Jan. 15, 1957 C. B. RICHARDSON 2,777,511

POT TYPE OIL BURNER AND LOW FIRE PILOT UNIT

Filed March 24, 1953

Fig. 1.

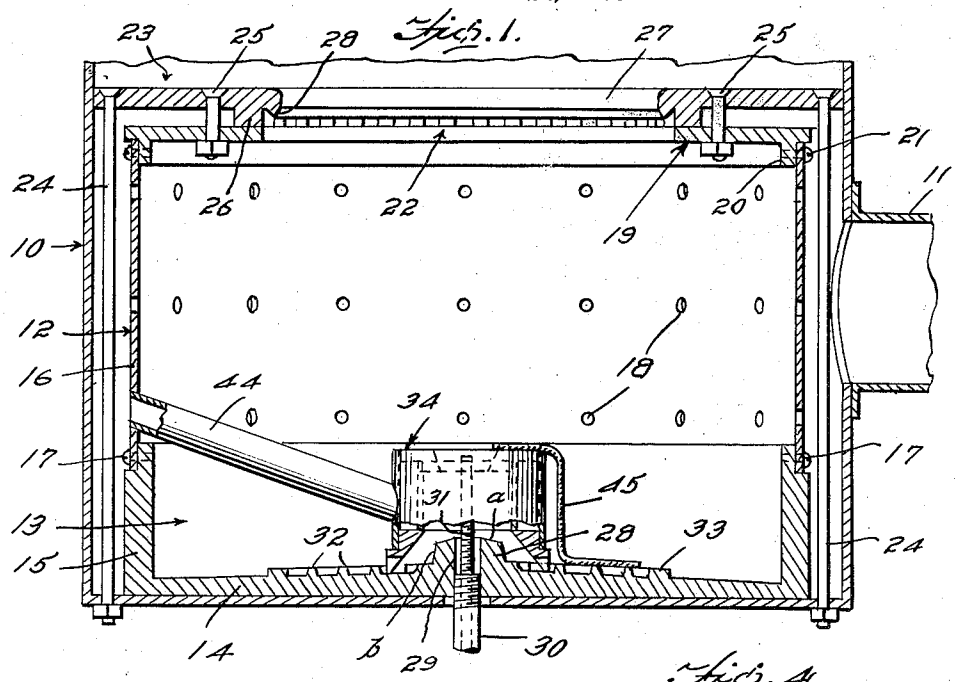


Fig. 4.

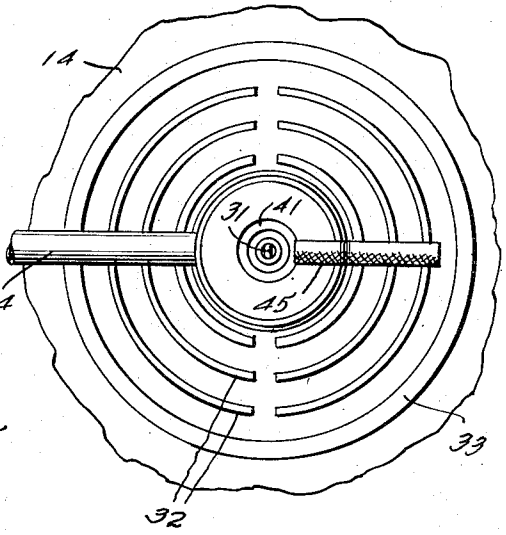
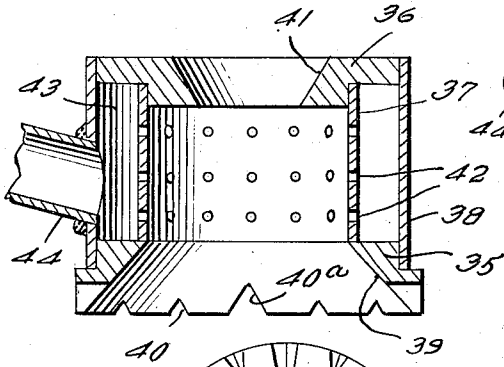


Fig. 3.



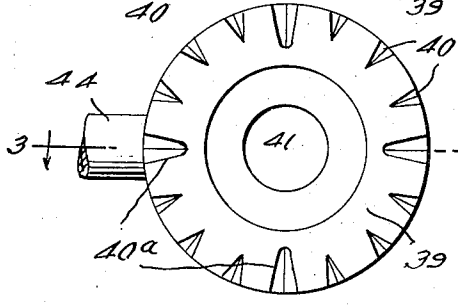


Fig. 2.

Inventor
Carl B. Richardson

By Wilfred L. Lawson

Attorney.

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POT TYPE OIL BURNER AND LOW FIRE PILOT UNIT

Carl B. Richardson, Norfolk, Va.

