereto, and this spout or pipe 11 provides means for delivering an air supply to the burner, suitable means, not shown, being in communication with the pipe to deliver air thereto. A fire-pot 12 is arranged in the jacket 10 and concentric therewith as clearly shown in Fig. 1. The pot 12 is provided with an upper peripheral flange 13 which rests upon an inwardly extending ring or other suitable supporting means 14 projecting inwardly from the inner side walls of the casing 10. The fire-pot 12 is also spaced from the bottom 15 of the casing to permit air to circulate about the bottom as well as the side walls of the fire-pot. Holes or openings 16 are provided in the side walls of the fire-pot so that the air passing thereabout will flow through the holes and provide air to the burner to assist combustion.

A central air flue 17 extends upwardly in the fire-pot and is located concentrically thereof. A pipe or riser 18 is mounted on top of the flue 17 and has an outwardly bulging surface 19 intermediate its upper and lower ends and near the top of the flue 17 so that air passing from the pipe line 11 and through the flue 17 may be discharged through the holes 20 provided in the bulging surface 19 of the stack or riser. The upper end of the riser extends a predetermined distance above the upper edge of the fire-pot and is provided with an opening 21 at its upper end through which air passes from the flue 17 and riser or stack 18. The air coming through the opening 21 in the stack or riser provides additional air to complete combustion and to give the flame an outward and upward spread.

The flue 17 may be provided with an elongated boss 22 which is provided with a drilled opening 23. A fuel supply pipe line 24 is arranged in the air pipe line 11 and communicates with the opening 23. A spout 25 communicates with the passage 23 and is arranged above the bed of the burner so as to keep it out of the direct combustion zone. This spout 25 is also so positioned that air coming through the apertures or openings 20 in the riser will come in contact with the outlet or spout 25 and cool the same. Loose refractory material 26 may be arranged in the bottom of the fire-pot. The fuel from the spout 25 will flow onto the refractory material 26 and burn thereon. However, the air coming through the openings 20 will tend to force the flames outwardly from the central stack. A refractory ring 27 is arranged about the inner side walls of the fire-pot near the bottom thereof, as shown in Fig. 1, to assist in vaporizing the fuel as, during operation of the burner, this outer ring will become very hot. An upper inwardly extending peripheral refractory ring 28 is mounted on the upper edge of the fire-pot and projects inwardly about the side walls thereof a predetermined distance.

The fuel pipe line 24 is shown entering the lower central portion of the fire-pot. The fuel

flows through the pipe line 24 and through the drilled passage 23 and drops out of the end of the spout 25, from which point it will flow into the vaporizing zone of the burner. The outlet 25 is located in the air stream, air coming through the holes in the lower portion of the central riser or stack. The outlet 25 is also arranged between the air stream and the hot vaporizing area. Consequently, this outlet is kept relatively cool, while the vaporizing surface is allowed to reach a temperature high enough to effect complete vaporization of the fuel burned.

The burner in Fig. 2 comprises a fire-pot 30 which has an air line 31 leading to a concentrically arranged flue 32 which extends upwardly from the base 33 of the fire-pot a predetermined distance as indicated by the numeral 34. This present burner is of the double wall type, having an outer wall 35 and a spaced inner wall 36, each of which are preferably made of refractory material and integrally connected. The inner wall 36 comprises a plurality of spaced fingers 37 which extend upwardly abruptly from an annular oil groove 38 formed in the refractory bottom 39. Inwardly of the groove 38 the refractory bottom is pitched outwardly, as indicated at 40.

An inverted dome-shaped member 41 fits over the top of the flue 32 and is provided with a plurality of air outlets 42. An oil supply pipe line 43 is arranged in the air pipe line 31 and has a goose-neck spout 44 connected at its upper end for depositing liquid hydrocarbon into the oil grove 38. The outlet 44 is positioned immediately in front of an air outlet 42 so that air coming in through the pipe line 31 will pass through the flue 32 and then through the outlets 42 by the inverted dome-shaped member 41.

The same principle exists in this latter construction as in the construction shown in Fig. 1 and previously described. Oil passing through the pipe line 43 drops out through the goose-neck spout 44 and into the groove 38 which extends about the entire hearth, the oil following the groove 38 to maintain an equal level. Air is blown in from the central stack or flue about the feed pipe line 44. Combustion occurs around the outer edge of the vertical fingers 37. When the fire is low, the fire will burn near the bottom of the groove and toward the outer wall of the same. As the flame is increased in size, it will tend to lift itself onto the fingers 37 and burn in suspension. The refractory fingers 37 will attain a glowing heat and effect complete vaporization. The feed pipe line 44, however, will remain relatively cool because of the air passing around it as well as being cooled by the cold fuel passing through the inside of the fuel pipe line.

