

Oct. 9, 1934.

R. A. SHARP

1,976,097

FLUID FUEL BURNER

Filed Feb. 15, 1932

2 Sheets-Sheet 1

FIG. 1.

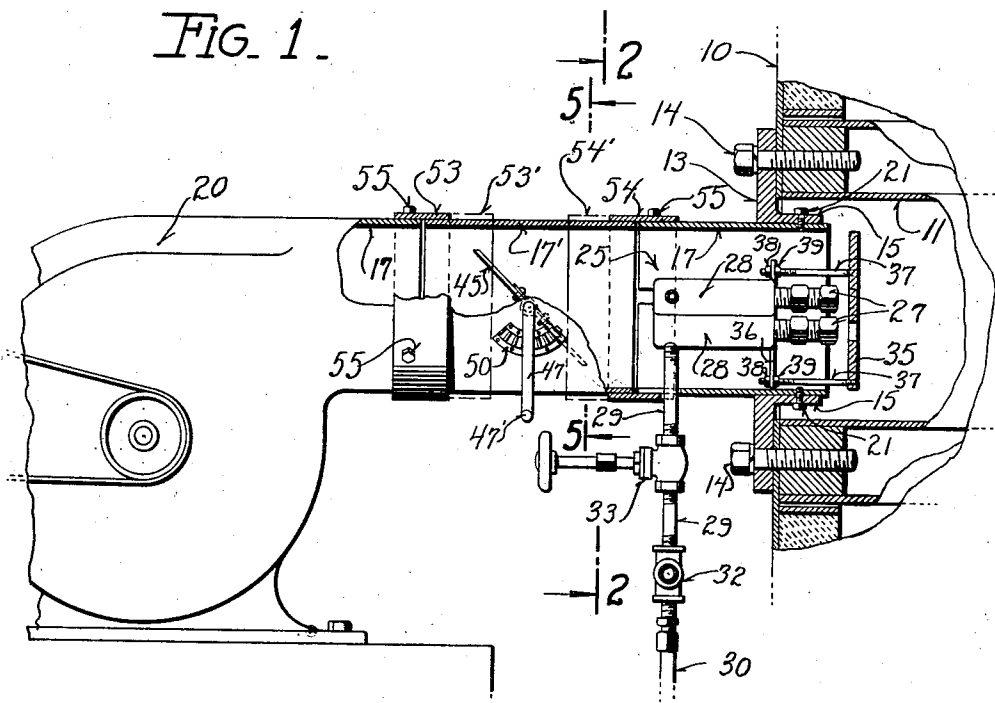


FIG. 4.

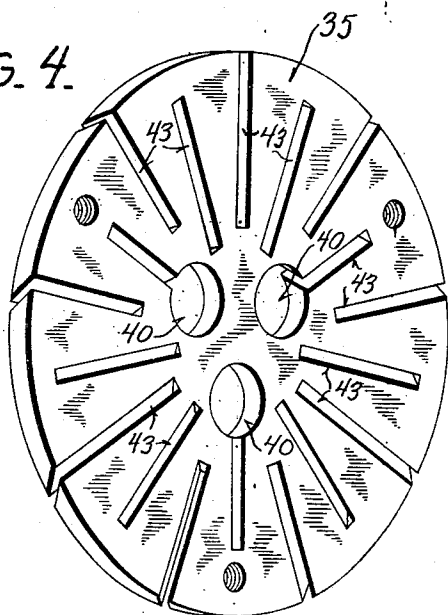
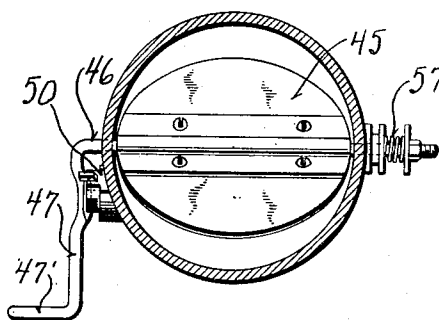


FIG. 5.



