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J. T. GROTENHUIS
OIL BURNING APPARATUS
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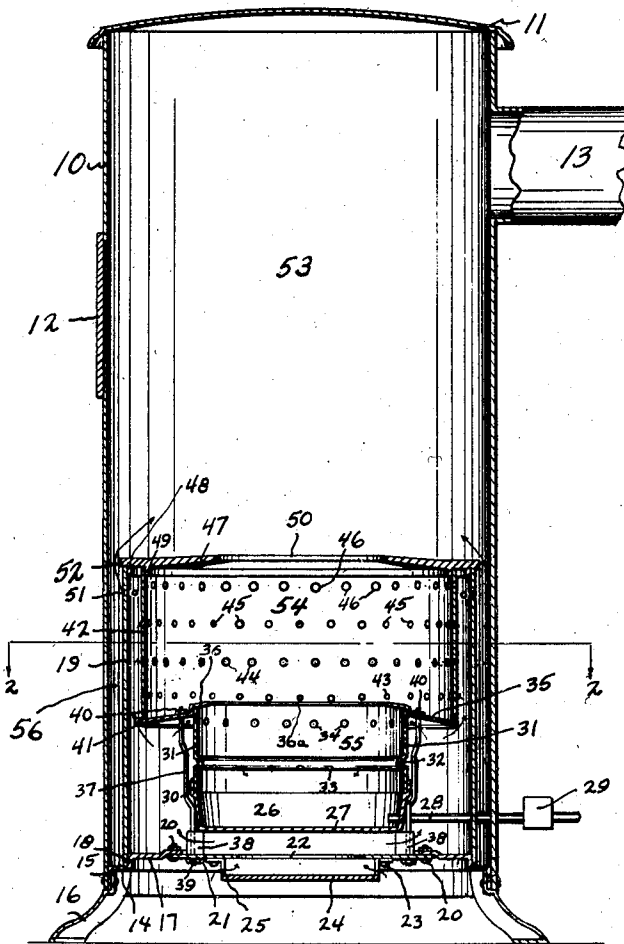


Fig. 1

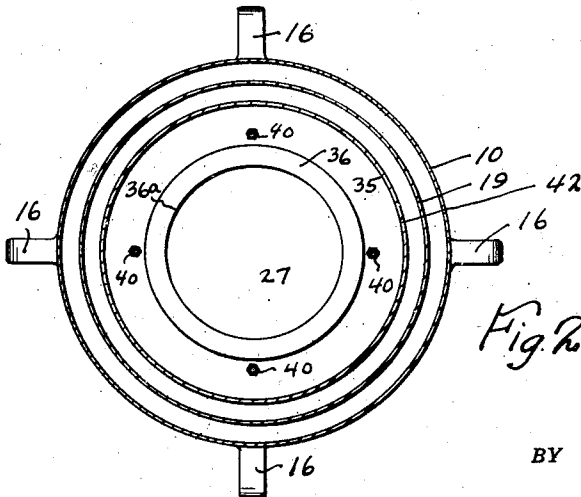


Fig. 2

BY

INVENTOR.
James T. Grotenhuis
BY
Sam J. Slotky
ATTORNEY.

UNITED STATES PATENT OFFICE

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OIL BURNING APPARATUS

James T. Grotenhuis, Orange City, Iowa, assignor to Silent Sioux Oil Burner Corporation, Orange City, Iowa, a corporation of Iowa

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1 Claim. (Cl. 158—91)

My invention relates to a combustion apparatus of an oil burner.

An object of my invention is to provide an oil burning unit in which the gases will move at a uniform rate from the time of mixing the same until the combustion is completed.

A further object of my invention is to provide a smaller chamber to which oil is first fed to allow the evaporation thereof with only enough air being admitted to assist the evaporation and to accelerate the rate at which the vapor leaves the oil on the bottom of such chamber.

A further object of my invention is to provide a series of vertically arranged chambers of increasing cross-sectional areas above the lower chamber and means for admitting air into said upper chambers.

A further object of my invention is to create and hold conditions in the smaller chamber from the minimum to the maximum capacity of the entire heating unit.

A further object of my invention is to provide an oil burning unit having a wide range in capacity and which produces a clean, economical, easily controlled and safe combustion throughout its entire range.

A further object of my invention is to provide such an apparatus which includes an easily removable oil vaporizing unit which is thus easily accessible for cleaning.

A further object of my invention is to provide a gradual increasing supply of air to the unit as the gas travels upwardly so that the combustion is more perfectly attained.

