

May 1, 1923.

1,453,495

J. A. DOBLE

LIQUID FUEL BURNER

Filed Jan. 5, 1920

4 Sheets-Sheet 1

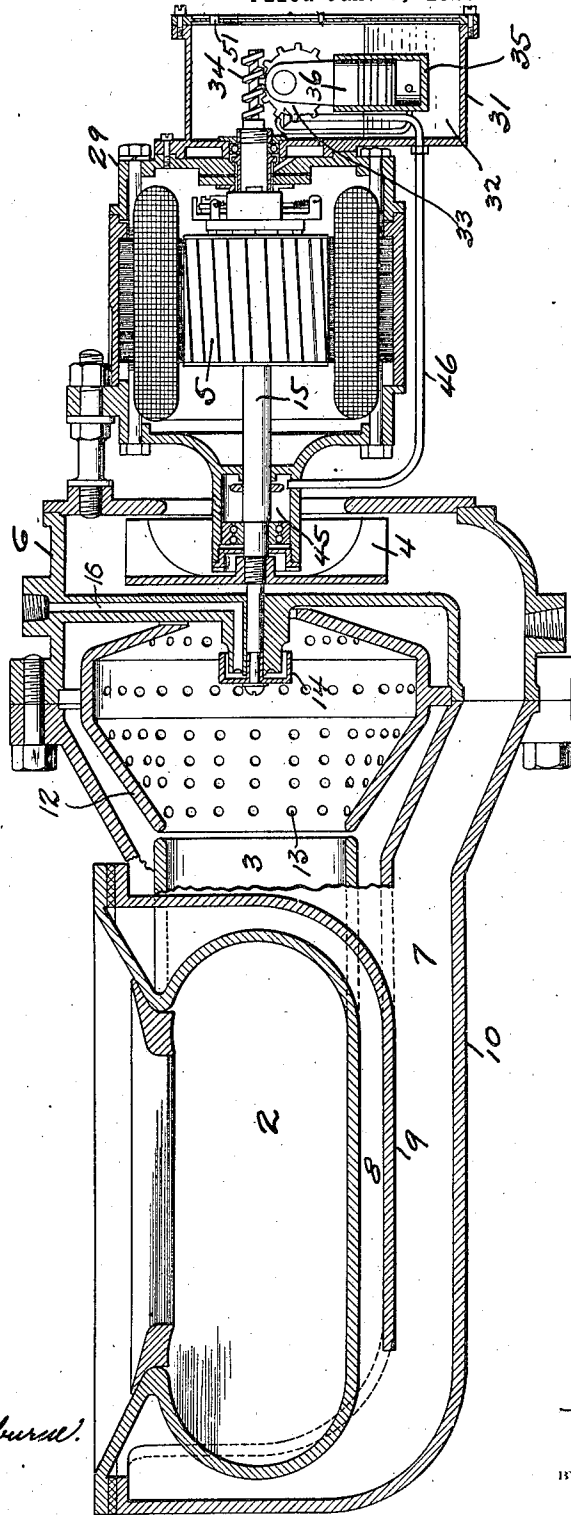


Fig. 1

WITNESS:

H. A. Shurburn

INVENTOR

JOHN A. DOBLE

BY *White & Frost*
his ATTORNEYS

May 1, 1923.

