

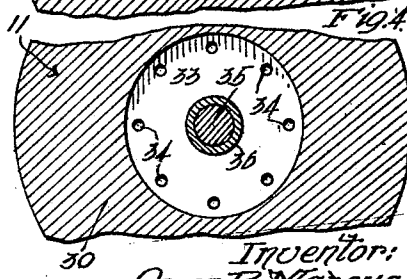
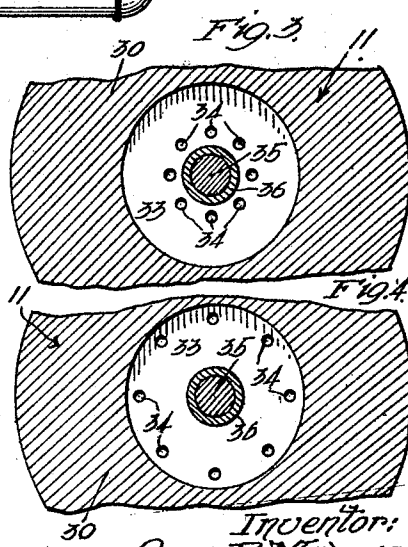
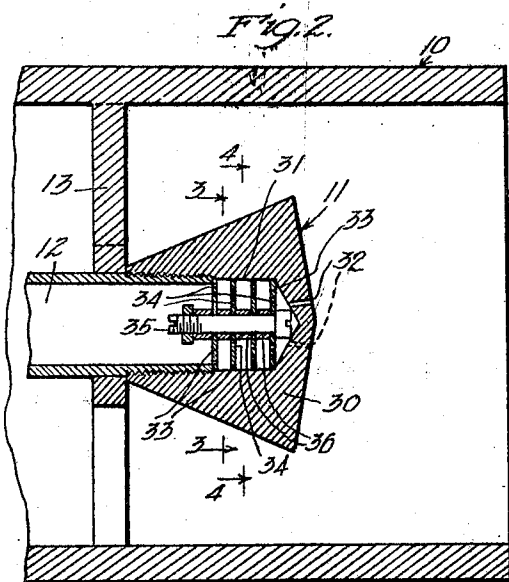
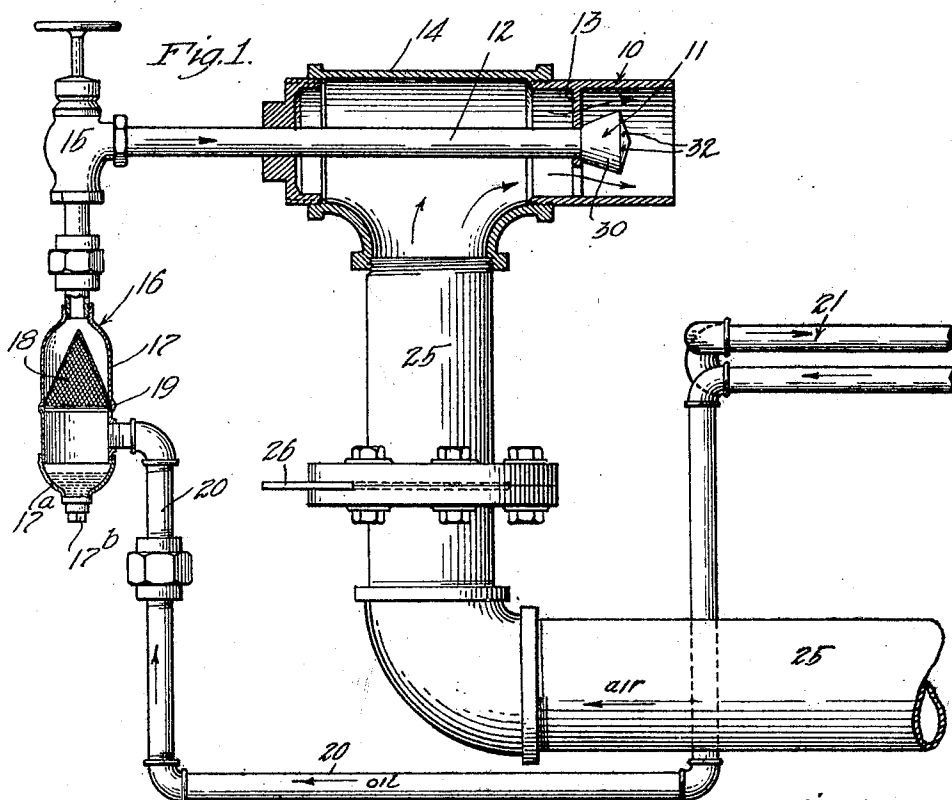
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O. R. MARCUS