Application March 24, 1953, Serial No. 344,352

3 Claims. (Cl. 158—91)

This invention relates generally to the class of fuel oil burners and is directed particularly to improvements in pot type burners.

An object of the present invention is to provide an oil burning pot type burner of novel construction which has a low rate of oil or fuel consumption and which may be operated on a high fire or a low fire without smoking.

Another object of the invention is to provide an improved pot type oil burner having a low fuel consuming pilot burner by means of which there may be maintained a fire of lower flame and smaller fuel consumption than is possible with the ordinary pot type burner and by means of which the fire in the pot may be easily raised to full fuel consumption.

Still another object of the invention is to provide a pot type oil burner having an inside secondary or pilot burner in which a low flame may be maintained and from which fuel run into the pot may be ignited for full fuel or high fire operation.

Still another object of the invention is to provide a pot type burner having a pilot burner as above set forth, with novel means for conducting combustion thereby maintaining air directly to the pilot burner through the larger burner or pot, from the same air source as that from which the pot is supplied.

Other objects and advantages of the invention will become apparent as the description of the same proceeds, and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of the specification, with the understanding, however, that the invention is not to be limited to the exact details of construction shown and described since obvious modifications will occur to a person skilled in the art.

In the drawings:

Figure 1 is a vertical sectional view through a pot type burner constructed in accordance with the present invention showing the novel pilot burner therein.

Figure 2 is a view in top plan of the pilot burner per se.

Figure 3 is a vertical sectional view taken substantially on the line 3—3 of Figure 2.

Figure 4 is a plan view of the inside of the bottom of the pot looking down upon the burner and showing the igniting wick.

Referring now more particularly to the drawings the numeral 10 generally designates an air housing in which a static air pressure is maintained in accordance with customary practice, the air being applied from a suitable source such as an air pump or the like, not shown, through the pipe or conduit 11 which opens through the side wall of the housing 10 as illustrated.

The pot burner unit constructed in accordance with the present invention is generally designated 12. This burner comprises the bottom pan or receptacle 13 which, in accordance with the present invention, has a bottom wall 14 and a low side wall 15 formed of thick or heavy cast iron or steel. Forming a continuation of the low thick or heavy wall 15 is the thinner circular wall 16 which is

formed of light weight sheet steel and which encircles the top edge of the low wall 15 and is secured thereto in a suitable manner as, for example, by the use of screws 17 or the like.

The wall 16 is provided with numerous air admission apertures 18 whereby air may enter from the housing 10, the overall diameter of the wall 16 being materially less than the inside diameter of the housing 10 as shown whereby space is provided around the pot for free movement of air.

The top of the pot is closed by the head plate 19 which is provided with the depending annular flange 20 which fits within the wall 16, to which it is secured in a suitable manner by the employment of screws 21 or the like. The head plate 19 is provided with the central opening 22 through which the flame of the burning gases discharge.

Overlying the head plate 19 is the air deflector plate 23. This deflector plate is of an overall diameter approximately equalling the inside diameter of the housing 10 so that it forms a horizontal partition in the housing above the pot burner and it is secured in place by means of the long bolts 24 which pass down through the deflector plate, between the wall of the housing 10 and the wall of the pot burner to be secured in the bottom of the housing as illustrated. In addition, the shorter bolts 25 are employed for directly coupling the deflector plate 23 with the head plate 19.

The air deflector plate 23 which is maintained above and in spaced relation with the head plate or top plate 19 by the integral depending lugs 26, is particularly described and claimed in my co-pending application filed March 24, 1953, Serial No. 344,353. This plate has the central opening 27 which is concentric with the opening 22 and which is defined by a depending lip 28 which functions, as set forth in the co-pending application above referred to, to deflect air flowing inwardly between the plates 19 and 23 downwardly and inwardly toward the center of the pot.

The construction of the pan or receptacle portion 13 of the pot is also particularly set forth and claimed in a co-pending application filed of even date herewith and this pan has a central body 28 in the form of an upstanding mound having the outwardly and downwardly sloping top and side surfaces *a* and *b* by means of which oil flowing in through the admission port 29, is caused to move outwardly and radially on the bottom wall 14 of the pot. This port 29 extends upwardly through the axial center of the mound 28 and has the fuel supply pipe 30 connected with the lower end thereof.

The interior of the pipe 30 is threaded or smooth to receive the threaded or smooth lower end portion of a rod 31 which is flattened on two sides so as to permit a free flow of fuel into the burner. This rod functions as a pre-heating element, extending upwardly a substantial distance into the burner and conducting heat from the interior of the burner down into the inwardly flowing oil.

The top surface of the bottom wall 14 of the pot receptacle 13 slopes downwardly and outwardly from the mound 28 as shown and the mound is encircled by a number of concentric broken rings 32 which are in turn enclosed in an outer continuous annular ring or wall 33.

