

Feb. 12, 1935.

H. M. JEROME

1,990,695

OIL BURNING HEATER

Filed April 5, 1930

3 Sheets-Sheet 1

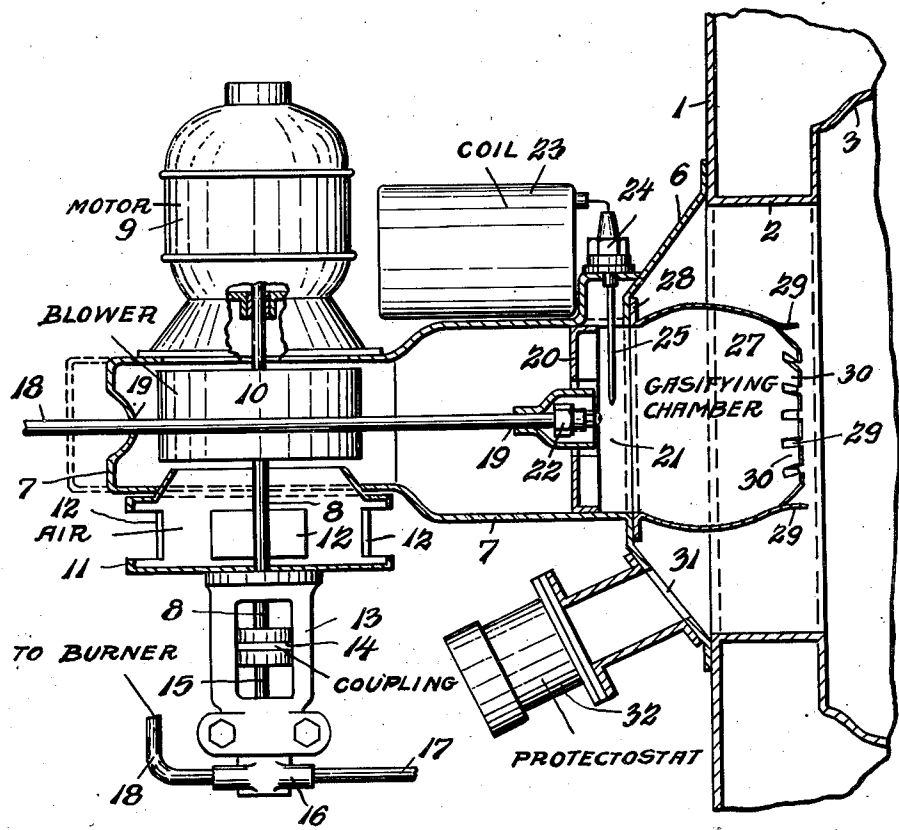


Fig. 1.

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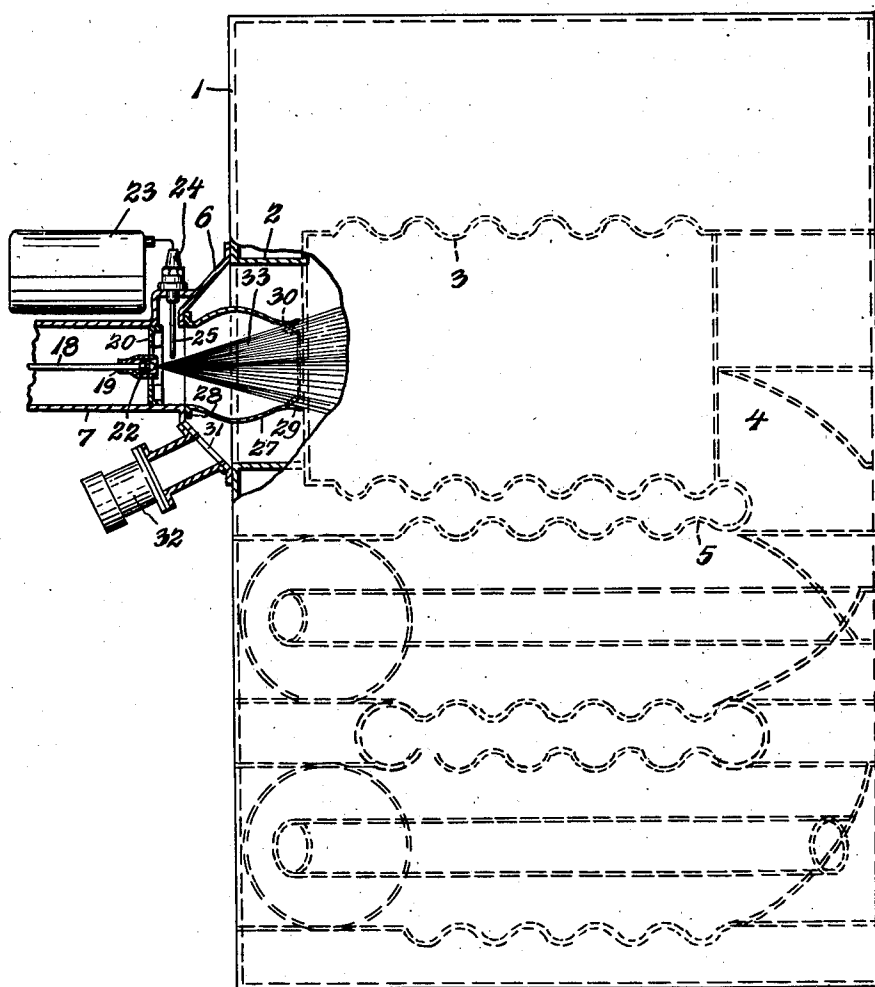
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Fig. 2.



