Mar. 20, 1923.

1,448,802.

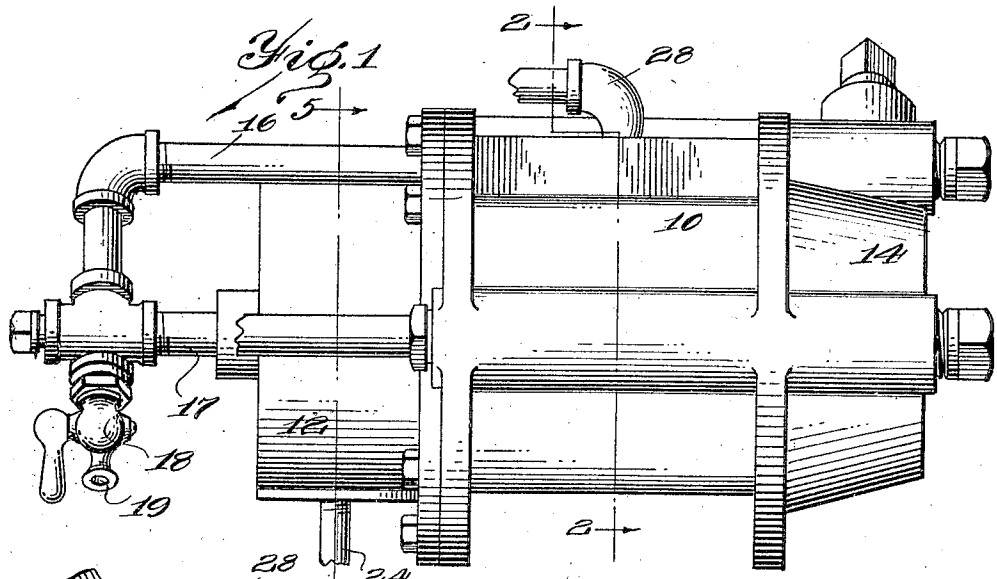
W. M. HOFFMAN.

FUEL OIL BURNER.

FILED APR. 17, 1922.

2 SHEETS—SHEET 1.

Fig. 1



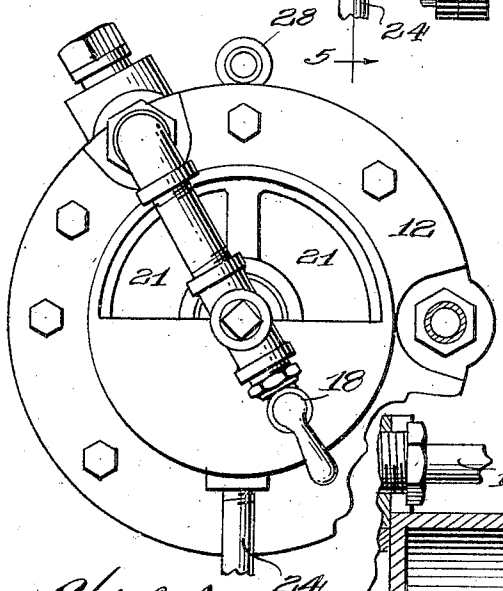


Fig. 4

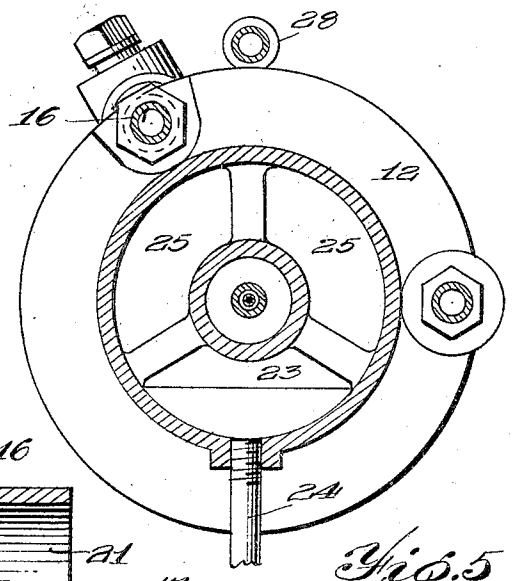


Fig. 5

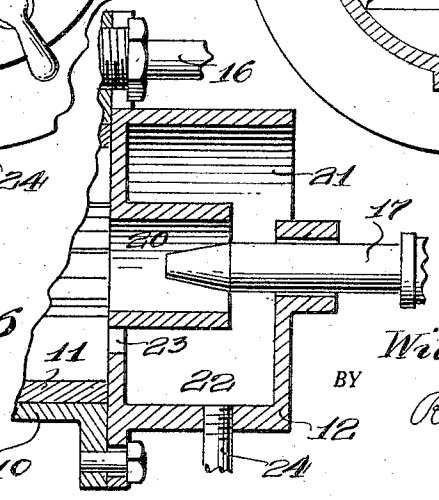


Fig. 6

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2 SHEETS—SHEET 2.

