Dec. 18, 1934. A. J. FRAME 1,984,573

OIL PILOT FOR HYDROCARBON BURNERS

Filed Sept. 14, 1931 2 Sheets-Sheet 1

Fig. 1.

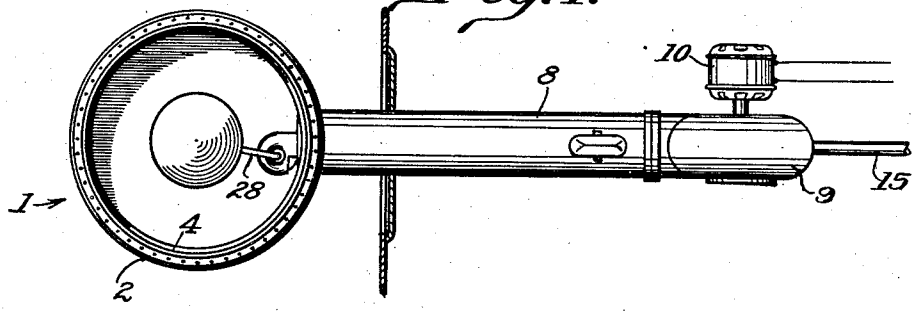


Fig. 2.

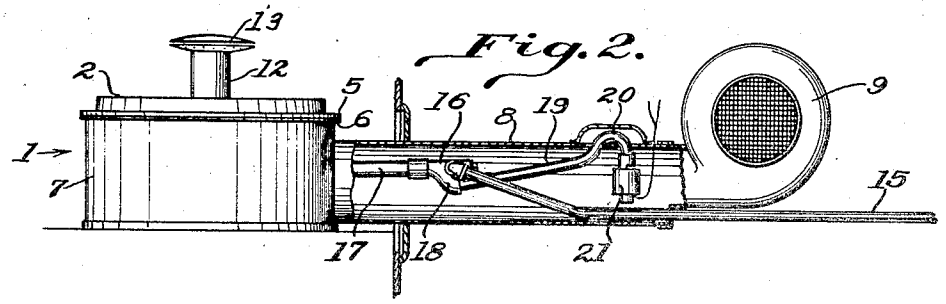


Fig. 3.

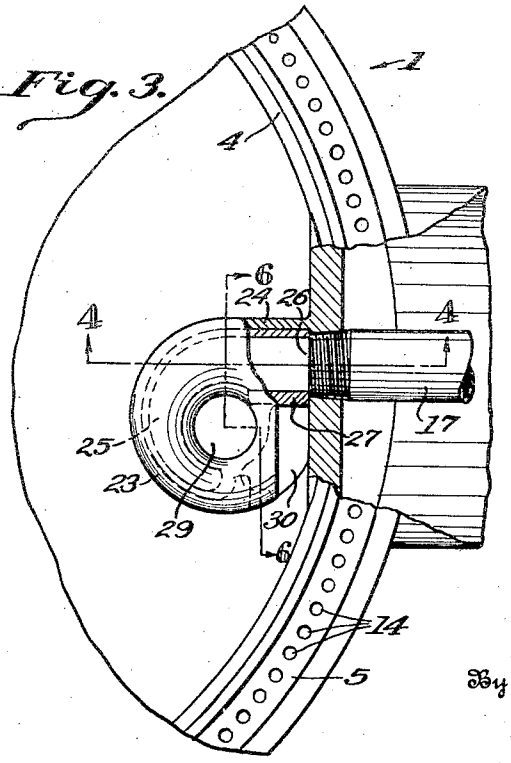
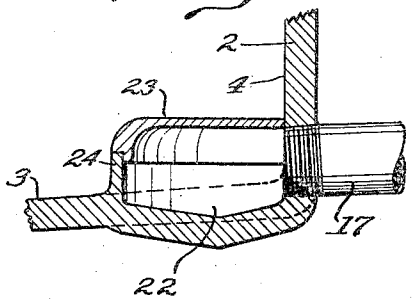


Fig. 4.



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OIL PILOT FOR HYDROCARBON BURNERS