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3 Sheets-Sheet 3

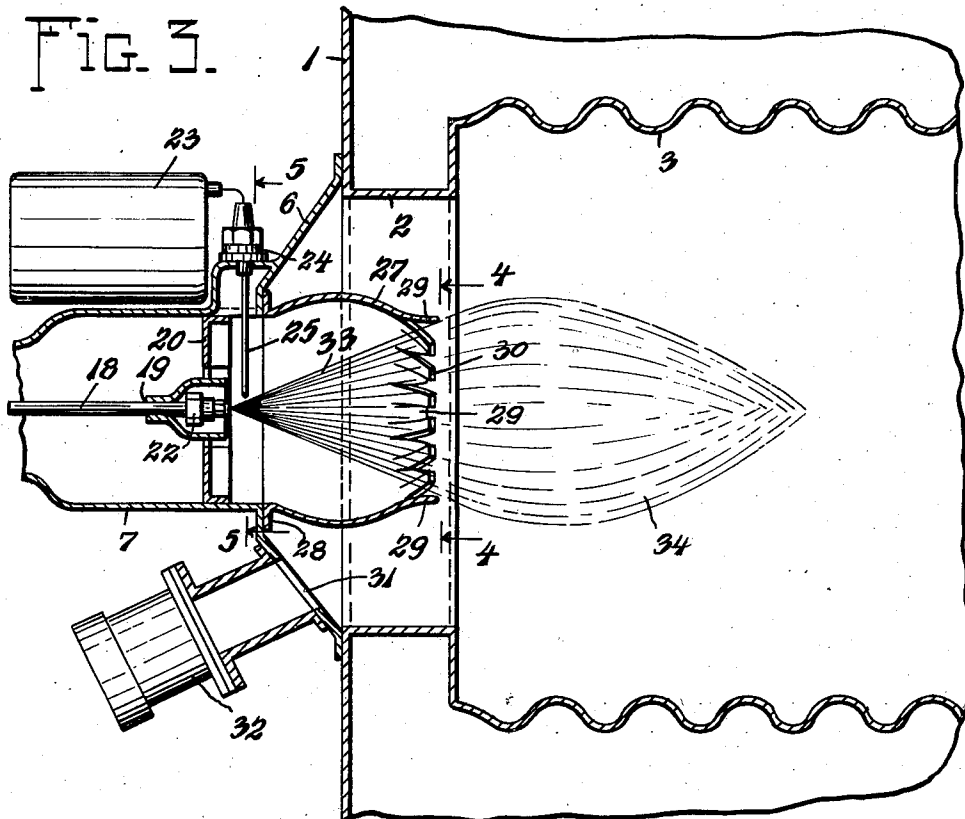


Fig. 4.

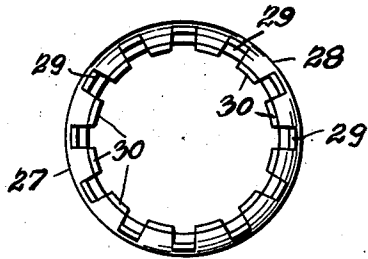
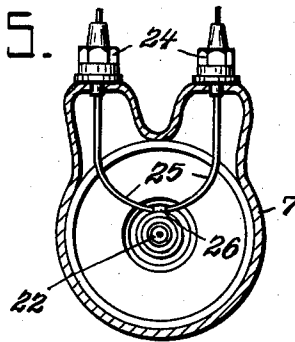


Fig. 5.



