

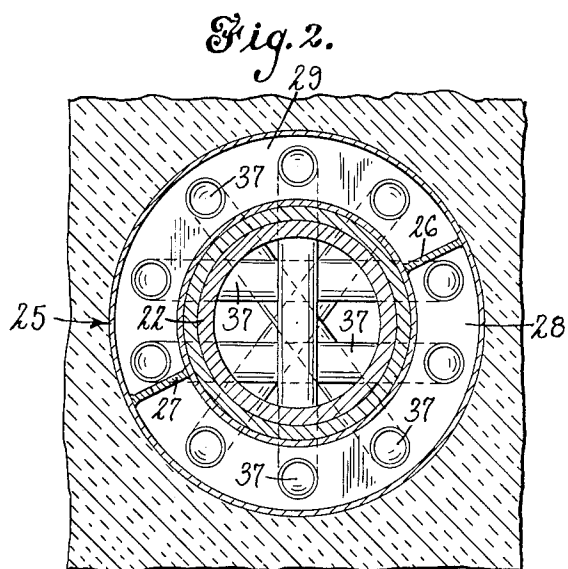
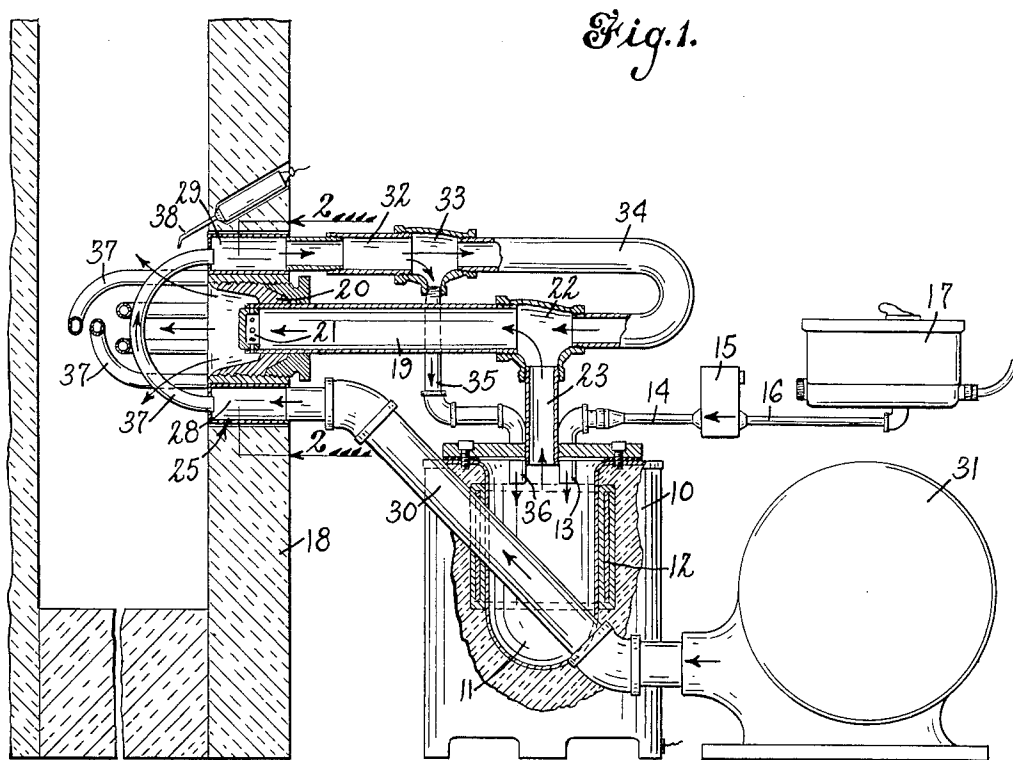
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R. REICHEL
BURNERS FOR LIQUID FUELS