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2 Sheets-Sheet 2

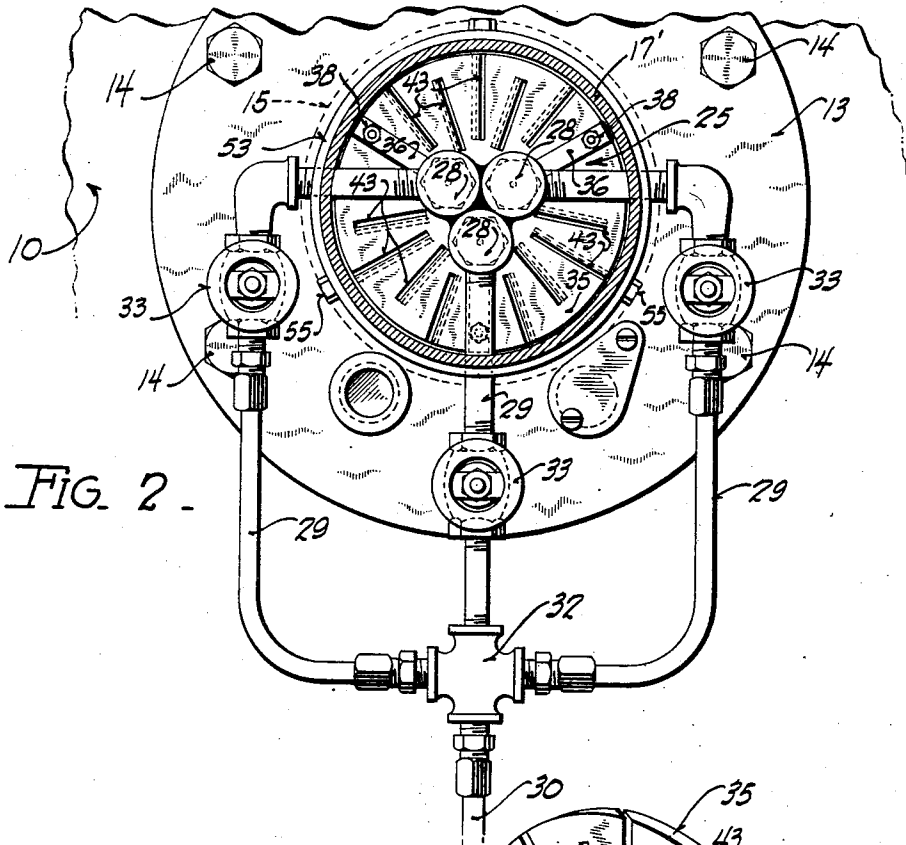


FIG. 2.

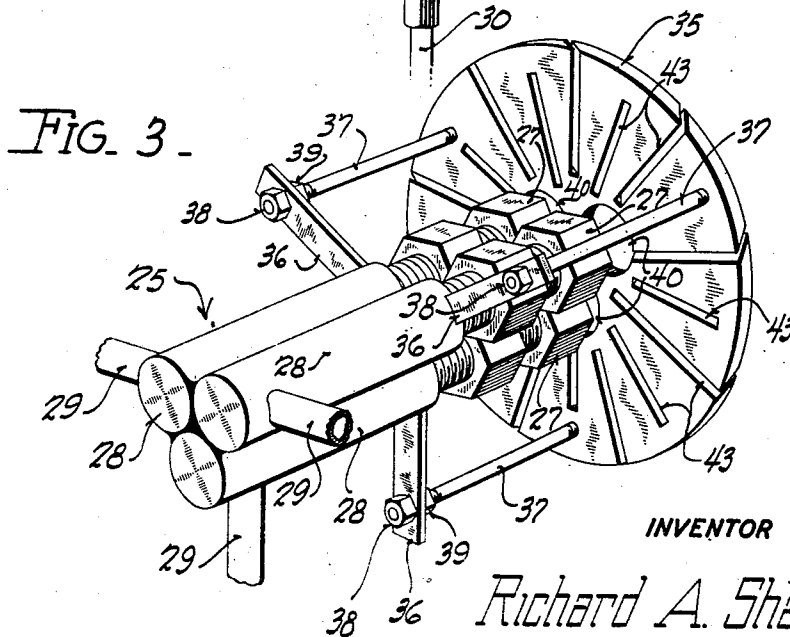


FIG. 3.

