W. A. DOBLE.

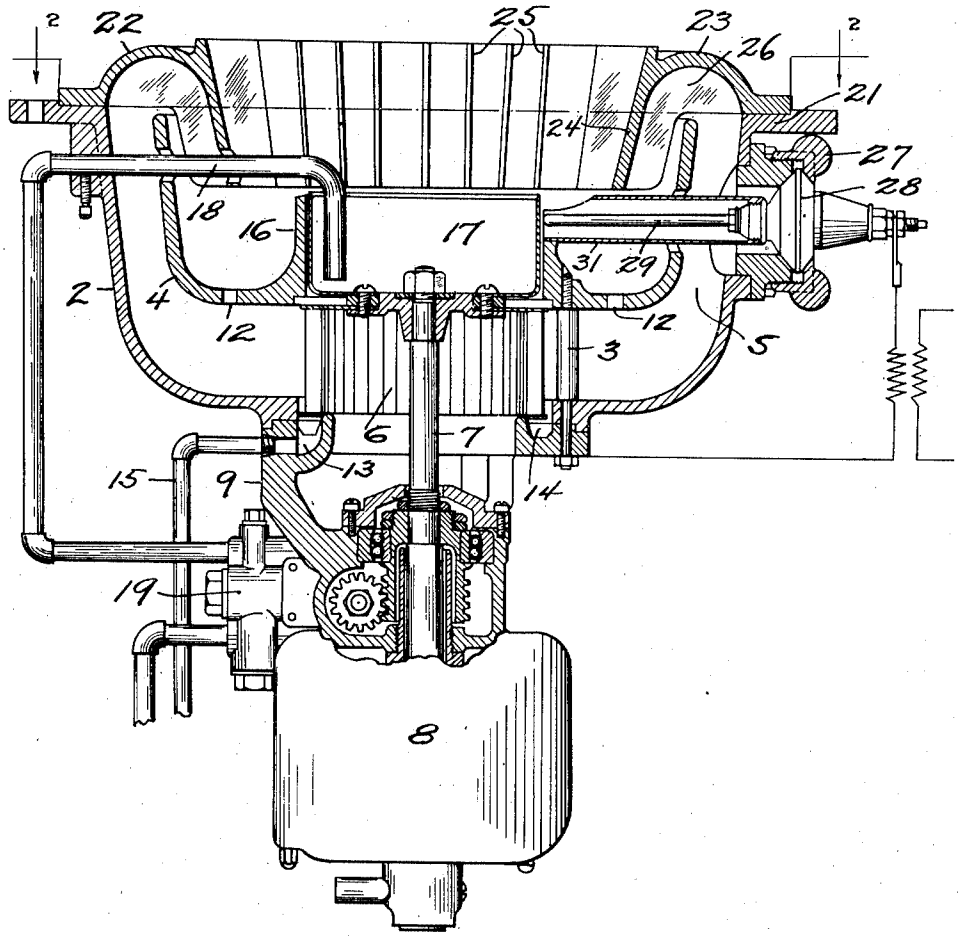
LIQUID FUEL BURNER.

APPLICATION FILED JULY 16, 1919.

**1,373,178.** **Patented Mar. 29, 1921.**

2 SHEETS—SHEET 1.

Fig. 1.




WITNESS
H. A. Sherburne.

INVENTOR
W. A. DOBLE.
BY White & First
HIS ATTORNEYS

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LIQUID FUEL BURNER.