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2 Sheets-Sheet 1



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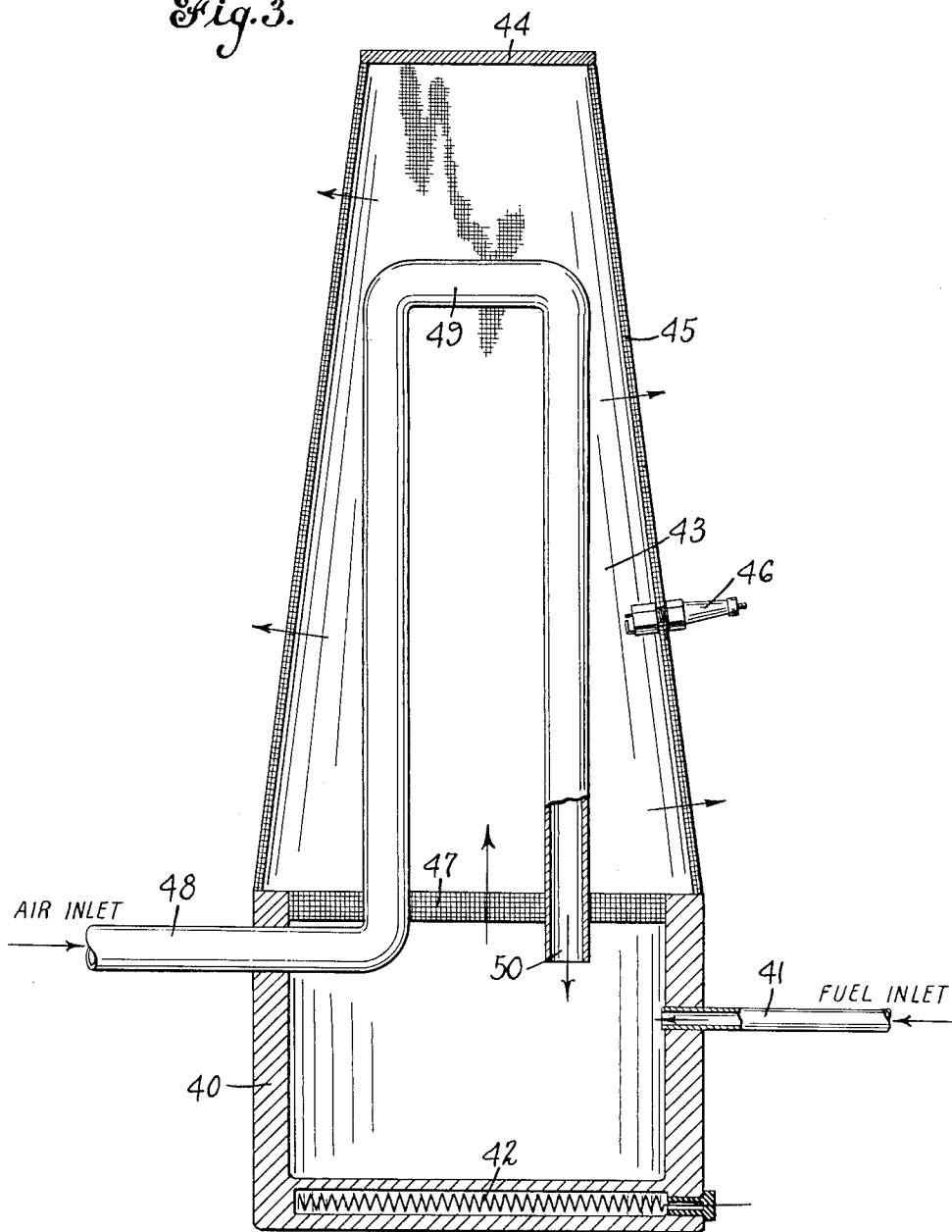
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Fig. 3.



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BURNERS FOR LIQUID FUELS

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4 Claims. (Cl. 158—5)

This invention relates to a gasifier and burner for fuels, and more particularly for liquid fuels in order to promote a more complete and efficient combustion of the latter.

In particular the device of the application and the method disclosed herein relate to means for changing a liquid fuel into a gas and conveying this gasified fuel to a combustion chamber or other place of consumption.

