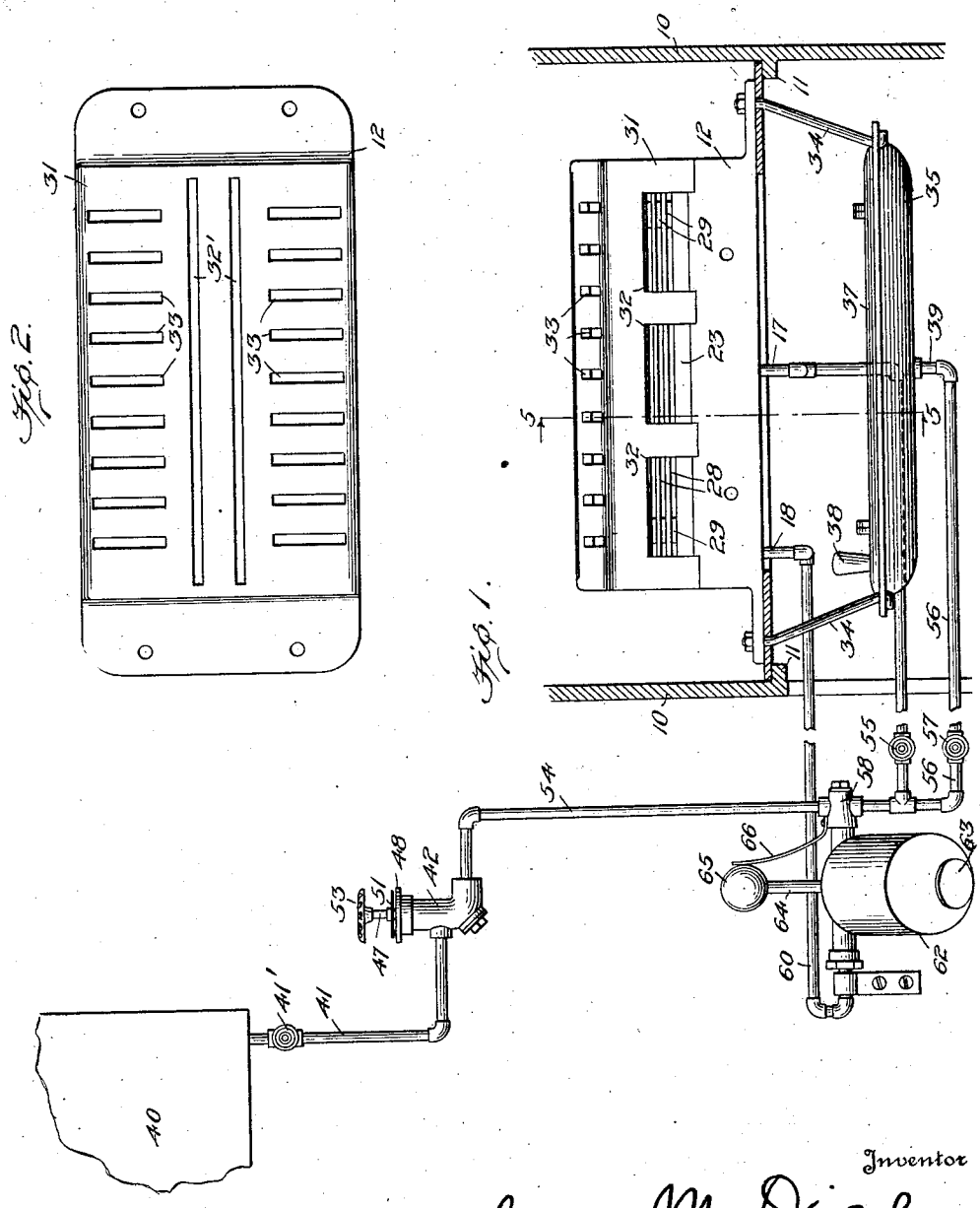
Nov. 22, 1927. 1,650,065

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LIQUID FUEL BURNER

Filed Sept. 17, 1924 3 Sheets-Sheet 1



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LIQUID FUEL BURNER