A further object of my invention is to prevent an excess of explosive conditions by admitting additional air to provide further oxidation to prevent the danger of such explosions.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claim, and illustrated in the accompanying drawing, in which:

Figure 1 is a sectional view taken along the upright or longitudinal axis of the burning apparatus, and

Figure 2 is a sectional view taken along the lines 2—2 of Figure 1.

I have used the character 10 to designate the outer shell of my burner which includes the top member 11 and a suitable door 12. The cylindrical shell 10 communicates with the flue pipe

13. Attached at the bottom of the shell 10 is the flanged member 14 having the annular flange 15 which is attached to the supporting legs 16. The member 14 is dished into the further member 17 which includes the annular flange 18 which is received within a further cylindrical member 19.

Attached by means of suitable bolts and nuts 20 to the member 17 is the plate 21 which includes the opening 22. Attached at 23 to the plate 21 is the further plate 24 which includes the small legs 25 which are attached by the screws 23 and which legs serve to separate the member 24 from the plate 21. The purpose of the plate 24 is to provide a guard against the heat from the burner passing downwardly to the floor surface.

Spaced from the plate 21 and the opening 22 is the hollow cylindrical chamber 26 having the bottom 27 and communicating with the chamber 26 is the oil pipe 28 which passes through the members 19 and the shell 10 to a suitable constant level device 29 which in turn communicates to the oil supply. The member 26 includes the upwardly extending annular flange 30 into which is welded or otherwise attached the further cylindrical member 31 which includes the inwardly positioned annular bead 32, the bottom of which bead 32 included a series of spaced openings 33. A further series of openings 34 are spaced vertically from the openings 33 and are provided in annular formation about the member 31.

An annular member 35 which extends into the portion 36 is arranged to rest upon the upper periphery of the cylindrical member 31 and received through the member 35 are a series of lengthened bolts 37 which are suitably bent to prevent striking against the inner cylinder and which bolts 37 pass through spacers 38 and are secured at the bottom of the plate 21 by means of the nuts 39. Inside of the portions 36 is the circular opening 36a which provides communication between the chambers 55 and 54.

These bolts are secured against the member 35 by means of the further nuts 40 so that as a result, the entire lower unit is securely braced. Peripherally attached at 41 to the member 35 is the further member 42 which is of substantially greater diameter than the member 31. The member 42 includes a series of vertically spaced openings 43, 44, 45, and 46. The openings 46 are the largest, the openings 44 and 45 are of smaller diameter than the openings 46 and the openings 43 are the same or

slightly smaller than the openings 44 and 45. The openings 33 are slightly smaller than the openings 34.

Attached at the upper portions of the members 19 and 42 is the plate 47 which includes the annular flanges 48 and 49 for such attachment and which plate 47 includes a restricted opening 50. A series of openings 51 are formed in the member 19 which openings communicate to the space between the member 19 and the member 10. The upper plate 47 extends beyond the member 19 at the points 52.

Now that the general structure of my device has been explained, I shall explain the operation and advantages thereof.

The air for combustion enters through the opening 22 in the plate 21 and about the legs 25 of the further guard plate 24. This air enters into the chamber formed between the walls 31, 42, and the member 19 and from this chamber the air enters into the chambers 26, 55, 54 and 56 through the perforates 33, 34, 43, 44, 45, 46, and 51. The oil enters the chamber 26 and spreads over the surface of the bottom 27 which oil becomes vaporized from the heat of the combustion taking place at a point above this surface.

The vapor is gradually mixed with air from the perforate openings and reaches the proportions and temperature necessary for combustion. The openings 33 which are diverted downwardly and inwardly assist in speeding up the mixing process and results in faster initial generation of the burner through such downward diversion since the air is supplied more rapidly at the point necessary. When the burner is operating at a minimum low fire combustion occurs substantially about the level of the member 36. The burner will operate satisfactorily at a low inlet of fuel so that the fire is held at the jets from the row of perforates 34, but it is preferred to limit the same to a point slightly above this. This point is just at or above the member 36 as explained where the tops of jets from the perforates 34 practically meet the jets 43.

It should be noted that the row of perforates 43 is slightly above the top of the member 36 so that the combustion will take place at a lower fire. As the oil flow is increased into the chamber 26, the point of combustion moves correspondingly upward in the chamber 54 until at maximum high fire combustion begins at the jets from the upper row of perforates 46 and is completed in the chamber 53 above the plate 47.