Fig. 3

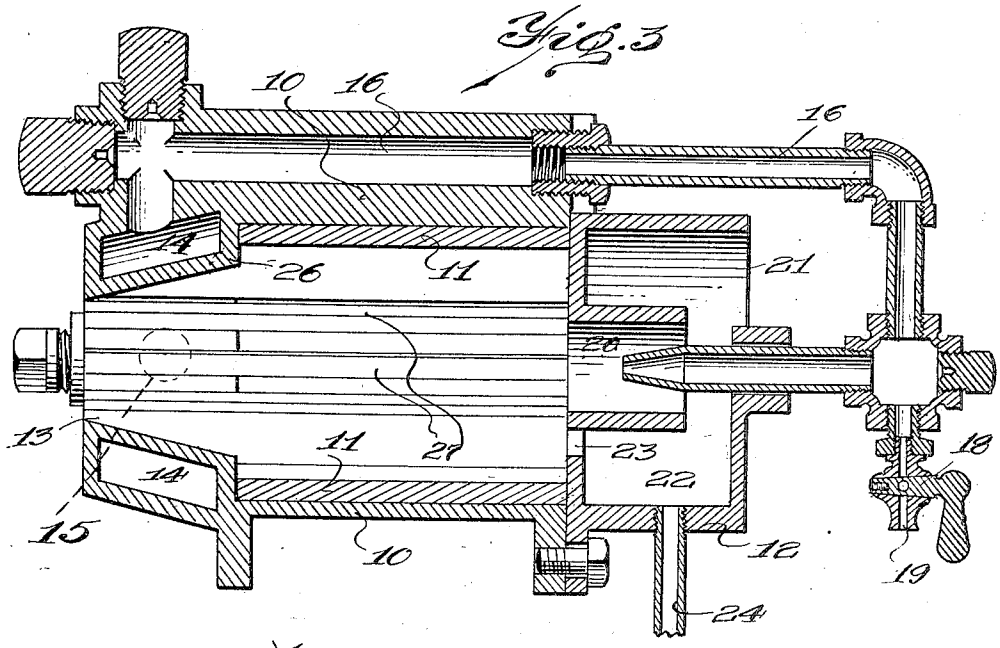
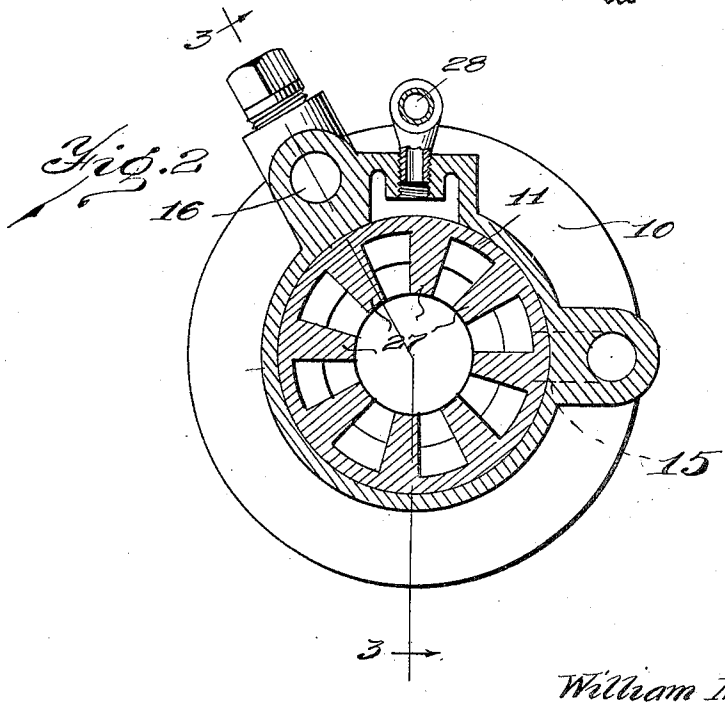


Fig. 2



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Patented Mar. 20, 1923.

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1,448,802

UNITED STATES PATENT OFFICE.

WILLIAM M. HOFFMAN, OF BUFFALO, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO OIL FUEL ENGINEERING CORPORATION, A CORPORATION OF NEW YORK.

FUEL-OIL BURNER.

Application filed April 17, 1922. Serial No. 553,615.