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Fig. 3

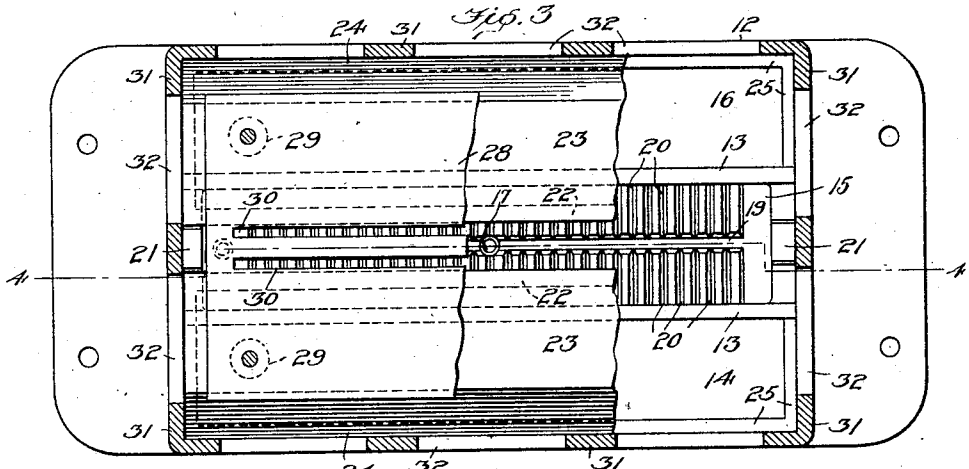


Fig. 4

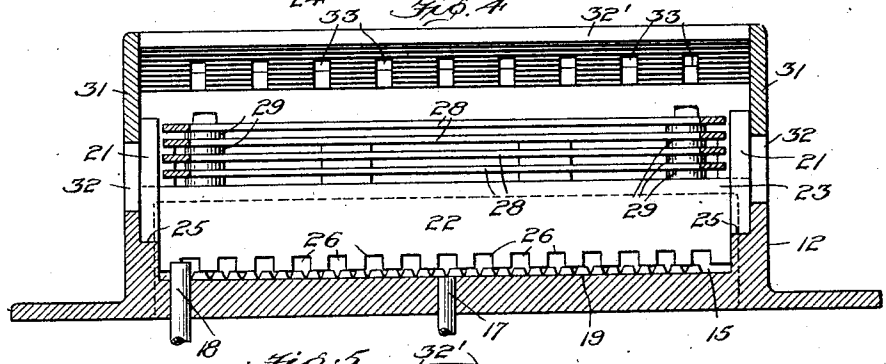
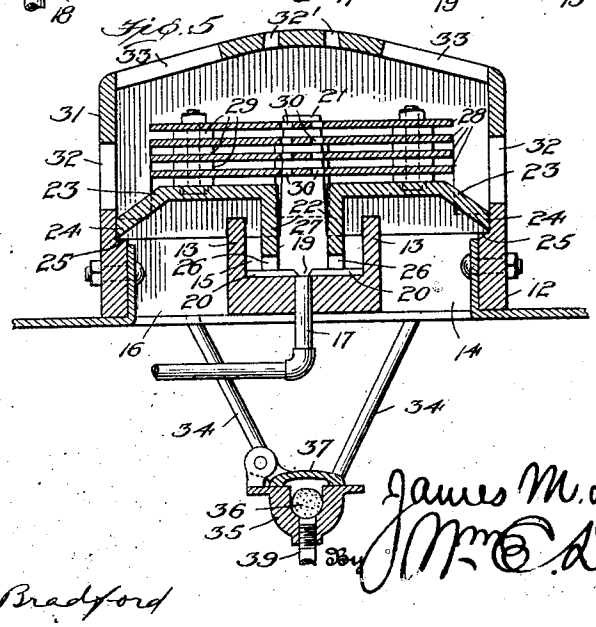


Fig. 5



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Fig. 6.