1,453,495

J. A. DOBLE

LIQUID FUEL BURNER

Filed Jan. 5, 1920

4 Sheets-Sheet 2

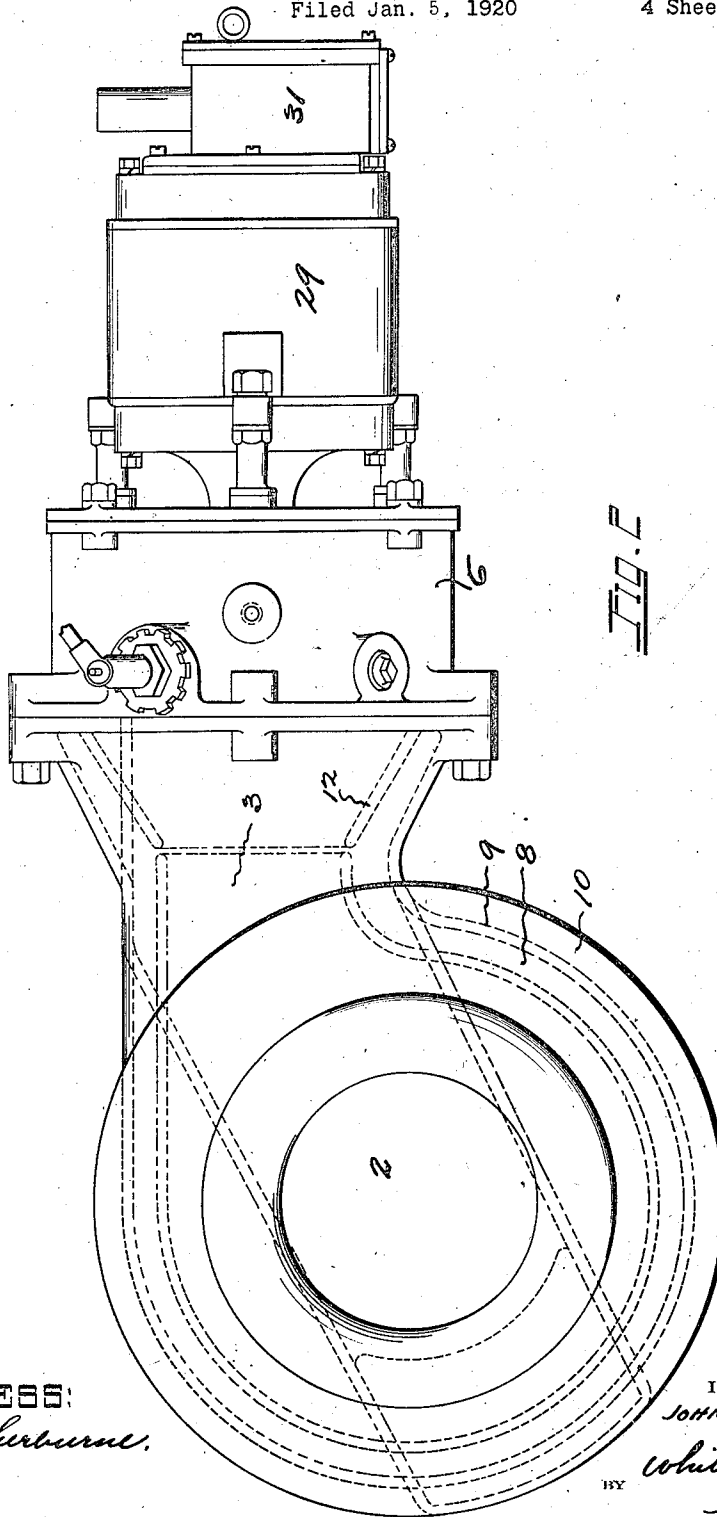


FIG. 2

WITNESS:

H. A. Sherburne.

INVENTOR

JOHN A. DOBLE

BY

White & Frost
his ATTORNEYS

May 1, 1923.