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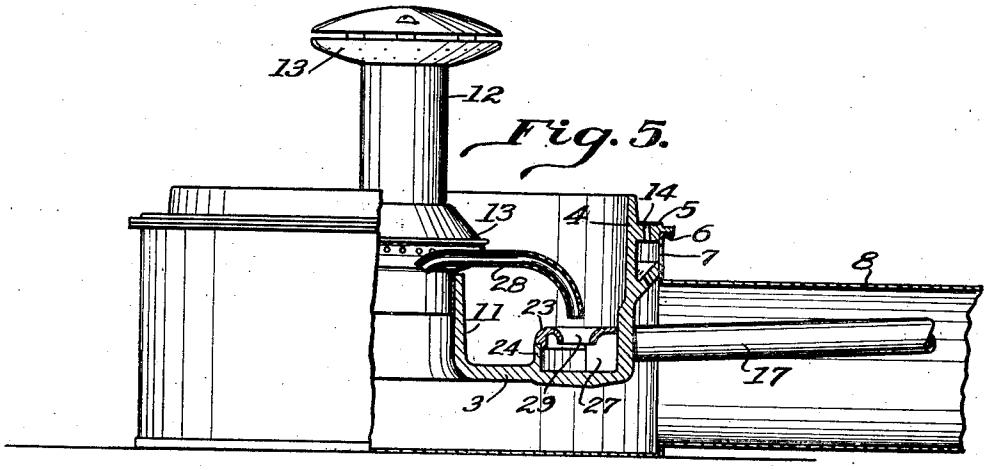


Fig. 5.

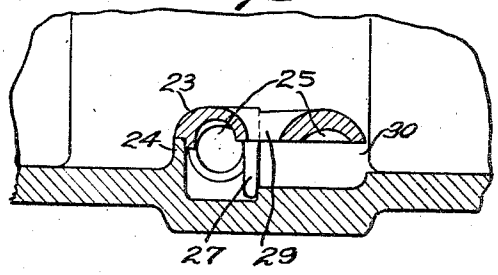


Fig. 6.

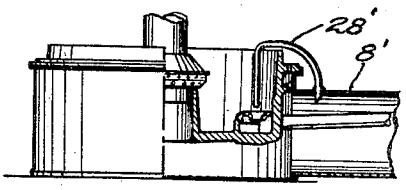


Fig. 8.

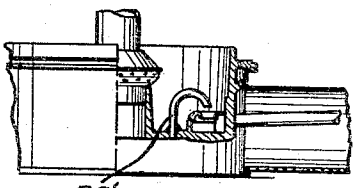


Fig. 9.

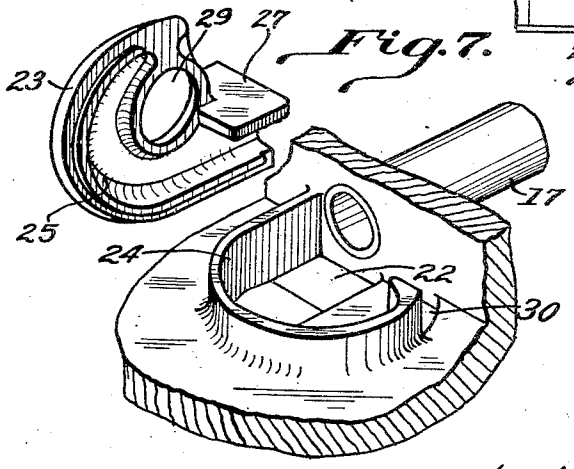


Fig. 7.

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UNITED STATES PATENT OFFICE

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OIL PILOT FOR HYDROCARBON BURNERS

Augustus J. Frame, Columbus, Ohio, assignor to Franklin Oil Heating, Inc., Columbus, Ohio, a corporation of Ohio

Application September 14, 1931, Serial No. 562,724

6 Claims. (Cl. 158—91)

This invention relates to oil pilots for use in effecting combustion in hydrocarbon fuel burners, especially fuel burners of the automatic type utilized for residence and building heating purposes.

It is an object of the present invention to provide an oil pilot for such burners which utilizes the same fuel, namely, fuel oil employed in effecting the operation of the main burner, whereby an economical and satisfactory pilot is provided which is independent of extraneous sources of fuel supply for its operation.

Another object of the invention is to provide an oil burning pilot of the character specified wherein provision is made for carbureting the oil fuel supplied thereto with air in such a manner that an efficient combustible mixture is produced by which the pilot may burn without smoking and producing disagreeable odors together with forming objectionable carbon deposits.

With these and other objects in view, which will appear as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts hereinafter to be more fully described and pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a top plan view of an oil burner heating unit wherein is embodied the oil pilot comprising the present invention,

Figure 2 is a side elevation thereof, part of which has been broken away to show underlying structure,

Figure 3 is an enlarged detail elevational view partly in section,

Figure 4 is a detail vertical longitudinal sectional view taken on the line 4—4 of Figure 3,

Figure 5 is a vertical longitudinal sectional view taken through the burner unit and the associated oil pilot mechanism,

Figure 6 is a detail transverse vertical sectional view taken on the line 6—6 of Figure 3,

Figure 7 is a perspective view of the members comprising the oil pilot burner head, and

Figures 8 and 9 are part vertical sectional views disclosing slightly modified forms of the invention.