To all whom it may concern:

Be it known that I, WILLIAM M. HOFFMAN, a citizen of the United States, residing at Buffalo, county of Erie, State of New York, have invented a certain new and useful Improvement in Fuel-Oil Burners, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in fuel oil burners and is particularly intended as an improvement on the fuel oil burner described in my Patent No. 1,401,404, dated Dec. 27, 1921.

The object is to provide a fuel oil burner comprising a hollow porous refractory combustion chamber core within the interior of which combustion takes place and through the wall of which fuel oil percolates to be burned, which core is provided with a maximum interior burning surface for a minimum diameter of the core.

A further object is to provide, in combination with such a combustion chamber, means for projecting a vapor jet into the interior thereof to mix with the volatilized hydrocarbon in combustion and an expansion chamber in connection with such jet projecting means wherein the vapor from the jet may mix with air before discharging into the combustion chamber.

The above, and other objects, together with details of construction, will more fully appear in the following specification, appended claims and accompanying drawings, in which:

Figure 1 is an elevation of my improved burner.

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is an elevation of the rear end of the burner.

Fig. 5 is a cross-sectional view taken on the line 5—5, of Fig. 1.

Fig. 6 is a fragmentary vertical sectional view through the rear end of the burner.

My fuel oil burner is one in which combustion takes place on the interior surface of a hollow combustion chamber open at one end for the discharge of products of combustion, and provided at the opposite end with a vapor projector adapted to project a vapor jet into the burning zone to mix steam or the projected vapor with the volatilized hydrocarbon for combustion. The wall of this combustion chamber is formed of a porous refractory material through which fuel percolates to be burned within the chamber.

My burner comprises in combination a casing 10 within which is positioned a removable hollow porous refractory core 11, open at both ends and adapted to be inserted into the casing from the rear thereof by the attachment of the rear portion 12 of the casing. The casing is open at the forward end as at 13 for the discharge of products of combustion and integral with the casing and surrounding such discharge opening 13 is a jacketed portion 14 of the casing, which serves as a steam superheater. This jacketed portion 14 is fed with steam from a suitable source of steam supply (not shown in the drawing), through an inlet conduit 15. The steam superheater is heated by the escaping products of combustion escaping from the burner through the opening 13. This superheater supplies dry, heated steam by means of a conduit 16 to a nozzle 17. A valve 18 may be provided to regulate the projection of steam through this nozzle by exhausting steam into the air through an outlet 19.

The nozzle 17 does not discharge directly into the combustion chamber but into a reduced diameter chamber 20, which forms a part of the rear portion 12 of the casing and serves as an expansion chamber within which the steam is mixed with air entering around the steam nozzle and through the opening 21 in the upper half of the rear end of the casing portion 12. The mixed steam and air in the expansion chamber discharges into the combustion chamber.

The lower half 22 of the casing portion 12 serves as a well or sump to which oil may overflow from the combustion chamber through an opening 23. This overflow of oil may be discharged from the well 22 through an outlet 24. By virtue of the spider-like construction of the forward end of the casing member 12, there are provided additional atmospheric openings leading to the interior of a combustion chamber above the nozzle, as shown at 25.

I have provided a porous core in which for a minimum core diameter there is a maximum of burning surface upon which the fuel oil may burn. My hollow cylindrical core, which is open at both ends and the forward end of which abuts the shoulder 26 formed by the superheater 14, is provided with an interiorly corrugated surface in the form of longitudinally-extending, radially-projecting fins or ribs 27 constructed of the same porous refractory material as the core.

The fuel oil is brought to the outer surface of this porous core by feeding through a fuel pipe 28 to a longitudinal cored-out portion 29 of the casing 10. The casing is cut away longitudinally at 29 adjacent the core 11, as shown in Fig. 2, so that the oil may percolate down through the core 11 and burn on the surface of the several fins. Through the use of this type of core, I greatly increase the burning surface of the core and permit the burning of a greater quantity of the oil in a small confined burner, from which the heat may be projected for use as desired.

I also provide means for furnishing air and steam to the combustion chamber in such quantities as may be necessary to burn the oil supplied to the burner.

What I claim is:

1. In a fuel oil burner, a hollow combustion chamber, said chamber being open at one end and having jet producing means positioned at the opposite end adapted to project a vapor jet thereinto, said combustion chamber having inwardly extending fins formed of porous refractory material through which fuel oil may percolate, and means for feeding oil thereto.

2. In a fuel oil burner, a casing, a removable hollow corrugated refractory porous core adapted to be received within said casing, means for feeding fuel oil to said core to be burned on the interior thereof.