LIQUID FUEL BURNER

Filed July 25, 1921



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UNITED STATES PATENT OFFICE.

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LIQUID-FUEL BURNER.

Application filed July 25, 1921. Serial No. 487,432.

To all whom it may concern:

Be it known that I, OSCAR R. MARCUS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Liquid-Fuel Burners, of which the following is a detailed specification.

This invention relates to liquid fuel burners for such fuels as petroleum oils and their derivatives; and it is a general object of the invention to provide a burner that will most effectively vaporize and atomize such fuel oils and most effectively cause complete combustion of all the constituent parts of such fuel oils, including particularly the heavier parts which ordinarily clog up the burners with heavy carbon or tar deposits and thus cause stoppages of operation and necessitate frequent cleanings of the burner and of furnaces. It is a general object to provide a liquid fuel burner that will be capable of handling all kinds of liquid fuel without clogging up the burner and without depositing in the furnace any heavy carbon or carbonaceous deposits.

There are other objects of the invention, but all the objects and the corresponding accomplishments and features of my invention will be best understood from the following detailed description of a preferred specific form of burner that embodies the invention; reference to this purpose being had to the accompanying drawings in which:

Fig. 1 is an elevation, with parts in section, illustrating my complete burner system and showing the burner itself; Fig. 2 is an enlarged section of the head of the burner as shown in Fig. 1; Fig. 3 is a cross section taken on line 3—3 of Fig. 2; and Fig. 4 is a cross section taken on line 4—4 of Fig. 2.

In the drawings the numeral 10 designates an air pipe through which air is delivered around the liquid fuel nozzle 11 which is located centrally in the air pipe 10 near its outlet end. The liquid fuel nozzle 11 is preferably substantially cone shaped with its larger end toward the outlet end of pipe 10; and this nozzle is fed with liquid fuel through a pipe 12 that is supported immediately back of the nozzle by a spider 13 and that extends through

the T fitting 14 of the burner head, all in the manner shown in the drawings. Outside the burner head there is a valve 15 that controls the supply of liquid fuel through pipe 12. Immediately below this valve 15 there is a strainer 16 which comprises a hollow casing 17 enclosing a conical screen 18 the screen being supported by its lower larger open end engaging a bead 19 in the casing wall. This screen, in its conical shape, presents a large straining area; and being open at its lower larger end provides ready facilities for the screening to drop back into the lower part 17^a of the casing, where they may be periodically withdrawn by removing the plug 17^b.

Fuel is supplied to the strainer casing through the pipe 20 under a suitable pressure; and this liquid fuel under pressure may be passed through a coil 21, previous to going to the strainer, the coil 21 being located adjacent the burner, or preferably some place in the furnace which is heated by the burner, so that the oil as it goes to the strainer and to the burner will be heated to some extent; say to 100° or 150° F. This preheating of the liquid fuel makes it more freely liquid and assists in causing the ready vaporization and atomization of the liquid fuel when it reaches the burner nozzle.

The air that is sent to the air pipe 10 may pass through an air feed pipe 25 which may be controlled by a slide valve 26; the air being fed under pressure from any suitable source of supply. This air may also be preheated to any desired temperature and by any suitable means.