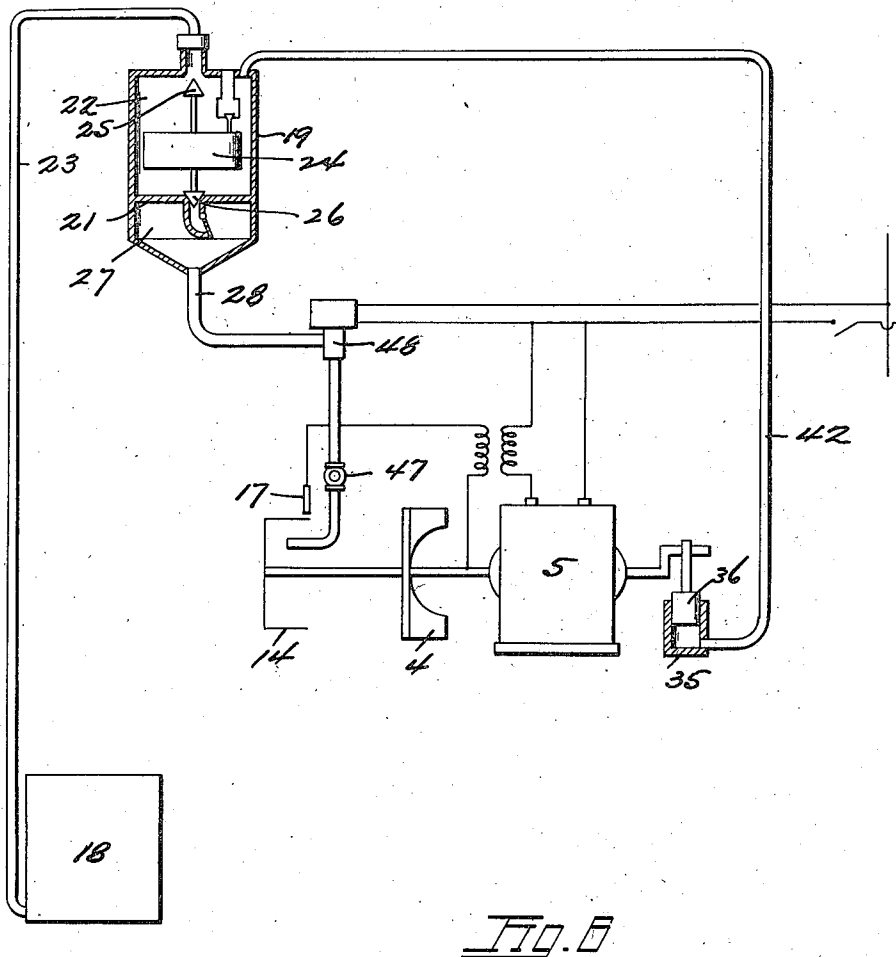
1,453,495

J. A. DOBLE

LIQUID FUEL BURNER

Filed Jan. 5, 1920

4 Sheets-Sheet 4



WITNESS:

A. A. Sherburne.

INVENTOR

JOHN A. DOBLE

BY *White & Frost*
his ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN A. DOBLE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO DOBLE LABORATORIES,
OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

LIQUID-FUEL BURNER.

Application filed January 5, 1920. Serial No. 249,874.

To all whom it may concern:

Be it known that I, JOHN A. DOBLE, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented a certain new and useful Liquid-Fuel Burner, of which the following is a specification.

The invention relates to liquid fuel burners and particularly to burners for use in heaters.

An object of the invention is to provide a burner constructed to raise the fuel from a supply tank placed at a lower level.

Another object of the invention is to provide an improved lubricating system for the burner.

A further object of the invention is to provide a burner particularly adapted for use in hot water or hot air heaters.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description, where I shall outline in full that form of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings I have shown one embodiment of my invention, but it is to be understood that I do not limit myself to such form, since the invention, as expressed in the claims, may be embodied in a plurality of forms.

Referring to said drawings:

Figure 1 is a longitudinal vertical section through one form of burner of my invention.

Figure 2 is a top or plan view of the burner shown in Figure 1.

Figure 3 is a cross section through the vacuum pump, taken at right angles to the section of Figure 1.

Figure 4 is a side elevation of the vacuum pump housing taken on the line 4-4, Fig. 3.

Figure 5 is a section on the line 5-5, Figure 1.

Figure 6 is a diagrammatic representation of the burner system.

The burner of my invention is particularly adapted for use in connection with heaters, either hot water or hot air heaters, installed in homes, dwellings or other places of permanent or temporary habitation. The burner comprises a suitable combustion chamber 2, preferably made of cast

