April 22, 1941. E. VIGNEAULT 2,239,025

FUEL BURNER

Filed Feb. 20, 1939

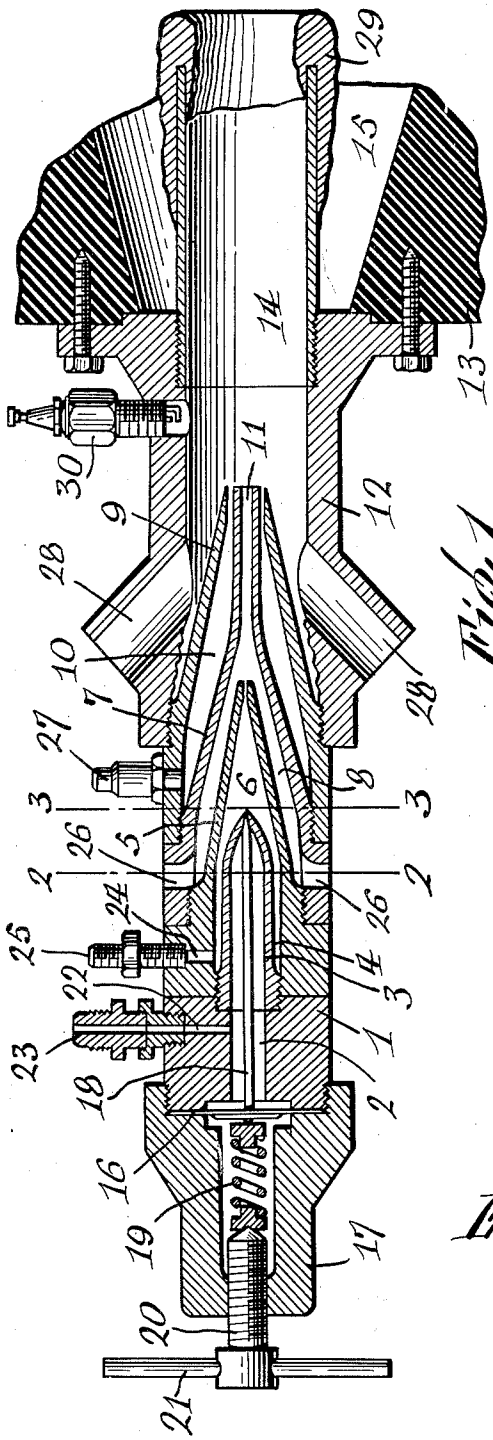


Fig. 1

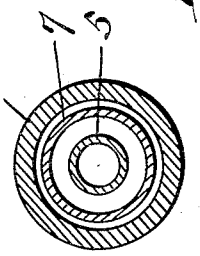


Fig. 3

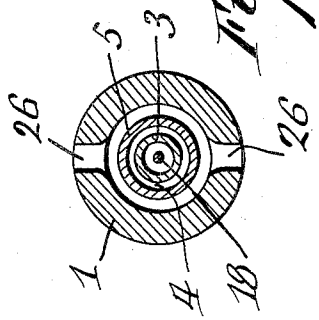


Fig. 2

Inventor:
Edmond Vigneault
By Albert Jaurmin
Attorney

Patented Apr. 22, 1941

2,239,025

UNITED STATES PATENT OFFICE

2,239,025

FUEL BURNER

Edmond Vigneault, Three Rivers, Quebec, Canada, assignor to "Franco-American Patents Limited," Three Rivers, Quebec, Canada

Application February 20, 1939, Serial No. 257,364

3 Claims. (Cl. 158—74)

The present invention pertains to a novel fuel burner, and the principal object is to provide an economical burner adapted to use any kind of liquid fuel. The burner constructed according to the invention is adapted to use the cheapest grades of liquid fuel and in fact, used motor oil with corresponding economy in heating.

This result is accomplished essentially by mixing the liquid fuel with compressed air, pre-heating the mixture with steam that eventually enters the mixture, and finally admitting atmospheric air to the mixture of liquid fuel, compressed air and steam. The pre-heating by steam in the manner described prepares the oil mixture for ignition and combustion, while the atmospheric air is so determined as to produce a readily combustible mixture.

In construction, the invention comprises a series of four nozzles arranged in co-axial alinement and spaced from each other. Liquid fuel is admitted to the first nozzle of the series, and compressed air, atmospheric air and steam are admitted respectively to the three successive chambers or spaces formed between the nozzles. The body is extended beyond the fourth nozzle and is formed with lateral ports to admit more atmospheric air for completing the combustible mixture.

Another object of the invention is to provide a means for producing ignition. The burner is attached to a furnace wall, and from the burner a tube is extended through an enlarged opening in the wall. The tube is made of heat-conducting metal and becomes heated by reason of the oversized opening in which it lies. The temperature thus acquired by the tube is sufficient to ignite the fuel mixture as it issues from the nozzles. A spark plug is also provided in the body extension for igniting the mixture when the furnace is cold or when the automatic ignition fails for any other reason.

The invention is fully disclosed by way of example in the following description and the accompanying drawing, in which:

Figure 1 is a longitudinal section of the device;

Figure 2 is a section on the line 2—2 of Figure 1, and

Figure 3 is a section on the line 3—3 of Figure 1.

Reference to these views will now be made by use of like characters that are employed to designate corresponding parts throughout.