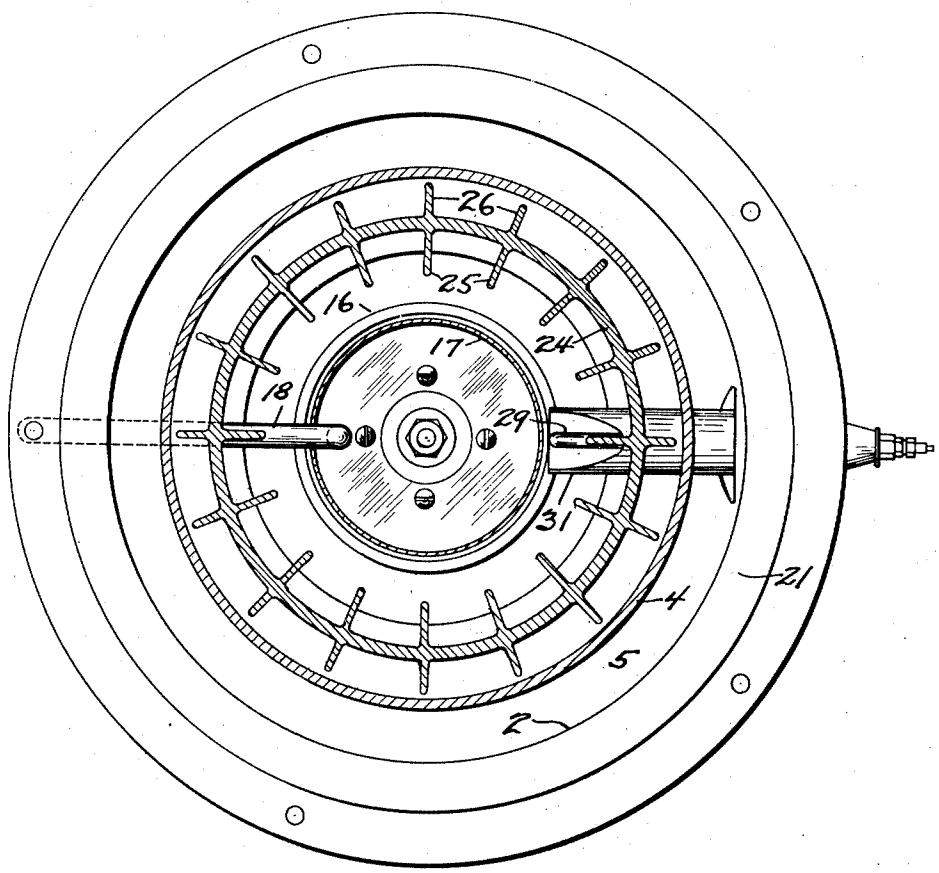
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2 SHEETS—SHEET 2.

Fig. 2.




WITNESS

H. A. Sherburne.

INVENTOR

W. A. DOBLE.

BY

White & Rust

HIS ATTORNEYS

# UNITED STATES PATENT OFFICE.

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

## LIQUID-FUEL BURNER.

1,373,178. Specification of Letters Patent. Patented Mar. 29, 1921.

Application filed July 16, 1919. Serial No. 311,138.

*To all whom it may concern:*

Be it known that I, WILLIAM 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.

An object of the invention is to provide a burner in which the air for combustion is heated to a high temperature by the flame, before it comes into the flame.

Another object of the invention is to provide a burner in which the fuel is sprayed and in which the air for combustion is intimately mixed with the sprayed fuel, before the mixture reaches the combustion zone.

Another object of the invention is to provide a burner in which combustion of the fuel occurs over a large distributed area.

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 specific form of burner 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 vertical section of the burner of my invention.

Fig. 2 is a cross section of the burner, taken on the line 2—2, Fig. 1.

The burner shown in the accompanying drawings, and which embodies my invention, comprises an outer casing or shell 2, preferably formed of cast iron. The shell 2 is preferably circular in shape and is provided at the bottom with a central opening through which the air for combustion enters the burner. Arranged within the shell 2 and spaced from the bottom and side walls thereof and supported in position by the posts 3, is an inner shell or casing 4, preferably made of cast iron. The inner and outer shells are similar in shape and inclose between them, an annular passage 5, through which the air for combustion passes upwardly. Arranged between the bottom walls of the two casings and directly over the aperture in the outer casing, is a blower 6, which blows air upwardly through the annular passage 5. The blower is secured to the shaft 7 of the motor 8 which is supported upon the bracket 9, secured to the outer casing. The inner casing 4 is provided in the bottom with one or more holes 12, through which unvaporized liquid fuel drains into the outer casing. The bracket 9 is provided with a passageway 13, opening into an annular groove 14 surrounding the air inlet and any liquid collecting in the groove passes through the passage 13 and is conveyed by the pipe 15 to the supply tank or other suitable receptacle. At starting, when the burner is cold, some of the fuel may remain in liquid form and this fuel is drained from the burner, as stated.