The air from the chamber 56 between the walls 19 and the shell 10 which is drawn through the openings 51 furnishes the necessary additional air for complete combustion at this stage. In again considering the chambers 26, 55 and 54, it will be seen that oil entering the lower chamber 26 evaporates and is mixed with the primary air which is admitted through the openings 33 and 34. The oil control is so constructed and adjusted that if oil is admitted at all, enough of the same enters to supply a sufficient amount of oil vapor so that when mixed with the primary air a combustible mixture is formed and ignition is established at the point of entering the second chamber 54.

The amount of primary air is so controlled by this construction that at no time, excepting at the generating period does the base of the flame drop below the top opening 36a in the first chamber 55. Ignition takes place where the mixture

of air and oil vapor from the first chamber comes in contact with air at the base of the second chamber 54. If additional oil is fed into the first chamber 26, (which is merely a continuation of the chamber 55) the base of the flame rises into the second chamber 54. Further air passes through the perforates 43, 44, 45, and 46 in the side walls 42 of chamber 54. This air is admitted in such locations, amounts, and temperature as to give a transparent or clean flame at all stages. As the primary air rises to the top of the first chamber 55 it passes through the opening 36a which slightly restricts the movement of air and therefore momentarily increases its velocity.

On entering the second chamber 54, additional air enters, and this fact, together with expansion of the mixture due to heating, increases its volume. Since the second chamber 54 is larger in diameter, the velocity of the gases will remain substantially the same as it was in the chamber 55. As the gases pass through the opening 50 at the top of the chamber 54, which opening is of smaller diameter, the gases again increase in velocity momentarily and upon entering into the third chamber 53 the gases will slow down to the constant velocity due to the larger diameter.

In other words, there are three expanding chambers, 55, 54, and 53 and in the lower chamber 55 all of the evaporation will take place with initial or complete mixing and combustion on the low fire. In the middle or next chamber 54, there will be complete combustion or mixing and combustion. The third chamber 53 which also acts as a radiator of heat will complete the mixing process and will complete the combustion. The size of the openings and the construction of the different diameter chambers also provides an arrangement in which the flooding of the burner can not cause smoking regardless of the draft available. The other advantages of a three diameter or more combustion chambers are that it results in more uniform gas velocity. As a result, a smoother action is obtained and more complete combustion without the necessity of high burner velocity which produces objectionable noises.

Further advantages are a lower minimum fire which corresponds to that of a conventional burner of the diameter of the lower burner chamber 55. A further advantage is that a maximum fire is obtained substantially equal to that obtained in a conventional burner as that of the same diameter of chamber 54.

The extinguishment of the flame due to excessive oil, poor draft, irregular draft, high draft or a combination of any of the above is prevented by limiting the size of the vaporizing bowl 26 so that it is impossible to vaporize sufficient oil to exceed the capacity of the combustion apparatus which in itself prevents the presence of large amounts of unburned combustible vapors. This effect is also obtained through the use of the larger top row of holes 46 in the upper chamber 54 so that combustion will always begin in the chamber 54 and at a point below the plate 47. The effect is further obtained by admitting air from the chamber formed by the walls 31 and 19, into the chamber 56 formed between the walls 19 and 10 by means of the openings 51 and thence admitting such air to the upper chamber 53 so that air is always present in the vicinity of the opening 50.

This air, which enters between the outer portions 52 of the plate 47 and the shell 10, is ad-

mitted and restricted in such a way that it can not be mixed with oil vapor, previous to entering the chamber 53.

5 The entire lower part of the burner such as the unit 31 can be removed by removing the bolts 39 and the nuts 20 and the entire unit can then be dropped vertically and removed for cleaning purposes. If desired, the spacers 38 can be solidly attached to the bottom 37.

10 Although Figures 1 and 2 show cylindrical or round construction only, it is the intention to cover all forms and shapes of cross sections. Other advantages will be apparent in my construction from the above description.

15 Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and

purpose of my invention, and it is my intention to cover by my claim and modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

5 An oil burning apparatus comprising a lower combustion chamber, means for admitting fuel to the lower chamber, a further chamber positioned above said lower chamber having a diameter substantially greater than said lower chamber, said chambers having a plurality of openings 10 arranged peripherally therein for admitting air to said chambers, a third chamber positioned above said aforementioned chambers, the lower chambers having restricted openings at the top 15 portions thereof.

JAMES T. GROTENHUIS.