The device is illustrated in Figure 1 as comprising a body portion 1 which, for convenience, may be constructed of two or more parts. The body is formed with an axial passage 2 and is fitted internally with a nozzle 3 communicating with the passage. An annular space 4 is retained around the nozzle, for the purpose that will presently be described, and the body is extended forwardly in the form of another nozzle 5 co-axial with the first nozzle 3 and forming therewith a chamber 6 communicating with the space 4.

A third nozzle 7 extends from the body 1 and surrounds the nozzle 5 to form therewith an annular chamber 8. Finally, the fourth nozzle 9 extends from and encloses the nozzle 7, forming a chamber 10 around the latter. The nozzle 7 has a cylindrical tip 11 which is co-terminous with the tip of the nozzle 9, as may be seen in Figure 1.

An extended body portion or discharge tube 12 is mounted on the nozzle 9, extending forwardly therefrom to the wall of the furnace 13 to which it is attached. A tube 14 extends from the forward end of the member 12 into an enlarged opening or heating compartment 15 in the wall 13.

A diaphragm 16 is clamped to the rear end of the body 1 by a suitable fitting 17. A needle valve 18 is secured to the diaphragm and extends to the tip of the first nozzle 3. Behind the diaphragm is a spring 19 regulated by screw 20 threaded in the member 17 and having an adjusting handle 21. By means of the screw, the opening at the tip of the nozzle 3 is regulated to about $\frac{1}{1000}$ of an inch.

A port 22 is drilled laterally through the member 1 to the passage 2 and is equipped with a fitting 23 for supplying the fuel. If any solid particles should block the tip of the nozzle 3, the pressure developed in the chamber 2 will repel the diaphragm 16 and needle valve 18 and thereby open the tip of the nozzle to about $\frac{1}{16}$ inch diameter. This is sufficient to permit the tip of the nozzle to be cleared, after which the diaphragm and needle automatically resume their adjusted position.

The body 1 has another lateral port 24 connected to a fitting 25 for supplying compressed air to the chamber 4 and chamber 6 of the second nozzle 5. Obviously, a mixing of the fuel and air occurs in the chamber 6. The flow of fluid through the tip of nozzle 5 creates a suction in the nozzle 7, and this suction is compensated by air drawn in through ports 26 formed in the outer wall of the nozzle 7 and communicating with the interior thereof. The outer end of the nozzle 9 is connected to a fitting 27, and the steam flowing through nozzle 9 envelopes the nozzle 7 and heats the mixture discharged through the latter. A thorough pre-heating is accomplished by reason of the extended tip 11

of the nozzle 7 and the co-terminous relation of the nozzles 7 and 9, with the further result that the steam does not mix with the other components until all have been discharged from the respective nozzles.

The body extension 12 has comparatively large air intake ports 28 through which air is drawn by the suction produced by the flow of fluid in the member 12. The ports 28 are so dimensioned as to admit sufficient air to produce a readily combustible mixture.

Because of the mounting of the tube 14 in the enlarged opening 15 of the furnace, the tube in operation becomes heated sufficiently to ignite the fuel mixture issuing from the nozzles. The tube 14 is enclosed, at least in its inner end, in refractory material 29 to prevent it from melting and also to permit the concentration of the jet. When the furnace is cold, the initial ignition is accomplished by a spark plug 30 inserted in the member 12, as also shown in Figure 1. The combination involving the member 14 is the subject of a divisional application hereof.

The fluid introduced through the fitting 27 is preferably steam to accomplish the best results in pre-heating the mixture and aiding in combustion. By reason of this construction, it is possible to use the cheapest and crudest grades of liquid fuel and even used motor oil.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention, as indicated by the appended claims.

What I claim is:

1. A liquid fuel burner comprising a body having a longitudinal passage, a series of four nozzles extending therefrom in co-axial and spaced relation to each other, the first nozzle communicating with said passage, means for admitting liquid fuel to said passage and first nozzle, a spring-pressed valve controlling the outlet of the first nozzle, means for admitting compressed air to the space between the first and second nozzles, the space between the second and third nozzles being open to the atmosphere, means for admitting steam to the space between the third and fourth nozzles, said second nozzle having an opening smaller than the openings of said third and fourth nozzles, and a body extension mounted on the fourth nozzle and enclosing the same, said extension having ports open to the atmosphere.

2. A liquid fuel burner comprising a body having a longitudinal passage, a series of four nozzles extending therefrom in co-axial and spaced relation to each other, the first nozzle communicating with said passage, means for admitting liquid fuel to said passage and first nozzle, a spring-pressed valve controlling the outlet of the first nozzle, means for admitting compressed air to the space between the first and second nozzles, the space between the second and third nozzles being open to the atmosphere, means for admitting steam to the space between the third and fourth nozzles, and a body extension mounted on the fourth nozzle and enclosing the same, said extension having ports open to the atmosphere, the third nozzle having an extended tip co-terminous with the tip of the fourth nozzle.

3. A liquid fuel burner comprising a body having a longitudinal passage, a series of four nozzles extending therefrom in co-axial and spaced relation to each other, the first nozzle communicating with said passage, means for admitting liquid fuel to said passage and first nozzle, a spring-pressed valve controlling the outlet of the first nozzle, means for admitting compressed air to the space between the first and second nozzles, the space between the second and third nozzles being open to the atmosphere, means for admitting steam to the space between the third and fourth nozzles, and a body extension mounted on the fourth nozzle and enclosing the same, said extension having ports open to the atmosphere, the third nozzle having an extended tip co-terminous with the tip of the fourth nozzle, said second nozzle having an opening smaller than the openings of said third and fourth nozzles.

EDMOND VIGNEAULT.