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A. P. PLAUT

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OIL BURNER

Filed Jan. 12, 1925

Fig. 2.

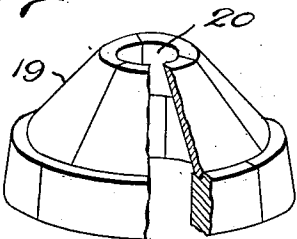


Fig. 3.

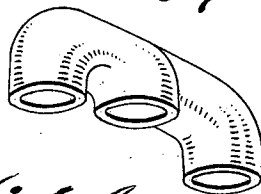


Fig. 4.

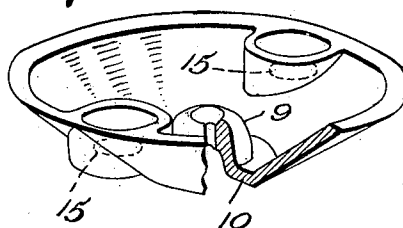
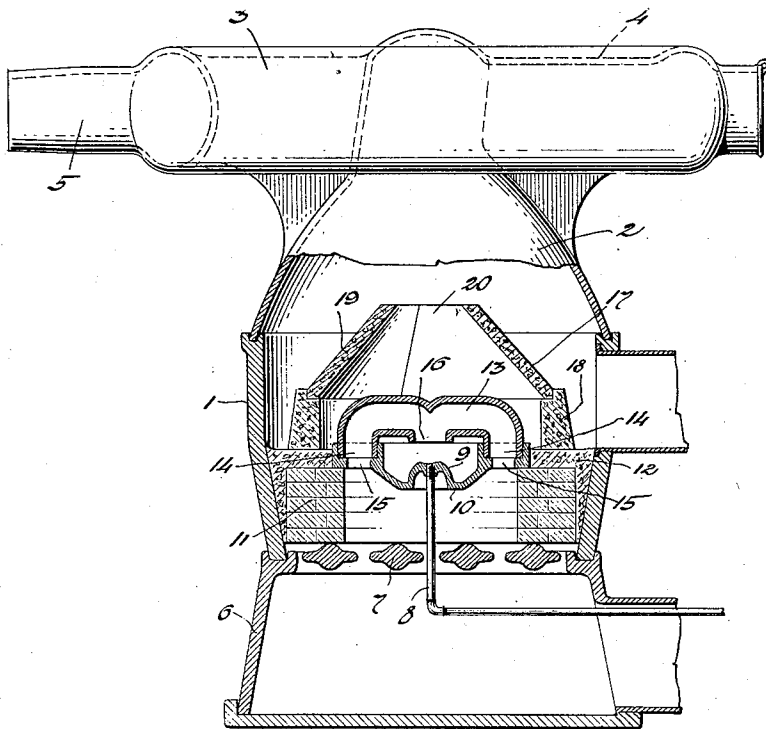


Fig. 1.



Inventor:

Antoine S. Plaut

By

Robert A. Ruck

Attorney.

UNITED STATES PATENT OFFICE

ANTOINE P. PLAUT, OF FLINT, MICHIGAN

OIL BURNER

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This invention relates to oil heaters or furnaces, and has for its object to effect the control and conservation of the flame and gases producing the flame whereby greater thermal efficiency will be obtained from the fuel than has heretofore usually been possible where no such provision has been made.

Ordinarily fuel oil is atomized or vaporized and admixed with air, together sometimes with steam, and this mixture upon issuing from a suitable mixing chamber, or directly as it is admixed, is ignited, the resulting flame being free to spread throughout the firebox within which it is formed or into which it is projected. In this way, considerable loss of efficiency results, due to the escape of a percentage of the gases and combustible material from the flame and from the immediate zone of intense heat, and the dissipation of such escaped gases and particles of combustible material thereafter without ignition. It is, therefore, an object of the present invention to prevent such loss to a very large degree by confining the flame and gases to ensure the proper combustion of the said gases, and minimize the production of smoke which would otherwise result.

It is also often desirable in order to secure high temperatures and thermal efficiency that a comparatively large quantity of oil be consumed within a small space, and the invention further aims to provide means whereby this may be done.

A still further object is to provide as an appliance for use with oil burners, a combustion chamber in the form of a flame confining device adapted to enclose the nozzle of a burner and temporarily entrap the flame and gases issuing therefrom in a manner retaining unburned gases in association with the flame until ignition.

Still further objects subsidiary to or resulting from the aforesaid objects, or from the construction or operation of the invention as it may be carried into effect, will be-

come apparent as the said invention is hereinafter further disclosed.

In carrying said invention into effect, I may apply to or use in combination with an oil burner wherein oil and air, or oil, air and steam are formed into a combustible mixture and ignited, a combustion chamber or enclosure extending over the point of initial combustion, said chamber being in the form of a casing so shaped, as by being in the shape of a hollow cone having a somewhat restricted opening at the apex, that the lower part of the said chamber admits of the expansion of the combustible mixture, and the conical shape of the chamber effects a slowing up of the travel thereof towards the outlet opening followed by a decrease in volume and increase of the velocity of the mixture towards said opening, whereby the flame will issue from said opening at high velocity and temperature, the gases having been thoroughly admixed within the said chamber.