iron and formed in any suitable shape, such as a bowl which is set in the fire box or burner chamber of the heater. The combustion chamber, when formed as a bowl 2, is provided with a tangential fire inlet 3, so that the flame is given a swirling motion in the chamber, causing complete combustion of the fuel in the chamber. The bowl 2 is suitably supported in the cast iron housing 10 and the outer surface of the bowl is spaced from the walls of the housing to provide air passages through which the air for combustion passes before it is mixed with the liquid fuel. The air is forced into the housing, by the blower 4, driven by the motor 5 and disposed in the blower casing 6. The air passes from the blower casing, through the passage 7, formed in the lower part of the housing 10 to the far end of the housing and then passes into the chamber 8 formed between the bowl and the dividing wall 9. This air is thus highly heated by the hot walls of the combustion chamber 2 and also cools these walls, maintaining their temperature sufficiently low, so that cast iron may be employed for the combustion chamber. The hot air then passes into the annular chamber between the outer wall of the housing and the perforated hood 12 and enters the hood 12 through the perforations 13, wherein it mixes with the fuel spray and the flame, producing complete combustion. The hood is perforated over its entire surface to permit free access of the air.

Arranged within the hood, in position to be swept by incoming hot air, is a rotatable fuel spray producing cup 14, secured to the shaft 15 of the motor 5. The cup is rotated at high speed by the motor and liquid fuel is fed into the cup through the conduit 16 formed in the rear wall of the housing. The fuel is discharged in a spray from the edge of the cup and is mixed with the hot air forming a highly combustible mixture.

The combustible mixture may be ignited in any suitable manner, such as by an electric ignition spark produced between the stationary electrode 17 and the edge of the cup 14. The electrode 17 is suitably insulated from the burner housing and one side of the ignition circuit is connected to the electrode and the other to the housing, with which the cup is in electrical contact. The ignited fuel mixture is discharged from the

forward end of the hood 12 into the tangential inlet 3.

The liquid fuel, which may be kerosene, distillate or other form of liquid fuel, is contained in a suitable supply tank 18, usually placed underground or at some place below the level of the burner, and is raised from the supply tank to a feed tank 19, by creating a condition of vacuum within the feed tank. The feed tank is arranged adjacent and above the burner, so that the fuel flows by gravity from the feed tank to the burner. The feed tank 19 is divided into two superposed compartments by the wall 21. The upper compartment 22 is connected to the supply tank by a conduit 23 and by producing a vacuum in the compartment 22, fuel flows from the lower supply tank into the compartment. Disposed in the upper compartment is a float 24, provided on its upper side with a valve 25 which controls the flow of fuel into the upper compartment and on its lower side with a valve 26 which controls the flow of fuel from the upper compartment to the lower compartment 27. From the lower compartment the fuel flows through the conduit 28 to the burner.

Means are provided for producing a condition of vacuum within the upper compartment. Secured to the motor casing 29 is a closed housing 31, on the side wall 32 of which is mounted a vacuum pump. Journaled in the side wall 32 of the housing is a worm-wheel 33 which is engaged by the worm 34 on the motor shaft. Pivottally mounted on the side wall below the worm wheel, is a pump cylinder 35, capable of oscillating on its pivot, which extends laterally from the cylinder intermediate the ends thereof. Disposed in the cylinder is a piston 36 which is journaled on the crank pin 37 carried by the worm wheel. It is evident, therefore, that as the worm wheel rotates, the piston is reciprocated and the cylinder is oscillated on its pivot. The side wall of the housing is thickened to form a pad 47 and the outer surface of the side wall of the cylinder is flattened and forms a tight sliding joint with the pad 47 and is held pressed against the pad by a spring 38. Formed in the side wall of the cylinder which is in contact with the pad 47 is a port 39, which on the upstroke of the piston registers with a port 41 in the pad, which latter port is connected to the upper compartment 22 of the feed tank by a conduit 42. Formed in the pad 47 adjacent the port 41 is a port 43 which is in registry with the port 39 on the downstroke of the piston. As the piston reciprocates, the cylinder oscillates, bringing the port 39 alternately into registry with the ports 41 and 43, producing a vacuum in the compartment 22. The port 43 is connected with the conduit 48 arranged within the housing and the air discharged from the