The inner casing 4 is provided with an inner annular wall 16 and within this wall and mounted on the motor shaft 7, is a rotatable metallic cup or bowl 17, into which the liquid fuel is fed and from the edge of which it discharges in a fine spray, in all directions, radially. The liquid fuel is delivered to the cup 17 through the pipe 18, by the pump 19 which is geared to the motor shaft 7, so that the amounts of air and fuel introduced into the burner vary simultaneously with the speed of the motor, thereby maintaining the proportion of air to fuel substantially constant at all times.

The outer casing 2 is provided at its upper edge with a flange 21, the upper surface of which is preferably disposed above the upper edge of the inner casing 4. Secured to the flange 21 is an annular cap 22 having a curved upper wall 23 and an inwardly and downwardly inclined inner annular wall 24 which forms the wall of the fire box or combustion chamber. The walls 23 and 24 are spaced from the inner wall 4, forming, with the inner wall, a continuation of the annular air passage. The inner wall 24 preferably terminates slightly above the plane of the rim of the cup 17. The cap 22 is provided on the inner face of the wall 24 with a plurality of radial fins 25 and is provided on the outer surface of the wall 24 and the under surface of the wall 23 with radial fins 26. The fins 25 become highly heated by the fire and the heat is conducted to the fins 26, over which the incoming air passes. A very large area of heated surface

is thus exposed to the air traveling through the passage, causing the temperature of the air to be raised to a high degree. The radial fins 26 also act as air guides, to check any swirling movement of the air and cause it to be discharged in relatively straight streams into the inner casing 4. The entering downwardly directed air is deflected upwardly into the combustion chamber by the bottom and inner wall of the casing 4.

The spray of finely divided fuel particles, discharging radially from the edge of the cup 17, is directed through two streams of heated air, so that the fuel is vaporized and intimately mixed with the air. The fuel first comes in contact with the upwardly deflected stream of air and that which is not arrested and carried along with the ascending stream, passes into the descending stream issuing from the annular passageway, wherein the fuel is vaporized.

Means are provided for igniting the combustible mixture of air and liquid fuel. Secured to the outer casing 2 by the clamp nut 27 and insulated therefrom by the block 28 of insulation, is an electrode rod 29, the inner end of which lies adjacent the side of the cup 17, which forms the other electrode. One side of the ignition circuit is connected to the rod 29 and the other side is grounded on the burner casing. A spark is formed between the stationary and rotatable electrodes, which ignites the mixture. I have found it desirable to protect the spark against the high velocity incoming air and for that purpose, I inclose the rod in a tube 31 which is firmly held in place and which extends to adjacent the end of the rod. The tube is cut away at the top on its inner end to permit the entry of the combustible mixture to the arc and to provide an exit for the igniting flame.

I claim:

1. In a liquid fuel burner, an outer metallic casing having a reëntrant annular upper wall, an inner metallic casing forming an annular passage with the outer casing, fins on the other casing extending into said passage, means for blowing air through said passage, and means for adding liquid fuel to the air to produce a combustible mixture.

2. In a liquid fuel burner, an outer casing, an inner casing, a cap on the outer casing overlying the upper edge of the inner casing, an air blower arranged between said casings arranged to blow air through the passage between the casings and into the inner casing, and means within the inner casing for directing a spray of fuel into the air stream.

3. In a liquid fuel burner, a bowl-shaped outer casing having a central aperture therein, a bowl-shaped inner casing spaced from the outer casing and forming therewith an annular passage, means for blowing air through said passage, an annular cap arranged on the outer casing and overlying and spaced from the inner casing for deflecting the air into the inner casing, and means within the inner casing for directing a spray of fuel into the air stream after it has traversed said passage.