All of which is more particularly described and ascertained hereinafter, by way of example, having reference to the accompanying drawings, wherein—

Figure 1 is an elevation, partly shown in section, of an oil burning furnace equipped with a combustion chamber embodying the invention;

Figure 2 is a broken perspective view of the said combustion chamber removed;

Figure 3 is a perspective view of part of the oil burner in connection with which the invention is described; and

Figure 4 is a broken perspective view of the base of the said oil burner.

Similar characters of reference indicate similar parts in the several figures of the drawings.

For the purpose of illustrating the action of my device, I show a well known type of hot air furnace wherein the firebox 1 is surmounted by a dome 2 which carries a flue

member in the form of a heat radiator 3 having an inlet 4 and an outlet 5, the said firebox 1 being mounted on a base 6 which is provided with grate bars 7.

5 As an example of an oil burner, I show a gravity fed burner wherein a feed pipe 8 enters the central upwardly extended part 9 of a dished burner plate or mixing bowl 10 which is supported by a firebrick structure 11 within the firebox 1. 12 is a covering of refractory cement and forms a support or
10 hearth for the improved combustion chamber which will be further described. The said oil burner is shown as including a manifold 13, the arms 14 of which form air inlets and communicate with air openings 15 in the said burner plate 10, 16 being the outlet of the said manifold through which air is delivered to the burner plate for admixture with oil (or gas when the plate is
20 hot) issuing from the mouth of the feed pipe 8. This admixture of air and oil when ignited produces a flame which is spread by the burner plate and extends upwardly around the manifold.

25 Ordinarily no further control of this flame is exercised and it is simply permitted to perform its heating functions within the furnace as far as conditions permit. By my invention, however, I propose to control the flame and heated gases associated therewith for a period after the admixture and ignition to effect a more thorough combustion of the said gases, and to produce a greater
30 intensity of flame, and also to control the situation of the zone of application of the heat whereby it may be most effectively distributed according to requirements and whereby also it may be prevented from overheating those parts of the burner which might otherwise be damaged by excessive
40 heat.

For these purposes I surround the burner or at least the flame of the burner, with a
45 combustion chamber or enclosure 17 of any suitable material such for example as fire clay, the base 18 of which is of substantial internal area and the superstructure 19 of hollow conical form having a restricted opening 20 at the apex thereof. The said base
50 18 forms an expansion chamber for the burning gases, and due to such expansion the speed of rising of such gases is reduced and a state of turbulence produced which increases the time during which the ignited
55 and unignited gases remain confined within the chamber and in close and turbulent association with one another, this having a natural tendency to produce more complete combustion.

60 As the said gases travel upwardly, they enter the coned superstructure 19 of the combustion chamber which reduces the volume and increases the speed of movement of the gases toward the outlet 20. Incidentally

this reduction in the volume results in an increase in temperature and a further acceleration of the combustion so that, upon
70 issuing from the outlet, the gases enter the dome and radiator of the furnace wherein the heat of the gases is dissipated in the manner required, instead of being lost to a great extent in the firebox of the furnace as is permitted when the said combustion
75 chamber is not utilized.

With this device a very intimate mixing of the gases at a high temperature and over a sufficiently extended period of time is effected as the size of the combustion chamber relatively to the oil outlet is considerable,
80 allowing for considerable expansion of the admixed fuel and air; and the provision for increasing the speed of the gases when so admixed, by means of the coned upper part of the combustion chamber, results in the intensifying of the flame.

The capability of the said device to effect practically complete admixture of air and fuel is exemplified by the fact that by means of its use a greater quantity of fuel than
90 usual may be consumed in a small space without smoke or loss in thermal efficiency, which is of particular benefit in high power boilers where space is at a premium as in small high powered vessels such as torpedo
95 boat destroyers.

It is preferred for purposes of assembling and locating in furnaces or confined spaces that the combustion chamber be made up of sections or parts adapted to be assembled in
100 the furnace, such construction being shown in Figures 1 and 3.

This invention may be developed within the scope of the following claims without departing from the essential features of the
105 said invention, and it is desired that the specification and drawings be read as merely illustrative and not in a limiting sense, except as necessitated by the prior art.

What I claim is:—

1. In a furnace having a fire box, a hearth therein, a combustion chamber on said
110 hearth forming a flame enclosure having a base of substantial area, said enclosure extending upwardly from said base and narrowing to an outlet directed towards the upper part of said furnace, a mixing device open to said chamber and substantially closing the bottom of the chamber, oil supply
115 means entering said mixing device, an air inlet device open to said mixing device and closed to said chamber, whereby air other than that directed from the mixing device into said combustion chamber is excluded from the combustion chamber.

2. In a furnace having a fire box, a hearth therein, a combustion chamber on said
120 hearth forming a flame enclosure having a base of substantial area, said enclosure extending upwardly from said base and nar- 130

rowing to an outlet directed towards the
upper part of said furnace, a flanged mixing
bowl open to said chamber and substantially
closing the bottom of the chamber, oil sup-
ply means entering said bowl, the flange of
the bowl having air inlet ports, and a mani-
fold establishing exclusive fluid communica-
tion from said ports to said mixing bowl,
whereby air other than that directed from
the mixing bowl into said combustion cham-
ber is excluded from the combustion cham-
ber.

In testimony whereof I affix my signature.

ANTOINE P. PLAUT.