In particular the invention relates to a convenient and economical method of gasifying the liquid fuel wherein after the process is in operation the fuel will be gasified by the delivery of heated air to a gasifying chamber to which the fuel is also delivered, the air being heated by being passed through the combustion chamber so that once the method is in operation the apparatus will be self-sustaining and no extraneous means employed for providing heat for gasifying the fuel.

In some prior apparatus of this character liquid fuel has been gasified by introducing it into a chamber and there effecting combustion of a part of the fuel, the heat of combustion serving to gasify the remainder. This gasified fuel is then delivered to a combustion chamber where its useful combustion takes place. The present device and method distinguish from such a process in that in the present instance the fuel is not burned until it reaches the combustion chamber but is gasified by heat from heated air delivered to the gasifying chamber, the air in turn being heated by being passed through the combustion chamber on its way from the air source to the gasifying chamber.

It will be appreciated that when the burner is first placed in operation no heated air can be supplied thereto as there will be no heat in the combustion chamber. Therefore, a source of initial heat is provided such as an electrical heat source, for example, to initially supply heat to the combustion chamber and gasify the fuel therein. As soon, however, as this gasified fuel is carried to the combustion chamber and delivered thereto so that the air delivered to the gasifying chamber through the combustion chamber may be heated in its passage through the latter, this electrical heat unit may be cut off and thereafter the system will be self-sustaining.

One object of the invention is to provide a new and improved apparatus for gasifying fuel such, for example, as liquid fuel.

A further object of the invention is to provide a new method of gasifying fuel which comprises delivering heated air to a gasifying chamber in which the fuel is contained, the air being heated by being passed through the zone of combustion of the gasified fuel.

A still further object of the invention is to provide an improved gasifier and burner which will serve to gasify liquid fuel and then burn the same, the fuel being gasified by heat derived from the combustion of fuel after it leaves the gasifying chamber.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed and the combination of steps in the claimed process.

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In the accompanying drawings:

Fig. 1 is a diagrammatic view partly in section of the apparatus embodying my invention and illustrating my improved process;

Fig. 2 is a sectional view on line 2—2 of Fig. 1; and

Fig. 3 is a view of a modified form of gasifier and burner.

To illustrate a preferred embodiment of my invention I have shown in Figs. 1 and 2 of the drawings a burner and gasifier comprising a casing 10 providing therein a gasifying chamber 11. This gasifying chamber is surrounded by a heat unit 12 herein shown as an electrical heat unit so that an electrical current may be supplied to the unit and heat generated therein to heat the gasifying chamber 11 and gasifying the fuel therein. It will be understood that, as will be described hereinafter, this heat unit is designed to be employed only at the beginning of the operation of the burner, and as soon as the latter is in operation the use of the electrical heat unit will be discontinued.

Fuel such as heavy oil, for example, is introduced into the gasifying chamber through the nozzle 13 of a fuel pipe 14 leading to a control valve 15, such as an electric valve, for example, to control the flow of fuel to the chamber 11. From the casing of the valve 15 a fuel pipe 16 leads to a fuel supply source 17.

A combustion chamber is shown more or less diagrammatically at 18, and gasified fuel is introduced into this combustion chamber through the pipe 19 which passes through a thimble structure 20 in the wall of the combustion chamber and is provided at its inner end with a nozzle 21. The conduit or pipe 19 leads to a T 22 which is connected by the conduit 23 with the gasifying chamber 11 so that gasified fuel and air, as will be hereinafter explained, are delivered to the combustion chamber from the gasifying chamber.

Surrounding the thimble 20 is a hollow annular drum 25 shown in Figs. 1 and 2. This drum is provided with partitions 26 and 27 which divide it into two compartments 28 and 29, each of these being in the shape of a semi-annulus. The compartment 28 is connected by a tube 30 with an air source 31 which may be an air pump or fan of any desired form so that upon operation of the device air will be delivered to the compartment 28 of the drum 25.