4. In a liquid fuel burner, a bowl-shaped outer casing, a bowl-shaped inner casing spaced from the outer casing and forming therewith an annular air passage, means arranged between the casings for blowing air through said passage, an annular cap arranged on the outer casing and overlying the upper edge of the inner casing to deflect the air downwardly into the inner casing, an inner wall on said cap defining a combustion chamber, fins on said walls lying in said passageway, means in the inner casing for directing a spray of fuel into the air stream to produce a combustible mixture, and means for igniting said mixture.

5. In a liquid fuel burner, an outer bowl-shaped casing, an inner bowl-shaped casing forming an annular passage with the outer casing, a cap on the outer casing overlying the upper edge of the inner casing and forming a reëntrant passage in continuation of the annular passage, a wall on the inner periphery of said cap defining a combustion chamber, fins on said wall extending into the reëntrant passage, means for blowing air through said passages, means for directing a fuel spray into the air stream as it discharges from said reëntrant passage whereby a combustible mixture is produced, and means for igniting said mixture.

6. In a liquid fuel burner, an outer bowl-shaped casing, an inner bowl-shaped casing spaced from the outer casing and forming therewith an annular passage, a blower for blowing air through said passage, a cap on the outer casing arranged to deflect the air downwardly into the inner casing, an inner wall on said cap defining a combustion chamber and means for introducing a liquid fuel spray into the combustion chamber.

7. In a liquid fuel burner, an outer bowl-shaped casing, an inner bowl-shaped casing spaced from the outer casing and forming therewith an annular passage, a blower for blowing air through said passage, a cap on the outer casing arranged to deflect the air downwardly into the inner casing, an inner wall on said cap defining a combustion chamber, and fins on the outer surface of said wall extending into the air passage.

8. In a liquid fuel burner, an outer bowl-shaped casing, an inner bowl-shaped casing spaced from the outer casing and forming therewith an annular passage, a blower for blowing air through said passage, a cap on the outer casing arranged to deflect the air downwardly into the inner casing, an inner

wall on said cap defining a combustion chamber, fins on the inner surface of said wall extending into the combustion chamber and fins on the outer surface of said wall extending into said passage.

9. In a liquid fuel burner, an outer casing, an inner casing spaced from the outer casing and forming therewith an annular air passage, a blower arranged between the casings, a motor for driving the blower, a rotatable cup arranged above the blower and connected to the motor, and means connected to the motor for feeding liquid fuel to the cup.

10. In a liquid fuel burner, an outer casing, an inner casing, means for discharging a fuel spray into the inner casing and toward the side wall thereof, said inner casing being provided with a drain hole for deposited liquid fuel, a groove in the outer casing adapted to receive the drained liquid and a discharge conduit connected to said groove.

11. In a liquid fuel burner, a metallic wall defining a combustion chamber, means for producing an ignited combustible mixture of air and liquid fuel in said chamber whereby said wall is heated, metallic fins on the outer surface of said wall, and means for causing the air which is to form part of said mixture to pass in contact with said fins.

12. In a liquid fuel burner, a metallic wall defining a combustion chamber, means for producing an ignited combustible mixture of air and liquid fuel in said chamber whereby said wall is heated, metallic fins on the inner surface of said wall, metallic fins on the outer surface of said wall, and means for causing the air, which is to form part of the combustible mixture, to pass in contact with said outer fins.

13. In a liquid fuel burner, an outer casing, an inner casing, a rotatable metallic cup arranged within the inner casing, said cup constituting an electrode, means for feeding liquid fuel to said cup, a stationary electrode mounted on and insulated from the outer casing and extending through the wall of the inner casing into close proximity to said cup, and means for producing a spark between said stationary and rotatable electrodes.

In testimony whereof I have hereunto set my hand at San Francisco, California, this 7th day of July, 1919.

WILLIAM A. DOBLE.

In presence of—
W. W. HEALEY,
H. G. PROST.