INVENTOR

Richard A. Sharp

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UNITED STATES PATENT OFFICE

1,976,097

FLUID FUEL BURNER

Richard A. Sharp, Milwaukee, Wis., assignor to
Milwaukee Reliance Boiler Works, Milwaukee,
Wis., a corporation of Wisconsin

Application February 15, 1932, Serial No. 592,928

6 Claims. (Cl. 158—76)

This invention relates to new and useful improvements in oil or gas burners and more particularly to a multiple unit oil burner for use in furnaces, boilers or similar appliances.

In devices heretofore used, the burner comprises a single nozzle adapted to supply all the fuel needed for the fire. This has been found to have certain disadvantages among which may be mentioned the difficulty encountered in burning all of the fuel and that a single nozzle necessitates the shutting down of the entire burner if the nozzle should become clogged.

It is an object of the present invention, therefore, to eliminate such difficulties by the provision of a multiple nozzle unit of novel design, by the use of which a greater percentage of the fuel comes in contact with the induced draft.

It is a further object of this invention to provide a burner for use with either oil or gas, which will eliminate the inconvenience of having to dismantle the burner immediately upon clogging of a burner, by having a plurality of nozzles and means to adjust the amount of fuel flowing through each nozzle individually.

Another object of the present invention is to provide a burner unit which is bodily insertable into the air supply pipe from the blower in such a manner that it may be readily removed.

It is a further object of the invention to provide a novel deflector plate for the entering air which is adapted to give a portion of the air a whirling motion, which will entrain the remainder of the air and impart to it a whirling motion to more readily vaporize the fuel.

A structure embodying the invention is illustrated in the accompanying drawings and will be hereinafter fully described, the invention residing in certain novel features which will be particularly pointed out in the appended claims:

In the drawings:

Figure 1 is a side view with parts broken away and in section showing the burner constituting the present invention applied to a boiler;

Figure 2 is an enlarged cross sectional view of the burner taken on the plane of the line 2—2 of Fig. 1;

Figure 3 is a perspective view of the burner unit per se showing the relation of the burner to the deflector plate;

Figure 4 is a perspective view of the deflector plate showing the slots therein;

Figure 5 is a cross section on the line 5—5 of Fig. 1, showing details of the damper.

Referring to the accompanying drawings in which like numerals indicate like parts through-

out the several views, the burner has been shown installed on a boiler 10, of the type shown in the co-pending application of Richard A. Sharp, Serial No. 572,602, filed Nov. 2, 1931, although it will be understood that it is readily adapted for use in any furnace or boiler desired. The boiler 10 has a passage 11 therein, constituting a fire chamber in which the fuel is mixed with a suitable amount of air, the passage 11 leading to the fire tubes of the boiler, which have not been shown as they form no part of the present invention and are fully covered in the co-pending application mentioned above.

An annular flange 13 is mounted in the entrance of the passage 11 through stud bolts 14 spaced about the periphery thereof. The flange 13 has an turned collar 15 which projects into the passageway 11 and which provides a mounting means for a pipe 17—17' leading from a blower 20. The pipe 17—17' comprises two or more fixed sections 17 and a removable section 17', the details of which will be more fully described below, one of the sections 17 being fixed in any convenient manner on the collar 15 as by a plurality of screws 21 spaced about the periphery thereof and screwing through the collar 15 and into the pipe 17 as shown, or by other suitable means.