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1,990,695

OIL-BURNING HEATER

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Application April 5, 1930, Serial No. 441,887

2 Claims. (Cl. 158—28)

My invention pertains to an oil-burning installation and more particularly to cooperating burner and boiler units adapted for domestic heating.

Hitherto, so far as I am aware, all marketed oil burning heaters have attained an inadequate efficiency though requiring superior grades of fuel and during each periodical re-ignition do not soon enough attain their maximum efficiency because dependent upon pre-heating of a refractory furnace or boiler lining which was commonly a makeshift design calculated appropriately to convert the combustion chamber of the furnace or boiler which the customer happened to have and was disposed or compelled to retain by consideration or need of economy. It is not intended to have inferred from the foregoing that successful oil burners are not available, instead, that none achieves by itself a complete gasification. It is believed that all have been dependent upon a highly heated refractory enclosure apart from the burner proper and in consequence that all have entailed minutes of delay prior to attaining perfect combustion with the inevitable intervening deposition of globules of oil, resultant formation of carbon and its progressive insulatory diminuation of heat transfer.

Accordingly, the objects of my invention have been:

(1) To design a truly cooperative combination of oil burner and boiler which together achieve greater efficiency, which do so in a much shorter time after ignition, which will continue to do so for long time periods without cleaning attention and which will successfully consume an inferior grade of fuel.

(2) To construct an oil burner which will quickly gasify the fluid spray and project a flame of substantially perfect combustion whereby to permit advantageous heat convection along a sinuous boiler passage.

(3) To accomplish an oil burner assembly of sturdy, compact and economical design with the motor, blower and pump accessories all driven by a single shaft.

(4) To contrive a gasifying chamber of a shape and material adapted rapidly to heat and to withstand prolonged high temperature without distortion.

(5) To provide the gasifying chamber with a burner mouth also contributory to perfect combustion and to projected emanation of flame of concentrated and conventional shape.

(6) To design a boiler especially adapted to the declared purpose and having structural features

from which advantage may be derived either with well combusted oil fuel or fuel gas.

Claim is herein made to the burner and boiler combination and to the specific burner construction. The boiler is specifically claimed in a companion application filed of even date herewith.

It is to be realized that the scope of my invention comprehends many equivalent constructions. The showing of the drawings and the particular description are merely specific exemplifications of a plurality of mechanical embodiments and arrangements.

Adverting to the drawings:

Figure 1 is a part vertical section and part side elevation showing an oil-burner unit embodying my invention in cooperating relationship with a boiler.

Figure 2 is a vertical sectional view of a new design of boiler which has been successively adapted for cooperation with my new design of burner, a portion of which likewise appears in this view.

Figure 3 is an enlarged view of the burner proper, and showing its gasifying chamber occupying the inlet of the boiler.

Figure 4 is an end view of the gasifying chamber viewed on line 4—4 of Figure 3.

Figure 5 is a section taken on line 5—5 of Figure 3.

The exemplification of the drawings portrays a boiler 1 provided with an inlet defined by an annular flange 2 which communicates with a somewhat enlarged cylindrical combustion chamber 3. It is interpolated that the description of the boiler construction in this application should be succinct because its details of construction are to be claimed in a companion application. Suffice it to say here that the combustion chamber has a corrugated cylindrical side wall, that egress therefrom of the products of combustion is through a short bowed conduit 4 which communicates with the chamber 3 at one side of its rear wall. The conduit 4 leads downwardly and communicates at one side of the boiler with a slightly enlarged conduit 5 extending in a direction substantially horizontally toward the front and similarly fashioned with a corrugated annular wall. The flue passage then continues laterally, then again rearwardly, next downwardly, again forwardly, again laterally and to the rear to a lower stack outlet. The arrangement is such that an elongated sinuous flue passage is provided which is in fact of duplex zig-zag design because following relatively transverse courses across the confines of the boiler casing during its downward progression.

It should be understood, that the zig-zag flue passage is enveloped in a water jacket or reservoir.

Attached around the boiler inlet 2 is a casing support 6 and projecting from the latter in line with the inlet 2 and about its axis is a hollow structure 7 of peculiar shape and adapted to carry certain operating parts to be now described. A shaft 8 passes vertically through the structure 7 and its upper end is driven by a motor 9, the frame of which is shown supported on the structure 7. Directly below the motor and within the structure 7 is mounted a blower 10 and therebelow is a hollow structure 11 provided with circumferentially spaced air inlets 12. The shaft 8 continues downwardly through the structure 11 and is supported in additional bearings in a depending bracket 13, within which it is provided with a coupling 14 for establishing the connection with a driven shaft 15, which is operatively connected with a pump 16, which is designed to draw fuel through a pipe 17 connected with a supply tank (not shown) and deliver it through a pipe 18. It is mentioned that the employment of a motor, blower and pump is old practice, but my compact and sturdy arrangement thereof in association with a single driving shaft is believed to be advantageously novel.