By reason of the outwardly and downwardly sloping top surface of the bottom wall 14 and the sloping surfaces *a* and *b* of the mound 28 the fuel oil entering through the port 29 is maintained in constant movement outwardly from the entrance point and, as set forth in my co-pending application this constant movement of the fuel oil over the thick cast metal bottom which, after a short period of operation of the burner becomes highly heated, causes the oil to be thoroughly vaporized and cracked and thus becomes fully consumed and converted to combustible gases. This action of cracking the oil is

also obtained by the radiant heat which is directed downwardly onto the thin constantly moving layer or skim of oil.

In accordance with the present invention by means of which a low fire or pilot fire can be maintained within the pot there is provided the central pilot burner which is generally designated 34. This pilot burner comprises a bottom ring 35 and a top ring 36 which are maintained in vertically spaced relation by the spaced inner and outer walls 37 and 38 respectively.

As shown particularly in Figure 3 the bottom ring has a central opening defined by an upwardly tapering wall 39 so that the bottom edge of the bottom ring is relatively thin. The diameter of the bottom ring 35 is such as to permit the ring to be placed within the smallest one or the innermost one of the broken rings 32 as shown in Figure 1 and the inside diameter of the upwardly converging passage through the ring 35 is such as to encircle or enclose the mound 28 but not contact the latter as shown in Figure 1. Thus an ample amount of space is provided between the inclined wall 39 and the mound 28 for the movement of gases and fuel oil across the top of the mound downwardly and outwardly toward the bottom edge of the ring 35.

The bottom edge of the ring 35 is, as shown in Figures 2 and 3, provided with a plurality of radially extending notches or channels 40 which permit the fuel oil to flow out freely beneath the bottom edge of the pilot burner unit. Certain of these channels as, for example, the four designated 40*a* are slightly larger than the others to permit the free passage of gases and igniting flame from within the pilot burner outwardly to ignite fuel oil distributed between the rings 32 and 33 when it is desired to raise the fire in the burner.

The top ring 36 of the pilot burner is also provided with a central opening which is of considerably smaller diameter than the opening in the bottom ring 35 and which has the upwardly and outwardly flaring wall 41.

The inner vertical and annular or circular wall 37 of the pilot burner is provided with a plurality of air passages or openings 42 and, as shown, the two walls 37 and 38, being in spaced relation and fixed to the top and bottom rings 35 and 36, provide a circular air chamber 43 which is supplied with air under pressure through the tube 44. One end of the tube 44 opens through the outer wall 38 of the pilot burner as shown and the other end extends above the thick wall 15 of the pot receptacle and opens through the thinner wall 16 thereof as shown in Figure 1. Accordingly it will be readily understood that the air under static pressure in the space between the wall 16 and the wall of the casing 10, will be fed downwardly through the tube 44 into the chamber 43 for discharge into the central part of the pilot burner.

When the pilot burner is operating the fuel oil will run in, in a very small amount, onto the top and side surfaces *a* and *b* of the mound 28 and burn within the chamber defined by the wall 37 and the wall 39 of the bottom ring, being supplied with the necessary combustion air through the openings 42. When the inflowing fuel oil is admitted slowly or in small quantity all of the oil will be consumed within the pilot burner but when it becomes necessary to increase the activity of the pot burner the oil flow may be increased so that some of it will escape outwardly through the passages 40 and 40*a*. In this case the flame will under normal conditions follow through the bottom edge passages or notches and ignite the fuel within the pot receptacle outside the pilot burner.

In order to insure the ignition of the fuel oil outside the pilot burner when it is desired to operate the burner on high fire there may be provided an asbestos wick 45. This wick is positioned so as to have one end extended across the top of the pilot burner or into the opening 41 as shown, from which it extends outwardly

and downwardly along the side of the pilot burner and then outwardly over the rings 32 to the outermost continuous or unbroken ring 33. By the employment of this wick, when the burner is turned up, if the oil should not ignite immediately it will puddle in the outermost ring 33 and the wick will become quickly saturated and ignited at its top end from the low burning flame within the pilot burner. This flame will then be conducted to the outer or lower end of the wick which is in the oil outside the pilot burner and by this means the oil will be readily ignited.