A burner unit, generally designated 25, is mounted coaxially in the pipe 17 and comprises a plurality of separate nozzles 27 receiving fuel oil from communicating chambers 28. The chambers 28 are supplied in turn through pipes 29 fed from a common supply pipe 30 through the fitting 32, (herein shown to be a cross) to which all the pipes 29 and the supply pipe 30 are attached. The supply of fuel from the supply pipe 30 to the chambers 28 is controlled through separate valves 33 in each of the pipes 29 so that the flow of fuel to any burner may be controlled individually irrespective of the flow to any other burner.

A deflector plate 35 is supported from the burner 25 through a plurality of radiating arms 36 attached, preferably, to the chambers 28 and being adapted to support spacer rods 37 thereon. The rods 37 may screw or be otherwise fastened to the deflector 35 so as to support the deflector directly from the burner 25. Nuts 38 and 39 are screwed on the spacer rods 37 on opposite sides of the arms 36, and provide means to adjust the deflector plate 35 axially relative to the burner so as to give the most efficient results from the unit.

The deflector plate has a plurality of circular ports 40 therethrough which are aligned with the nozzles 27 so that fuel issuing from the nozzles 27 is projected through the ports 40 and into the

passage 11. The deflector plate 35 is also provided with a series of preferably radial slots 43 which extend alternately to a point adjacent the center and to the outer edge of the deflector 35. The slots 43 are provided with a forward twist so as to give a spin to the air passing through the slots. This breaks up the fuel and more readily vaporizes it, and insures complete burning thereof and a maximum efficiency for the furnace.

- 10 It will be observed that all of the air issuing from the blower 20 cannot pass through the slots 43. For this reason, the plate 35 is spaced from the inner end of the intake pipe 17 so as to leave an annular opening between the plate 35 and the inner end of the pipe 17, to permit air from the blower to pass both through the plate 35 and around it. The air that passes through the plate attains a whirling motion and entrains the air which passes around the outer edge of the plate to give to the latter air a whirling motion such as that obtained by the air passing through the plate.

- It will be apparent that some means must be provided to regulate the draft so that a proper amount of air be supplied to the flame to insure proper combustion. To accomplish this, the pipe 17' may be provided with a damper 45 of the butterfly type which is mounted on a rod 46. One end of the rod is bent downwardly and outwardly as shown at 47 and 47' respectively, so as to form a handle by which the damper may be actuated.

- A casting 50 provided with an arcuate row of serrations on its outer face is mounted on the side of the pipe 17' with its serrations arranged in an arc whose center coincides with the axis of the rod 46 to be engaged by the handle portion 47. A spring 57 holds the handle portion 47 in close contact with the serrations on the face of the casting 50 so that the valve may be held in any position of adjustment. This provides a relatively simple means by which the flow of air to the burner can be adjusted in accordance with the number of burners operating and with the setting of the valves 33.

- 45 In order that the burner unit may be made detachable, the section of pipe 17 which is fitted in the collar 15 is slotted, so that the pipes 29 may fit therein. The next adjacent section of pipe 17' is connected in the pipe line by means of a pair of collars 53 and 54 which are slidably mounted on the pipe 17' and adapted to slide over the pipes 17 and be fastened thereto by set screws 55 or other suitable readily releasable means. The collar 54 which is adjacent the oil inlet pipes 29 is likewise made slotted so as to fit over the pipes 29 in a similar manner to the slotting in the pipe 17. The construction of the slots in the pipes 17 and the collar 54 cooperate to snugly encircle the pipes 29 and permit a minimum leakage of air from the pipe 17.

- When it is desired to remove the burner unit 25, both of the collars 53 and 54 move onto the central section of the pipe 17—17' in a position shown in the dotted lines 53' and 54'. The central section 17' may then be removed preparatory to repairing, adjusting or removing the burner unit 25. To remove the burner, the fitting 32 may be disconnected from the supply pipe 30 and the burner 25 removed as a unit.