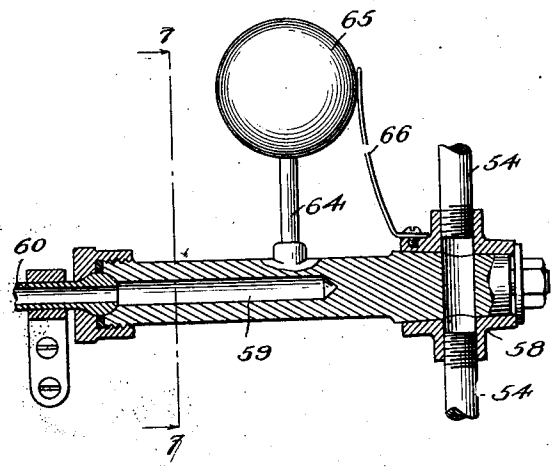


Fig. 7

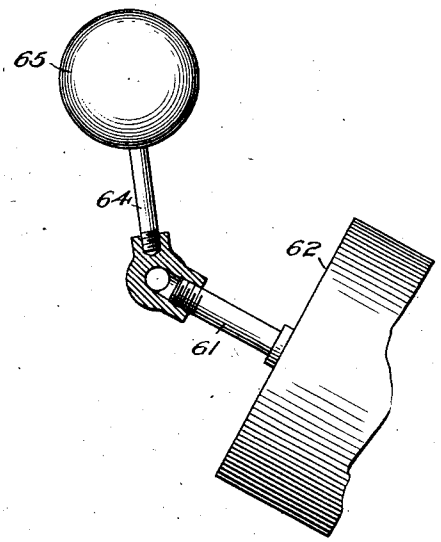


Fig. 8.

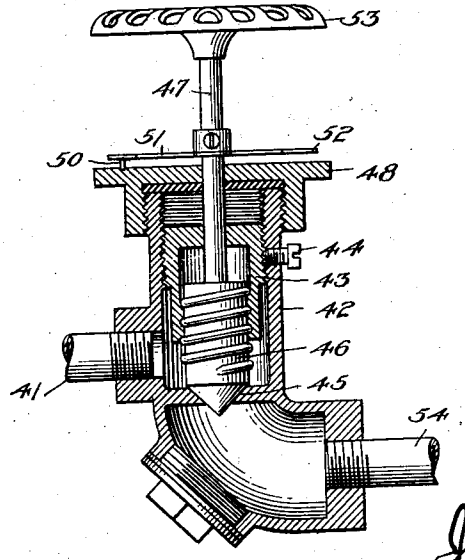
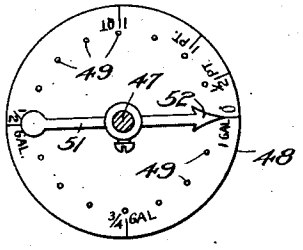


Fig. 9.



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UNITED STATES PATENT OFFICE.

JAMES M. DIAL, OF ATHENS, GEORGIA.

LIQUID-FUEL BURNER.

Application filed September 17, 1924. Serial No. 738,180.

My invention relates to liquid gaseous fuel burners, and more especially to burners of the pan and tray type, designed for the combustion of crude oil or other hydrocarbons such, for example, as kerosene distillates or fuel oils. It has for an object to provide a burner of the character indicated for industrial or domestic heating, which is of extremely simple, and durable construction, being at the same time capable of easy installation in stoves, ranges or furnaces, originally designed for buring coal or wood, as well as in stoves and furnaces designed especially to receive it.

This invention also has for an object the production of burners of the class indicated which are arranged and adapted to mix the atmospheric air and the vapors generated in the proper proportions to insure complete combustion.

For a further object the present construction provides means for regulating the supply of liquid fuel, and for feeding the same at a predetermined rate of delivery to the burner according to requirements.

With the foregoing and other objects in view, the invention will now be particularly described, and later pointed out by the appended claims.

In the accompanying drawings which form part of this application for Letters Patent, and whereon corresponding numerals indicate like parts in the several views:

Figure 1 is a side elevation of my invention including a fuel supply tank, a regulating valve, a pipe line and an automatic cut-off valve located in said pipe line;

Figure 2 is a top plan view of burner detached;

Figure 3 is a horizontal sectional view of burner detached, taken immediately below its top surface, and broken away in three zones so as to disclose underlying parts of the structure;

Figure 4 is a central longitudinal vertical section through burner taken on the zig-zag line 4—4 of Figure 3;

Figure 5 is a transverse vertical sectional view through burner and lighter on the line 5—5 of Figure 1;

Figure 6 is a central longitudinal sectional view through an automatic cut-off valve;

Figure 7 is a transverse sectional view on the line 7—7 of Figure 6, showing in side elevation portions of said automatic cut-off including a tank and ball counterbalance;

Figure 8 is a vertical central section through a fuel regulating valve; and

Figure 9 is a top plan view of said valve with the actuating hand-wheel removed, showing an indicator and fuel gauge.