With the construction herein described it is possible to obtain a low burning pilot which will crack all types of oil such as critical oils, run of the mine oils, diesel oil and the like. By the novel construction or formation of the device, there is provided the more or less restricted top opening in the ring 36, and there is provided the air admission holes 42 in the necessary number to admit the correct amount of air so that upon turning up the fuel supply for a high fire, the added volume of gases produced cannot escape with sufficient rapidity through the top opening and as a result of the increased pressure set up within the pilot burner the fire therein will go down and pass out through the passages 40 and 40*a* to ignite the fuel oil flowing into the larger burner, as above stated. The medium or high fire activity of the burner is obtained by the setting of the control valve by means of which the flow of oil is regulated. The pilot tube will then be operating under a flooded condition caused by the oil level increasing to an extent sufficient to close the outlet passages or channels 40 and accordingly the gases from the burning fuel all have to pass out through the top opening of the pilot unit or tube and the flame from the pilot unit or tube is then sucked up into the flame of the medium or high fire operating in the pot burner, the rising gases ceasing to be ignited within the pilot tube. On medium or high fire, therefore, the fuel gases burn above the pilot tube within the larger chamber of the main burner.

I claim:

1. A pot type oil burner comprising the combination of a main combustion chamber defined by bottom and side walls, a vertically disposed oil inlet port located centrally of said bottom wall and extending therethrough and a pilot burner comprising a lower ring supported by its lower edge on said bottom wall and concentric with said oil inlet port, an outer cylindrical sleeve supported on said ring, an inner cylindrical sleeve supported on said ring and concentric with said outer sleeve, a plurality of apertures in said inner sleeve, an upper ring carried by said inner and outer sleeves and closing the opening therebetween to provide an annular air chamber, said upper ring having a vertically disposed burner opening concentric with said inlet port and of less diameter than said inner sleeve, a forced draft tube communicating with said air chamber and extending substantially radially thereof exteriorly of said combustion chamber, a rod extending into said inlet port a substantial distance and through said burner opening in concentric relation thereto and a plurality of radially disposed grooves in the lower edge of said lower ring whereby upon a limited flow of oil to said inlet port and the flow of air through said tube to said air chamber and through said apertures said pilot burner will burn with a low flame and maintain said rod at a relatively high temperature to preheat said oil and burn any carbon deposit tending to form in said inlet port and upon increasing the flow of oil in excess of that burnable in said pilot burner said excess oil will flow outwardly through said grooves and the reduced burner opening in said upper ring will force flame outwardly through said grooves to ignite said excess oil in said main combustion chamber.

2. A pot type oil burner comprising the combination of a main combustion chamber defined by bottom and

side walls, a vertically disposed oil inlet port located centrally of said bottom wall and extending therethrough and a pilot burner comprising a lower ring supported by its lower edge on said bottom wall and concentric with said oil inlet port, an outer cylindrical sleeve supported on said ring, an inner cylindrical sleeve supported on said ring and concentric with said outer sleeve, a plurality of apertures in said inner sleeve, an upper ring carried by said inner and outer sleeves and closing the opening therebetween to provide an annular air chamber, said upper ring having a vertically disposed burner opening concentric with said inlet port and of less diameter than said inner sleeve, a forced draft tube communicating with said air chamber and extending exteriorly of said main combustion chamber, a rod extending into said inlet port and through said burner opening in concentric relation thereto and a plurality of groves in the lower edge of said lower ring whereby upon a limited flow of oil to said inlet port and the flow of air through said tube to said air chamber and through said apertures said pilot burner will burn with a low flame and maintain said rod at a relatively high temperature to preheat said oil and burn any carbon deposit tending to form in said inlet port and upon increasing the flow of oil in excess of that burnable in said pilot burner said excess oil will flow outwardly through said grooves and reduced burner opening in said upper ring will force flame outwardly through said grooves to ignite said excess oil in said main combustion chamber.

3. A pot type oil burner comprising the combination of a main combustion chamber defined by bottom and side walls, a vertically disposed oil inlet port located centrally of said bottom wall and extending therethrough

and a pilot burner supported on said bottom wall and concentric with said oil inlet port and comprising an outer cylindrical sleeve and an inner cylindrical sleeve concentric with said outer sleeve, a plurality of apertures in said inner sleeve, means at the upper ends of said sleeves closing the opening therebetween to provide an annular air chamber, said means having a vertically disposed burner opening concentric with said inlet port and of less diameter than said inner sleeve, a draft tube communicating with said air chamber and extending exteriorly of said main combustion chamber, a rod extending into said inlet port and through said burner opening in concentric relation thereto and a plurality of openings in said pilot burner adjacent said bottom wall whereby upon a limited flow of oil to said inlet port and the flow of air through said tube to said air chamber and through said apertures said pilot burner will burn with a low flame and maintain said rod at a relatively high temperature to preheat said oil and burn any carbon deposit tending to form in said inlet port and upon increasing the flow of oil in excess of that burnable in said pilot burner said excess oil will flow outwardly through said openings and the reduced burner opening in said means will force flame outwardly through said openings to ignite said excess oil in said main combustion chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,293,697	Chadwick	Aug. 25, 1942
2,513,551	Custance	July 4, 1950
2,549,068	Donley	Apr. 7, 1951
2,579,370	Donley	Dec. 18, 1951