cylinder passes through this conduit. The housing 31 is partially filled with lubricating oil which keeps the piston and the bearing 45 effectively lubricated. Connected to the chamber of the bearing 45 is a conduit 46 which extends into the housing 31 and upward therein, being provided on its upper end with an enlarged mouth, the upper edge of which is in the plane of the desired oil level in the chamber of the bearing 45. The conduit 48 is turned down at its upper end and discharges into the conduit 46. The oil in the housing leaks through the joint between the outer cylinder wall and the pad 47 and is conveyed through the conduit 48 with the discharged air. The oil is discharged into the conduit 46, keeping it full, and thereby insuring the proper lubrication of the bearing 45. The air discharges through a vent 51 formed in the upper portion of the housing. Lubricating oil is introduced into the housing through the filling cup 52, the upper edge of which is slightly below the upper edge of the conduit 46, so that an excess amount of oil cannot be introduced into the housing.

Disposed in the fuel feed pipe 28 is a regulating valve 47 and a solenoid operated control valve 48, such as is shown in my United States Patent No. 1,263,653, dated April 23, 1918. The solenoid is in series in the motor circuit, so that when the motor circuit is opened, the valve is closed and vice versa.

I claim:

1. A liquid fuel burning system comprising a motor, a blower driven by said motor for producing a stream of air, a liquid fuel feed tank, a conduit through which fuel flows by gravity from the feed tank to the air stream, a liquid fuel supply tank positioned below said feed tank, a conduit connecting said tanks, a vacuum pump driven by said motor and a conduit connecting the vacuum pump with the feed tank whereby a reduction of pressure is produced in the feed tank which causes the fuel to flow from the supply tank to the feed tank.

2. The combination with a liquid fuel burner provided with an electric motor, of a fuel feed tank, a conduit through which fuel flows by gravity from the feed tank to the burner, electrically operated means in said conduit for controlling the passage of fuel therethrough, a fuel supply tank positioned below the feed tank, a conduit connecting said tanks, a vacuum pump driven by said motor and a conduit connecting the vacuum pump with the feed tank, whereby a condition of vacuum is produced in the feed tank.

3. The combination with a liquid fuel burner, of a feed tank positioned above said burner and divided into two superposed compartments, a supply tank positioned below the feed tank and connected to the

upper compartment, a motor associated with said burner, a vacuum pump driven by said motor and connected to said upper compartment, a float valve in said upper compartment controlling the flow of fuel into said compartment and the discharge of fuel therefrom into the lower compartment, a conduit connecting the lower compartment and the burner and means for controlling the flow of fuel through the latter conduit.

4. The combination with a liquid fuel burner, of a motor for operating said burner, a pump piston driven by said motor, an oscillating cylinder in which said piston is disposed, a vacuum feed tank connected to the cylinder and to the burner and a fuel supply tank arranged below the feed tank.

5. In a liquid fuel burner, a motor, a housing associated with said motor, a cylinder pivotally mounted in said housing, a piston in said cylinder operatively connected to said motor, a port in said cylinder, and a port in said housing adapted to register with the cylinder port on the suction stroke of the piston.

6. In a liquid fuel burner, a metallic combustion chamber, a housing surrounding and spaced from said combustion chamber whereby a passage is formed within the housing, a fuel mixing chamber discharging into the combustion chamber, means for blowing air through said passage and into said fuel mixing chamber, means in the mix-

ing chamber for producing a fuel spray and means for igniting the combustible mixture.

7. In a liquid fuel burner, a motor, a shaft for said motor, a bearing for said shaft, a housing partially filled with oil, a conduit opening into the housing above the level of the oil and connected with said bearing, a vacuum pump in said housing partially submerged in the oil therein, a discharge conduit for said pump discharging into said first-named conduit whereby oil passing through said discharge conduit is delivered to said first conduit.

8. In a liquid fuel burner, a motor, a shaft for said motor, a bearing for said shaft, a chamber in which said bearing is disposed, a housing partially filled with oil, a conduit connecting the bearing chamber and said housing and opening above the level of the oil in said housing, said opening being on a level with the desired oil level in the bearing chamber, a vacuum pump in said housing partially submerged in the oil therein and adapted to pump air and oil, a discharge conduit for said pump opening into said first-named conduit, and means connecting the pump and the motor.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 30th day of December, 1919.

JOHN A. DOBLE.

In presence of—
H. G. PROST.