Reference being had to the drawings and numerals thereon, 10 indicates the walls of a furnace upon which grate bars (not shown) are ordinarily supported as at 11, or upon which the flanged ends of my improved burner body 12 may rest as shown. This body member 12 is preferably of rectangular form, and is provided with vertical partitions 13 dividing it into three compartments 14, 15 and 16. The two outer of these compartments, 14 and 16 open directly to the atmosphere below, while the intermediate oil tray or center compartment 15 is closed below, except for an oil inlet 17, and an overflow outlet 18, the former by preference located centrally and the latter at one end. Running longitudinally from end to end of the said compartment 15, and in direct communication with inlet 17, is a gutter or main oil duct 19, in open communication with lateral or transverse ducts 20 upon both sides thereof, and in close juxtaposition as best shown by Figure 3, and for purposes of spreading the fuel oil as it enters the oil tray of burner.

At opposite ends of the body 12 and centrally positioned are vertical guide posts 21, 21, against which rest the inner sides 22, 22 of corresponding hollow baffle-covers 23, 23, the outer edges 24, 24 of which latter rest upon the shouldered upper edges 25, 25 of the body 12 as best shown by Figure 5. By this Figure 5 also it will be seen that the inner downturned edges of said covers 23, 23 terminate slightly above the bottom of the intermediate burner compartment 15 and are notched throughout their length as at 26, thereby necessitating a tortuous passage for the air supply, from the open bottom of compartments 14 and 16, over their respective partitions 13 and down again to the oil burning surface of compartment 15.

Surmounting the aforesaid convex air-ducts or baffle-covers 23 and 23, and bridging the longitudinally and centrally positioned flame-passage 27, is a series of superposed flat and horizontally arranged heat baffle-plates 28, of rectangular form and separated by suitable corner spacing blocks 29 as shown. These plates may be made of cast or sheet metal variously perforated, but are

preferably made of fire-clay and ground asbestos molded into the desired flat form, and broken by longitudinal slots such as 30, 30, positioned in substantial alinement with the flame-passage 27 aforesaid, and extending almost the entire length of the plates 28. It is an object of these plates to retard the products of combustion, and to radiate the heat produced thereby in which connection they are highly heated and become incandescent.

Overtopping the entire burner is an outer cover 31 rising from the sides and ends of body 12 as shown by Figures 4 and 5, and broken by openings 32, in its sides and ends. This cover 31 is also provided with longitudinal slots 32′ and lateral slots 33 crossing it transversely as shown, the function of such openings and slots being to vent the burner and to liberate the heat generated for its intended purposes.

Bracketed beneath the burner body 12 as at 34, 34, is a trough-shaped lighter 35, containing an absorbent wick 36, and a hinged extinguishing cover or closure 37 adapted to be closed or opened by agency of the handle 38 shown by Figure 1, and entered centrally or at any convenient point by an oil supply pipe 39 for purposes that will later appear.

Depending from a suitable reservoir or supply tank 40 is a feed pipe 41 valved as at 41′, and containing a regulating valve 42 for feeding a predetermined supply of liquid fuel within a given period of time. This regulating valve is shown more in detail by Figures 8 and 9 of the drawings, and includes an ordinary case 42, a threaded and adjustable bushing 43 adapted to be secured in adjusted positions by means of the set screw 44, a valve-seat 45, also a needle valve 46 in threaded connection with the interior of the bushing 43, having a stem 47 projecting upward through said bushing, as also through a suitably packed screw-cap 48 for the valve case. The surface of this cap 48 is provided with a scale indicating the quantity of fuel oil to be delivered per hour, and also a circular series of small depressions or apertures 49 arranged and adapted to receive a small locking stud or pintle 50 depending from one extremity of an indicating arrow 51 of spring material, fixed upon the valve stem 47 as shown, and provided with an arrow-head or indicator 52 at its opposite end. Upon the upper end of this stem 47 is a hand operating-wheel 53 by which the valve 46 is seated more or less closely to regulate the quantity of fuel oil passing in a given period of time as indicated by the scale upon cap 48.

Continuing from the regulating valve 42 supply pipe 54 leads directly to the fuel inlet 17 of the burner, being guarded at 55 by an ordinary emergency valve. From the pipe line 54 also, there is a lateral oil supply pipe 56 controlled by an ordinary valve 57 and terminating in the inlet 39 for supplying oil when needed to the lighter 35. In the supply pipe 54 is interposed a rotary automatic plug cut-off valve 58, the body of which is bored longitudinally as at 59 and is in direct communication with the overflow outlet 18 of the burner body by agency of the connecting pipe 60. Mounted upon the exterior of the said rotary plug or valve body, and in direct communication with the bore 59 thereof, by means of a short section of pipe 61, there is provided an overbalancing can 62 having a removable screw cap 63 for use in emptying the same when occasion requires. In like manner upon the opposite side of the axial center of plug 58, is fixed a short arm 64 terminating in a fixed counterbalance 65, and upon the fixed casing of this valve 58 is located a leaf spring 66 adapted to rest normally upon one side of the said counterbalance 65 for purposes that will now appear in a brief description of operation.