- 70 It will be observed from the foregoing description, that there has been provided a simple and practical multiple unit fluid fuel burner for use in furnaces, boilers and similar appliances, which is adapted to burn either liquid or gaseous fuels and it will be apparent that the extreme flexibility

and ease of adjustment of the unit and its freedom from the ill effects of clogging constitute a valuable improvement over the burners heretofore developed. It is not, therefore, desired to limit the invention to the precise form herein shown and described, but only by the scope of the appended claims.

What is claimed as new and desired to secure by Letters Patent is:

1. In a burner of the character described, a plurality of nozzles, a plurality of arms fastened to said nozzles and radiating therefrom, a deflector plate having slots therein to deflect incoming air and to impart a spiral movement to it, said plate having apertures therein for the passage of fuel from the nozzles, said deflector being positioned in front of said burner with the apertures therein aligned with said nozzles, and supporting rods attached to said deflector and adjustably connected to said radiating arms.

2. In a device to removably mount a fluid fuel burner within an air inlet pipe comprising a first section of pipe projectable into a fire box, the outer end of said pipe being slotted to receive an intake pipe of said burner through the end of the slot, a second section of pipe removably mounted adjacent said first section and means to mount said second section of pipe on said first section comprising a sleeve slidable over both of said sections and having a notch in one edge thereof engageable over said pipe.

3. In a burner of the character described, an air duct arranged to discharge into a fire box, a fuel discharge unit removably disposed within the air duct to project fuel toward the discharge end of the air duct, and a plurality of fuel supply pipes for the fuel discharge unit, said fuel supply pipes supporting the unit within the air duct and passing through open ended slots in the outer end portion of the air duct whereby the fuel discharge unit may be withdrawn axially from the air duct, and means detachably connected with the outer end portion of the air duct to conduct air under pressure to said air duct, said means normally closing the open ends of the slots through which the fuel supply pipes pass.

4. In a burner, an air duct arranged to discharge into a fire box, a fuel discharge unit removably disposed in said air duct and comprising a plurality of parallel tubes clustered about a central axis and rigidly connected, nozzle means at the inner ends of the tubes to project fuel toward the discharge end of the air duct, a deflector plate, and adjustable means to support the deflector plate, from the plurality of tubes in a normal position near the discharge end of the air duct, said deflector plate being of a size to permit its passage through the air duct, and individual fuel supply pipes leading to the different tubes and passing through openings in the air duct to conduct fuel to the tubes and removably support the entire fuel discharge unit within the air duct.

5. In a burner of the character described, an air duct adapted to discharge into a fire box, means to force air through said duct into the fire box, a fuel discharge unit removably supported within the air duct, comprising a plurality of tubes parallel to and arranged about the longitudinal axis of the air duct and rigidly connected to each other, nozzles at the open ends of the tubes to project fuel into the fire box, a flat deflector plate having slots cut at an angle to impart a whirling motion to the air flowing through said slots, a plurality of rods secured to said de-

deflector plate, and adjustable connections between the ends of the rods and the tubes to adjustably support the deflector plate from the tubes ahead of the discharge nozzles and near the discharge
5 end of the air duct, said deflector plate having openings aligned with the discharge nozzles to permit unrestricted passage of fuel therethrough.

6. In a burner of the character described, an air duct having its open inner end arranged to
10 discharge into a fire tube of a heat exchange device, a liquid fuel nozzle within the air duct and adapted to direct a spray of fuel from the open inner end of the duct into the central portion of
said fire tube, means to force air under pressure

into the duct to be discharged from its open inner end and be injected into the fire tube along with the fuel supply, and a flat deflector plate mounted near the open inner end of said air duct within the fire tube ahead of the liquid fuel nozzle, said
80 flat deflector plate having a series of angular slots therethrough to impart a whirling motion to the air as it enters the fire tube and to cause part of said air to travel in a hollow shell along
85 the wall of the fire tube and to cause another part of the air to co-mingle with the spray of liquid fuel.

RICHARD A. SHARP.

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