The compartment 29 of the drum is connected by a conduit 32 with a T 33, which T is connected by a pipe 34 with the T 22 and also connected by the pipe 35 with the air nozzle 36 leading into the gasifying chamber 11. It may be noted here that, as will be hereinafter explained, heated air is conveyed by the pipe 32, which air stream is divided in the T 33. A part of the air passes into the gasifying chamber to gasify the fuel therein, while another part of the heated air passes through the pipe 34 to the T 22 where it is delivered into and mixed with the gasified fuel being delivered to the combustion chamber through the pipe 19. Thus in the pipe 19 the gasified fuel and air from the gasifying chamber is mixed with additional heated air entering by way of the pipe 34 so that there will be a sufficient quantity of heated air delivered to the combustion chamber with the fuel for complete combustion of the latter.

In order to heat the air, which is delivered into the drum by the conduit 30, the compartment 28 communicates with the compartment 29 through a number of tubes or pipes passing through the combustion chamber immediately opposite the nozzle 21 of the pipe 19 so that these pipes will lie in the combustion zone and the air will be heated in its passage from the compartment 28 to the compartment 29 of the drum 25.

As shown, a number of these pipes 37 are provided, each communicating at one end with the compartment

28 and at the other end with the compartment 29. The pipes are of arched shape so that they will provide a relatively long passage for the air in order that it will have plenty of time to be heated. As shown, certain of these pipes are arranged to cross each other in passing from one of the compartments to the other so that they must be so shaped as to cross without interference. Thus the air passing from one of the compartments of the drum to the other is divided up into a number of streams each of which has a relatively long course or path through the combustion zone to adequately heat the gasifying air.

The gasified fuel may be ignited in the combustion chamber by any desired means, such for example as a spark element 38. It will be understood that this element will be energized only in the initial starting of the apparatus as combustion will be self-supporting when once started.

In operation fuel is delivered to the gasifying chamber 11 through the nozzle 13 by opening the valve 15. The electrical heating unit 12 is energized to heat the gasifying chamber, it being assumed that there is no heat in the combustion chamber 18. Air is delivered to the gasifying chamber from the air source 31, and as soon as the fuel is gasified it is delivered through the pipes 23 and 19 to the combustion chamber where it is ignited by the spark mechanism 38. As soon as ignition is effected, the action of the spark mechanism is discontinued.

The gasified fuel burns in the combustion chamber 18, and the air being delivered from the air source through the pipe 30, the pipes 37 and conduit 32 is conveyed by the pipe 35 to the gasifying chamber 11 in a heated condition, it having been heated by passage through the pipes 37 which lie in the zone of combustion. This heated gas will now supply sufficient heat to the gasifying chamber to gasify the fuel and the electric heat element 12 may be cut off. Also at this time air from the pipe 32 will be conveyed by the pipe 34 into the T 22 and will mix in the pipe 19 with the gasified fuel and air being delivered to the combustion chamber. It will be seen, therefore, that there will be a sufficient quantity of heated combustion air to effect complete combustion of the fuel.

It will be noted that the system will now be self-sustaining in that the air heated by passage through the combustion zone of the fuel will be sufficient to gasify the fuel so that the use of the electric heat unit may be discontinued, and it will also be noted that none of the fuel is consumed prior to its being consumed in the combustion chamber where the heat will be employed usefully.

In Fig. 3 of the drawings I have shown a modified form of my invention wherein the gasifying chamber and combustion chamber are combined into a single unit. Here the gasifying chamber or pot is shown at 40 to which the fuel is delivered through the fuel inlet 41. At the lower portion of the gasifying chamber is an electric heat element 42 to initiate the gasifying action when the burner is first set into operation.

A combustion chamber 43 is provided above the gasifying chamber, the combustion chamber being closed at the top, as shown at 44, and being surrounded by a radiant screen 45, as for example a nickel alloy screen, so as to transform the blue flame within the combustion chamber into a radiant flame which issues from the chamber. An ignition device such as a spark plug 46 is provided in the chamber to initially ignite the gasified fuel.