Valves 41′, 55 and 57 once opened, fuel oil from a source of supply such as reservoir 40, flows to the interior of lighter 35 saturating its wick 36, and also to the interior of the burner tray in compartment 15 where it is distributed evenly by way of the oil duct 19 and its communicating laterals 20. A match now applied to the lighter wick 36 causes flame to envelop the oil tray of compartment 15, thus vaporizing the oil therein which burns freely supported by the oxygen of the air entering compartments 14 and 16 from below.

Thus the surface or floor of the tray compartment 15 is flooded, and the supply of burning fuel augmented as the combustion proceeds, and flames rising through the longitudinal central flame-passage 27 heat the baffle covers 23 intensely, as also the air passing therethrough to the fire-chamber, whereupon the direct flame is baffled by the successive plates 28 which become incandescent as in fact the entire burner including its cover 31 becomes more or less incandescent radiating heat in all directions.

As a means of regulating or controlling the quantity of fuel oil fed to the burner within a given period of time, according to requirements, the valve 46 is seated more or less closely by a turn of its hand-wheel 53 until the arrow-head 52 thereon indicates upon the scaled face of the valve cap 48 the measure to be passed per hour. In this predetermined position the indicator is then adjustably fixed by means of its pin 50 entering the appropriate aperture 49, whereupon the flow of oil and the resulting flame continues.

As a precautionary measure the safety cut-off valve 58 is interposed in the feed pipe 54

which it serves to close automatically if occasion requires, as follows:

If the oil supply in the burner tray 15 reaches a level that permits it to enter its overflow pipe 18, the surplus oil will then flow thence through discharge pipe 60, the axial channel 59 of the said valve plug 58, and finally through the communicating lateral tube 61 into the receptacle 62 until such instant as the accumulated weight of oil in said receptacle causes it to overbalance the counterbalance weight 65, rotating the safety valve or plug 58 on its axis and positively closing the valve to starve the burner. During the automatic operation last described the counterbalance 65 leaves its normal position as indicated by Figures 1 and 6, wipes by the resilient retaining spring 66, and by gravity assists not only in closing the valve 58 suddenly, but also in holding it closed until again manually opened and reset.

Having thus described my invention, what I now claim and desire to secure by Letters Patent is:

1. A liquid fuel burner including in combination a burner tray provided with a longitudinal gutter and a series of lateral ducts in open communication with said gutter, means for supplying fuel to said tray in predetermined quantities, air ducts upon opposite sides of said tray, means for causing an air supply to flow by a tortuous route through the burner tray, and a series of spaced apart baffle plates surmounting the tray aforesaid directly in the path of the products of combustion.

2. A liquid fuel burner including in combination a burner tray provided with a centrally positioned longitudinal gutter, oppositely disposed lateral ducts upon each side of and in open communication with said gutter, means for supplying fuel to the burner tray in predetermined quantities, air ducts upon opposite sides of said tray, means for causing an air supply to flow by a tortuous route into and through the burner tray, and a series of spaced apart baffle plates surmounting the tray aforesaid directly in the path of the products of combustion.

3. A liquid fuel burner comprising and including in combination a burner tray, means for supplying fuel to said tray in predetermined quantities, air ducts upon opposite sides of said tray, means for causing an air supply to flow by a tortuous route through the burner tray, a series of spaced baffle plates surmounting the tray aforesaid directly in the path of the products of combustion, and a cover for the entire burner having side, end and top openings.

4. A liquid fuel burner including in combination a burner tray provided with a longitudinal gutter, a series of lateral ducts in open communication with said gutter, means for supplying fuel to said tray in predetermined quantities, hollow baffle covers upon opposite sides of the burner tray having inner downturned notched edges resting in said burner tray whereby the air supply is caused to flow in a tortuous course into and through the burner tray, and a series of spaced apart baffle plates surmounting the burner directly in the path of the products of combustion.

In testimony whereof I affix my signature.

JAMES M. DIAL.