Referring more particularly to the drawings, the numeral 1 designates an oil burner of the type adapted for installation in the heating furnaces of residences and other buildings. The burner is shown to comprise a vaporizer or combustion vessel 2 consisting preferably of a circular cast iron structure having a bottom 3 and an open top. The circular side wall 4 of the vessel is provided adjacent to its upper and outer edge with an annular flange 5 which is situated upon a similar flange 6 formed with the upper portion of a supporting casing 7. This casing is connected by means of a conduit 8 with a source of forced air supply created by a blower 9 driven by a motor or other power unit 10. The bottom of the vessel 2 is spaced from the bottom of the casing 7 as shown in Figure 5 and air entering the casing passes upwardly through an upstanding sleeve 11 formed axially in connection with the bottom wall 3 of the vessel 2, carried by the upper portion of the sleeve 11 is a riser or air distributor 12 which is formed with an open bottom and a closed top. The air distributor is provided with one or more vertically spaced circular heads 13, which may be formed with a plurality of ports by which streams or jets of air are directed outwardly and radially from the air distributor to combine with vaporized oil released from the bottom of the vessel to produce the main combustible mixture. A secondary body of air is supplied to this mixture by providing the flange 5 with a plurality of upwardly directed ports 14, which latter direct streams of air into the primary mixture produced in the vessel to form substantially smokeless combustion with but a minimum carbon formation.

Although the burner is preferably of the construction shown and described, it will be understood that the present invention, which is directed to an oil pilot, is not necessarily limited for use in connection therewith, and the burner mechanism disclosed has been merely selected for purposes of facilitating a clear understanding of the invention and its manner of use in practical operation.

Indicated by the numeral 15 is an oil line which leads from a source of oil supply (not shown), the flow of the oil through the line being regulated preferably by automatic means, such as a control valve, not illustrated, by which oil is delivered through the line 15 either under gravity or pressure in regulated quantities. Such oil control mechanism has been disclosed in my co-pending application Serial No. 551,439, filed July 17, 1931, and inasmuch as it does not constitute a part of the present invention, the illustration thereof has been omitted. It may be stated, however, at this point that the oil control mechanism set forth in this co-pending application includes a solenoid operated control valve for shutting off the passage of liquid

through the line at regulated intervals controlled by a thermostatic switch located within the building or room to be heated. The control valve in this instance when closed is so regulated as to permit a small quantity of oil to pass therethrough at all times to keep the pilot supplied with fuel.

The pipe line 15 connects at its forward end with a fitting 16 which in turn is connected by means of a short pipe line 17 threaded into the lower part of the vessel 2, as indicated more particularly in Figures 3 and 4. The fitting 16 is formed at its forward lower portion with an offset 18 into which is threaded the lower end of an air supply pipe 19. This pipe extends axially within the conduit 8 and has its upper end terminating in a goose neck 20, which is disposed in a horizontal plane above the level of the liquid oil which may accumulate in the bottom of the combustion vessel 2. The goose neck 20 terminates in a downwardly extending portion which is connected to a solenoid controlled air valve structure 21. The construction of this valve has also been set forth in my aforesaid co-pending application, and which valve is electrically connected with the oil control valve and functions to permit the inflow of air into the pipe line 19 when the oil valve has shut off the main liquid oil flow through the line 15. Ordinarily the valve 21 remains closed during the operation of the main burner structures and the oil is permitted to flow merely by gravity to the oil line 15. The valve 21 will however, serve its purpose during the operation of the pilot which will be brought out later.

The bottom wall 3 of the vessel adjacent the inlet end of the conduit 17 is formed with a sump 22 and positioned over this sump is a shell 23 comprising primarily the oil pilot. Cast integrally with the bottom 3 of the vessel is a substantially circular flange or wall 24 upon which the shell 23 rests and together with the latter forms a substantially circular passageway indicated at 25. The oil and air inlet 26 of the shell is arranged laterally to one side thereof in registration with the discharge end of the conduit 17, so that the oil entering the passageway provided by the wall 24 and the shell will be given a whirling or rotary movement. This whirling motion is assured by the provision of a baffle plate 27 integrally formed with the shell and which limits the entrance of the oil and air mixture to one side of the shell as indicated more particularly in Figure 3. Due to the curved walls of the shell 23 and the provision of the baffle plate 27 therein, this air and oil mixture will whirl rapidly within the circular passageway within the shell to produce an intimate mixture of the oil and air which will strike the baffle 27, becoming thoroughly vaporized and burn with a substantially blue flame.