In Fig. 3 there is shown a very simple construction which also follows the same principles previously referred to. The burner shown in Fig. 3 comprises an outer casing 50 having an air supply pipe line or flue 51 which passes around the bottom and side walls of the fire-pot 52. The fire-pot 52 is spaced from the bottom 53 of the casing and is concentrically spaced relative to the casing 50 to provide an air space 54 between the exterior walls of the fire-pot and the inside walls of the casing. The fire-pot 52 is supported in position by the annular flange 56 on the casing. A refractory material annular ring 57 is supported on the top of the fire-pot and extends inwardly a predetermined distance. The fire-pot is preferably made foraminous, being provided with a plurality of holes 58. These holes may be larger at the top, as indicated by the numeral 59.

A feed inlet pipe line 60 is arranged in the air inlet pipe line 51 and terminates in a spout 61 which is arranged inside of the fire-pot a predetermined distance above the bottom 62 thereof. This pipe line is cooled by the air passing through the holes 58 as well as by the cool fuel passing through the pipe line itself. Oil is fed through the feed pipe 60 and spout 61, which spout is located in the path of the incoming air from the adjacent air openings 58. The walls of the burner will become extremely hot, but by bringing the outlet away from the walls and placing it in the cool air stream between the point of outlet of the air and the fuel, it will be kept relatively cool and free from carbon formation. A low or small fire tends to burn in the center of the pot because of the blast of air from all the sides. High fire, however, tends to lift toward the outlet or open end of the fire-pot with little or no fire burning down into the bowl. Consequently the end of the pipe or spout 61 will not be subject to the direct heat of the flame as it is located considerably back from the flame proper in the path of the inwardly directed air.

To further enhance the cooling of the spout 61, a plurality of converging openings 63 may be formed about the inlet 60 so that air coming through the line 51 will be directed or impinged directly against the outer walls of the spout 61, Figs. 4 and 5.

The burner shown in Fig. 6 comprises the outer casing 50 and the inner pot 52 which is provided with a plurality of openings 58. Also, the refractory material ring 57 is supported at the top of the body or pot 52 and casing 50. The body 52 has its bottom spaced from the casing to permit air to circulate about the side walls. The oil pipe line 70 extends through the member 52 below the top thereof and above the bottom so that it will discharge the oil onto the loose refractory material which is positioned on the bottom of the fire pot or burner 52 at a point indicated by the numeral 71. This refractory material does not extend above the lowermost row of holes 72. The fuel supply pipe line 70 is provided with a clean-out rod 73 which is used periodically to prevent the caking or coking of carbon about the outlet of the fuel pipe line. The holes 58 extend about the supply pipe line 70 and tend to keep the mouth of the outlet of the fuel pipe line free from carbon. It has been found that the fire will burn cleaner when the fuel inlet and discharge are located above the lowermost row of holes 72.

In conventional burners, particularly in the gravity feed type, the oil is fed to the combustion chamber through a pipe which is threaded directly into the side walls or bottom of the combustion chamber. During operation, oil is fed through this pipe and flows into the chamber where it is vaporized by the radiant heat of combustion. In certain stages of the operation, the walls and bottom become heated, and if given a sufficient amount of air, the fuel adjacent thereto will be completely burned. If, however, certain portions of the containing wall are not, at some time during the operating cycle, allowed to attain a temperature which is beyond the end point of the fuel burned and consequently not receive sufficient air, residual carbon will be formed. Furthermore, sufficient air for combustion is not supplied to this area as it is generally below the bottom level at which air is being ad-

mitted. The result is that carbon will accumulate and eventually an encrustation will be caused about the fuel outlet and produce stoppage of the oil and require periodic cleaning.

The present invention eliminates these inherent defects on account of the cooling effect on the pipe itself by the air, as well as the cooling effect of the cold oil entering the burner. The area immediately adjacent the entrance of the feed pipe tends to remain relatively cool, and combustion will not occur in and around this particular area.

The present invention provides a burner having means for causing the oil to drop onto the vaporizing surface from a point above the surface. Also, the oil discharge is separated from the containing walls of the combustion chamber. By placing the point of oil discharge between the incoming air and the zone of combustion, this oil will be kept cold by the air passing around it and yet allow the oil to flow into the zone of higher temperature.

Changes may be made in the form, construction, and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claim.

The invention is hereby claimed as follows:

A burner comprising a fire pot having a closed bottom, and an open top, forming a combustion chamber, an air receiving chamber therein comprising an air inlet conduit, a dome shaped member enclosing said air inlet conduit and forming a downwardly extending air passage therebetween, said member being provided with a plurality of radially extending ducts for conducting currents of air from the downwardly extending passage into the combustion zone, a fuel supply pipe extending into the combustion chamber and into the path of the incoming currents of air from the radial ducts, an annular groove formed in the bottom of the combustion chamber for receiving fuel from the fuel supply pipe, an outer wall, and an inner wall spaced from the outer wall, and surrounding said annular groove, said inner wall comprising a plurality of upwardly extending fingers.

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