The fuel pipe 18 enters the forward end of the structure 7 and passing axially therethrough is mounted at spaced points 19 therein. That one of the mountings 19 which is nearest the boiler is carried by an interior bracket 20. The end of the fuel pipe 18 is fashioned as a nozzle 21 with a minute orifice and the nozzle is detachably connected at 22 with the end of the pipe 18 to permit of cleansing or repair.

A pair of coils 23 are carried by the top of the structure 7 and with each is connected a plug 24 having an electrode 25 located within the structure 7. Electrodes 25 curve toward each other, as clearly shown in Figure 5, and terminate so as to provide an effective spark gap 26 at a point slightly ahead of the nozzle (as shown in Figures 1 and 3) and elevated with respect thereto a distance determined by the approximately conical spray jet from the nozzle; the intention being to have the spark gap in close proximity to the upper arc of the jet.

One of the features of my invention is the provision of a new type of gasifying chamber which approximates a globular form and is composed of thin alloy possessed of heat resisting properties and capable of maintaining its shape under high temperature approaching 2000° Fahrenheit. The gasifying chamber 27 includes an annular flange 28 which is adapted to be attached in any feasible manner around the interior margin of the casing support 6. The disclosure of the drawings may be considered to illustrate a welded connection therebetween. As so supported, the chamber 27 has its spherical surfaced side wall projecting into the inlet 2 and its boiler-inserted open end terminating close to the outer end of the combustion chamber 3, and it will be observed that the margin of such discharge end of the gasifying chamber is fashioned with circumferentially arranged vanes formed by slitting said margin. Alternately arranged vanes 29 are bent outwardly, as shown in Figures 1, 3 and 4, whereas the remaining vanes 30 follow their original contour. Such a design of burner mouth is calculated to assist in the projection of a so-called ball of fire

in apparent suspension from the outlet of the chamber and not impinging the walls of the boiler chamber. The lower side of the casing support 6 is provided with an opening 31 around which is mounted some standard type of protectostat 32 operating as a safety device to shut off all operation in case of failure of the flame to attain its proper burning efficiency of which the atomized spray 33 and approximate shape of flame 34 are included as determinants. The spark gap 26 should be in close proximity to the uppermost spray line 33, as shown in Figure 3.

I have successfully demonstrated that a burner of the design just described will attain full efficiency in about two minutes or in so much less time than other marketed oil burners with which I am acquainted as to avoid the necessity of a preheated refractory lining and as to make possible the use of a lower and cheaper grade of oil. The wall and lips of the gasifying chamber 27 reach a high temperature so readily as to contribute to the desired complete combustion in a minimum period of time and thereby to avoid any protracted spraying of oil on the walls of the combustion chamber with the consequence of an insulating and inefficient carbon deposition thereon. It is to be noticed also that the size of the combustion chamber 3 is enough greater in diameter than the diameter of the gasifying chamber as to avoid direct impingement of the flame 34 with the walls of the combustion chamber. In that sense I believe I have evolved a new cooperative relationship between an oil burner and a surrounding furnace or boiler wall to which feature I have made some claim. That is to say, an all metal boiler of my design is believed to be possible of use only in conjunction with a burner of the type I have described and with a comparatively large combustion chamber which it is not required to preheat in order to obtain the complete combustion therein. The desired constant of CO and CO₂ may be surprisingly soon achieved in my flame 34 so that a metal combustion chamber and metal flue passage may be employed with continuing efficiency.

I claim:

1. In an oil burner, the combination of a thin globular refractory gasifying chamber composed of metal and having axially opposite open ends, means for projecting atomized fuel and air into and through one open end, ignition means adjacent said projecting means, said other open end forming the discharge for said chamber, the peripheral edge thereof being formed with fingers, alternately extending towards and parallel to the axis of the said openings.

2. In an oil burner, the combination of a thin globular refractory gasifying chamber and having axially opposite open ends, a nozzle for projecting atomized fuel and air into and through one open end, ignition means including a spark gap at a point slightly ahead of said nozzle and elevated with respect thereto a distance determined by the proximately conical spray jet from the nozzle so that the spark gap will be positioned in close proximity to the upper arc of the jet, said other open end forming the discharge for said chamber, the peripheral edge thereof being formed with fingers, alternately extending towards and parallel to the axis of the said openings.

HORACE M. JEROME.