The combustion chamber is separated from the gasifying chamber by a flame-arresting screen 47 so that the flame in the combustion chamber 43 will be prevented from passing downwardly into the vaporizing chamber 40. The screen will, however, permit the gasified fuel to pass upwardly from the chamber 40 to the combustion chamber 43.

An air inlet tube 48 to which air is supplied from a suitable source leads into the vaporizing or gasifying

chamber 40 and thence upwardly through the flame-arrester 47 into the combustion chamber for a considerable distance where it is reversely turned, as shown at 49, to pass downwardly and deliver heated air through the nozzle 50 into the vaporizing chamber.

The operation of this device is similar to that described in Figs. 1 and 2 in that fuel introduced into the gasifying chamber is first gasified by heat from the electric heat element 42. Air is introduced through the air inlet tube 48 which carries the gasified fuel into the combustion chamber 43 where it is ignited by the spark plug 46. As soon as the gas is ignited the spark plug is cut off and the heat of combustion in the chamber 43 will serve to heat the air passing through the pipe 49 into the gasifying chamber, which heated air will serve, without more, to gasify the fuel. The operation of the electric heat element may now be discontinued and the burner will be self-sustaining.

Thus the combustion chamber and gasifying chamber may be combined to a single unit separated only by the flame arrester which will prevent any consumption of the fuel until it passes into the combustion chamber, and the hot air heated by its passage through the combustion chamber will serve to vaporize the fuel.

While I have shown and described some preferred embodiments of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. In a gasifier and burner a gasifying chamber, means to introduce into said chamber the fuel to be gasified, a combustion chamber, said gasifying chamber being disposed without the combustion chamber, means to deliver gasified fuel from the gasifying chamber to the combustion chamber, a source of air under pressure, means to convey air from said source through the combustion chamber, to heat the same, to a delivery conduit without the combustion chamber, and means connecting said conduit with said gasifying chamber to deliver a part, only, of said heated air to the latter, and means also connecting said conduit to said fuel delivery means leading to the combustion chamber to deliver the remainder of said heated air to the gasified fuel at a point without the combustion chamber during its passage from the gasifying chamber to the combustion chamber.

2. A fuel gasifier and burner comprising a combustion chamber, a gasifying chamber disposed without the combustion chamber, means for delivering fuel to the latter chamber, a source of air flow, means for conducting air from said source through the combustion chamber to be heated therein, means to convey said heated air out of said combustion chamber and deliver a part thereof to the gasifying chamber, a fuel passage to convey gasified fuel from the gasifying chamber to the combustion chamber, and means to convey a part of said heated air to said fuel passage between the two chambers to be carried into the combustion chamber with the gasified fuel.

3. A fuel gasifier and burner comprising a combustion chamber, a gasifying chamber disposed without the combustion chamber, means for delivering fuel to the latter chamber, a source of air flow, means for conducting air from said source through the combustion chamber to be heated therein, means to convey said heated air out of said combustion chamber and deliver a part thereof to the gasifying chamber, a fuel passage to convey gasified fuel from the gasifying chamber to the combustion chamber, means to convey a part of said heated air to said fuel passage between the two chambers to be carried into the combustion chamber with the gasified fuel, and a heating device to initially heat the gasifying chamber.

4. A fuel gasifier and burner comprising a wall forming a combustion chamber, a gasifying chamber disposed without the combustion chamber, means for delivering fuel to the latter chamber, a source of air flow, means for conducting air from said source through the combustion

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chamber to be heated therein, means to convey said heated air out of said combustion chamber and deliver a part thereof to the gasifying chamber, a fuel passage to convey gasified fuel from the gasifying chamber to the combustion chamber, means to convey a part of said heated air to said fuel passage between the two chambers to be carried into the combustion chamber with the gasified fuel, said air-conducting means comprising a drum in the wall of the combustion chamber having an inlet compartment and an outlet compartment, and curved tubular members disposed within the combustion chamber and connecting said compartments.

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