Although oil pilots of this general construction have been in use and give quite satisfactory results, they have been known in some instances to burn with a smoky flame due to imperfect combustion and lack of oxygen. This objection has been overcome by supplying the pilot with additional air and to this end a tube 28 is arranged above the shell 23 and has one of its ends curved downwardly in close proximity with the opening 29 formed centrally of the shell through which the pilot mixture escapes for combustion purposes. The other end of the tube 28 enters the air distributor 12 so as to be in open communication with the air supply within the casing 7 and will effect a stream of air to enter centrally of the oil pilot flame breaking up the smoky core thereof and producing a bright, clear blue flame free from smoke and undesirable odors, in contrast to the weak yellow smoky flame produced by oil pilots heretofore developed for this purpose. Although the air supply tube 28 has been shown as entering the air distributor it will be understood that the same will function with equal facility if entered at other points as illustrated in Figures 8 and 9. In the former the tube 28' has its inlet end positioned within the air supply conduit 8'. In Figure 9 said tube is shown with its inlet end positioned in the bottom wall of the combustion chamber in open communication with the air casing surrounding the same. However, for convenience it has been found most practical to attach the air supply tube to the air distributor, as shown in the preferred form since the same may thereby be readily cleaned by the removal of said head or distributor.

When the burner is in active operation and the full supply of oil flows through the pipe 15, the oil passes from the shell by way of the outlet 30 provided between the side wall of the pot and the end of the wall 24 formed with the bottom thereof and into the bottom of the latter, where the oil enters in a relatively thin body over the bottom wall 3 of the vessel. Due to the heat of the combustion, this oil readily vaporizes and unites with the stream of air issuing from the distributor head 12 and the ports provided in the heads 13 supporting the principal combustion operation of the burner. Upon discontinuance of the burner operation effected by the thermostatically controlled oil regulating valve in the line 15, a limited oil supply flow will be maintained in the line and a sufficient amount contained in the sump to provide for sustained combustion. This limited oil flow provided for within the line 15, which may flow by gravity, is acted upon by the air entering the valve structure 21 positioned within the air conduit 8 and which air is maintained under pressure by the constantly operated fan or blower 9. This air supplied to the oil stream together with the additional air entering the pilot through the tubing 28 provides for the proper and efficient operation of the oil pilot.

In view of the foregoing it will be seen that the present invention provides an oil burning pilot for oil consuming heating units which will function to maintain an efficient pilot flame when the heating unit proper is ineffective. The pilot flame is, of course, maintained during the periods of inactivity of the main burner so that when the main flow of oil is again resumed a flame is present to initiate combustion thereof. By the provision of the shell and the additional air supplied thereto, the otherwise stagnant smoky core of the flame will be broken up producing a pilot flame which is steady and constant.

What is claimed is:

1. In an automatic oil burning heater, a combustion vessel, a pilot burner within the combustion vessel, means to supply oil to said vessel and to said pilot burner, and means delivering a jet of air in a reverse direction to and against a flame produced by the said pilot burner.

2. In an automatic oil burning heater, a combustion vessel, means supplying air under pressure thereto, a pilot burner positioned within the combustion vessel, means supplying fuel oil to the

pilot burner, and a conduit connected to the air supplying means and receiving air therefrom and terminating adjacent the pilot burner in a position to deliver a jet of air downwardly against a flame produced by the said pilot burner.

3. In an automatic oil burning heater, a combustion vessel, an oil supplying conduit connecting the combustion vessel and a source of oil supply, an air conduit supplying air to the combustion vessel and connected with a source of air supply, a pilot burner positioned within and forming part of the bottom of the combustion vessel and receiving oil from the oil supplying conduit, and a second air conduit connected to the first air conduit and terminating adjacent the pilot burner in a position to deliver a jet of air against a flame produced by the pilot burner.

4. In an automatic oil burning heater, a combustion vessel, an upstanding air supplying sleeve positioned centrally in the combustion vessel, means supplying air under pressure to the said sleeve, a pilot burner positioned within the combustion vessel, means supplying oil and air to said pilot burner and an air conduit connected at one end to the air supplying sleeve and receiving air therefrom and terminating at the other end adjacent the pilot burner and in a position to deliver a jet of auxiliary air against a flame produced by the pilot burner.

5. In an automatic oil burning heater, a combustion vessel, a pilot burner positioned within the combustion vessel, and comprising a casing having a vertical wall arranged in the form of a whorl and a top having a central escape opening, a conduit opening into the casing of the pilot burner adjacent the outer extremity of the whorl-shaped wall, means supplying a mixture of air and oil through the conduit, and means delivering a jet of air against a flame produced by the combustion of the air and oil mixture issuing from the escape opening.

6. In an automatic oil burning heater, a combustion vessel, a conduit connected to means supplying a mixture of oil and air and opening into the combustion vessel, a pilot burner within the combustion vessel and comprising a top having a central escape opening and a vertical wall arranged in the form of a whorl and positioned eccentrically to and surrounding the opening of the conduit, and means delivering a jet of air against a flame produced by the combustion of the whirling mixture of oil and air issuing from the escape opening.

AUGUSTUS J. FRAME.