3. In a hydrocarbon burner, a removable hollow casing core having inwardly extending ridges formed of porous refractory material through which liquid may percolate, said core being open at one end for the discharge of the products of combustion and provided at the opposite end with means adapted to project a vapor jet thereinto.

4. In a fuel oil burner, a hollow combustion chamber formed of porous refractory material having inwardly extending radial fins through which fuel oil may percolate to be burned on the interior of the chamber.

5. In a fuel oil burner, a hollow combustion chamber of porous refractory material having longitudinally-extending inwardly-projecting fins through which fuel oil may percolate to be burned within the interior of the chamber.

6. In a hydrocarbon burner, a hollow combustion chamber of porous refractory material having an interiorly corrugated surface, the wall of said combustion chamber adapted for the percolation of fuel oil therethrough, means for supplying fuel oil thereto.

7. In a hydrocarbon burner, a hollow combustion chamber in the interior of which combustion takes place, the wall of which chamber is formed of porous refractory material and has longitudinally-extending, interiorly projecting radial fins formed of a similar material, a fuel oil container from which fuel is adapted to pass to the porous wall of said combustion chamber.

8. In a hydrocarbon burner, a hollow combustion chamber provided with a porous refractory wall having interiorly projecting fins, said wall so constructed that fuel oil may percolate therethrough, means for supplying fuel oil to the wall of said combustion chamber, means for projecting a steam jet into said combustion chamber, a steam super-heater from which steam is furnished to said jet projecting means, said super-heater so positioned as to be heated from said combustion chamber.

9. In a fuel oil burner, a hollow cylindrical combustion chamber open at one end for the discharge of products of combustion and having a wall formed of a porous refractory material adapted for the percolation of liquid fuel therethrough, which wall is provided with inwardly projecting fins of similar material, means for projecting a steam jet into said combustion chamber at the end opposite the discharge opening.

10. In a fuel oil burner, a hollow porous interiorly ribbed combustion chamber through the wall of which fuel may percolate, and open at one end for the discharge of products of combustion, means for bringing fuel oil to said combustion chamber wall to percolate therethrough, means for projecting a regulated steam jet into said combustion chamber at the end opposite the discharge end, and means for superheating said steam before it is projected into said combustion chamber.

11. In a fuel oil burner, a hollow porous combustion chamber adapted for the percolation of oil through the wall thereof to be burned on the interior and being open at one end for the discharge of the products of combustion, means for supplying fuel oil thereto, a vapor expansion chamber positioned at the end opposite the discharge end and communicating therewith and means for projecting a vapor jet into said expansion chamber.

12. In a fuel oil burner, in combination, a hollow combustion chamber in the interior of which combustion takes place, and which is open for the discharge of products of combustion, an expansion chamber positioned so as to discharge into said combus-

tion chamber, said expansion chamber provided with atmospheric openings.

13. In a fuel oil burner, in combination, a hollow combustion chamber having a porous refractory wall through which fuel oil may percolate to be burned on the interior thereof, said combustion chamber open at one end for the discharge of products of combustion and provided at the opposite end with an expansion chamber discharging thereinto, vapor projecting means positioned so as to project a vapor jet into said expansion chamber, said expansion chamber provided with atmospheric openings about said vapor projecting means.

14. In a hydrocarbon burner, a hollow combustion chamber in the interior of which combustion takes place, said combustion chamber open at one end for the discharge of the products of combustion and having at the opposite end an expansion chamber discharging thereinto, said expansion chamber provided with air-inlet openings, vapor jet projecting means adapted to discharge into said expansion chamber.

15. In a fuel oil burner, a combustion chamber having an open mouth for discharging products of combustion, a vapor jet producing means positioned so that vapor therefrom may enter the opposite end of said combustion chamber, an expansion chamber intermediate said jet producing means and the combustion chamber so that vapor from the jet will pass through the expansion chamber before entering into the combustion chamber, said expansion chamber provided with atmospheric openings.

16. In a fuel oil burner, in combination, a hollow porous refractory core through which fuel oil may percolate to be burned in the interior thereof, a casing for such core, a steam superheater integral with said casing and adapted to be heated by the products of combustion as they escape from the combustion chamber, an expansion chamber positioned so as to discharge into said combustion chamber, a steam nozzle positioned so as to discharge into said expansion chamber, steam communicating means leading from said superheater to said nozzle.

17. In a fuel oil burner, in combination, a hollow combustion chamber open for the discharge of products of combustion, an expansion chamber positioned so as to discharge into said combustion chamber, vapor jet projecting means positioned so as to discharge into said expansion chamber, said expansion chamber provided with air inlet openings, said combustion chamber provided with auxiliary atmospheric openings.

In testimony whereof, I sign this specification.

WILLIAM M. HOFFMAN.