Nozzle 11 has a hollow body 30, and is preferably substantially conical in form with its larger end toward the open end of air pipe 10. The hollow interior of the body is preferably slightly tapered as shown at 31; and the supply pipe 12 threads into, or otherwise connects with, the rear end of the interior of the body. The front end of the body has a liquid fuel delivering orifice or orifices as shown at 32. These orifices may be one or more in number, their number and size being gauges in accordance with the amount of fuel it is desired to discharge. Between the supply pipe 12 and the discharge orifices 32 there is arranged a plurality of spaced plates 33 each with perforations 34; but the perforations in the several plates are arranged in staggered relation to

each other so that the liquid fuel passing through the perforations in one plate will strike a solid portion of the next plate. And then, when the liquid fuel sprays from the perforations of the foremost plate it does not strike the discharge orifices 32. In order to hold the plates 33 together as a single unit and to space them properly, they are all mounted upon a suitable bolt 35 with spacers 36 between them; so that the spaced plates may be handled as a single unit. The peripheries of these plates are ground down so as to fit snugly into the liquid chamber 31 so as to prevent passage of liquid fuel around the edges of the plates and force all of the liquid fuel to pass through the orifices 34.

The combined capacity of discharge orifices 32 is sufficient to take care of the capacities of the orifices 34; so that, although of course there is a certain amount of pressure behind the final vapor that is jetted from orifices 32 yet there is not maintained at any time a great back pressure in the spaces between the plates. In other words, as the fuel flows from space to space between the plates, there is a gradual release of pressure step by step, so that there is thus a tendency to vaporize and atomize the fuel. The jetting of the fuel through the small orifices 34, and its impingement upon the successive plates, also very materially helps in the atomization and vaporization of the fuel, so that the fuel as it finally emerges from the discharge orifices 32 is very thoroughly atomized and vaporized. I have mentioned the fact that the fuel is preferably heated to a suitable temperature before it reaches the burner. After the burner has gotten into operation it is of course itself heated from the flame; and this heating materially helps in causing rapid and effective vaporization of the fuel as it passes through the discharge nozzle. As a result, the fuel which emerges from the discharge orifices 32 is in a highly atomized and thoroughly vaporized state, easily and quickly expands and mixes with the stream of air that is flowing over and around the nozzle 11; and so that an efficiently combustible mixture emerges from the air pipe 10 into the flame. The result is a flame of very high efficiency.

Having described a preferred form of my invention, I claim:

1. In a liquid fuel burner, the combination of an air pipe and means to direct air to it to flow out its end, a liquid fuel spraying nozzle located substantially centrally in the

air pipe near its end, said nozzle embodying a substantially conical body with its larger end toward the end of the air pipe, the body being hollow and having fuel spraying perforations at its larger end, a fuel supply pipe connecting to the smaller end of the nozzle body and into its hollow interior; and a plurality of fuel sub-dividing plates arranged spacedly across the interior of the body between the pipe and discharge perforations, said plates being perforated, with perforations in adjacent plates in staggered relation.

2. A liquid fuel burner nozzle, embodying a hollow body with a fuel feed pipe at one end and fuel discharge openings at the other end, and a series of fuel subdividing plates spacedly arranged across the hollow interior between the pipe and the discharge openings, said plates being perforated and the perforations in the several plates being arranged in staggered relation; a central bolt passing through said plates and spacers between the plates, said bolt and spacers forming a plate carrying and spacing element that holds and carries the plates as a single unit.

3. A liquid fuel burner nozzle, embodying a hollow body with a fuel feed pipe at one end and fuel discharge openings at the other end, and a series of fuel sub-dividing plates spacedly arranged across the hollow interior between the pipe and the discharge openings, said plates being perforated and the perforations in the several plates being arranged in staggered relation; a central bolt passing through said plates and spacers between the plates, said bolt and spacers forming a plate carrying and spacing element that holds and carries the plates as a single unit; the interior of the body being tapered and the plates being sized to fit accurately into said tapered interior to prevent passage of fuel around the plates.

4. A liquid fuel burner nozzle, embodying a hollow body with fuel discharge openings at one end and pipe threads at the other to take a fuel feed pipe, a series of fuel subdividing plates spacedly arranged across the body interior between the pipe and the fuel openings, spacers between the several plates, and the end of the pipe abutting the outermost plate to thus hold all the plates in place.

In witness that I claim the foregoing I have hereunto subscribed my name this 14th day of July 1921.

OSCAR R. MARCUS.