

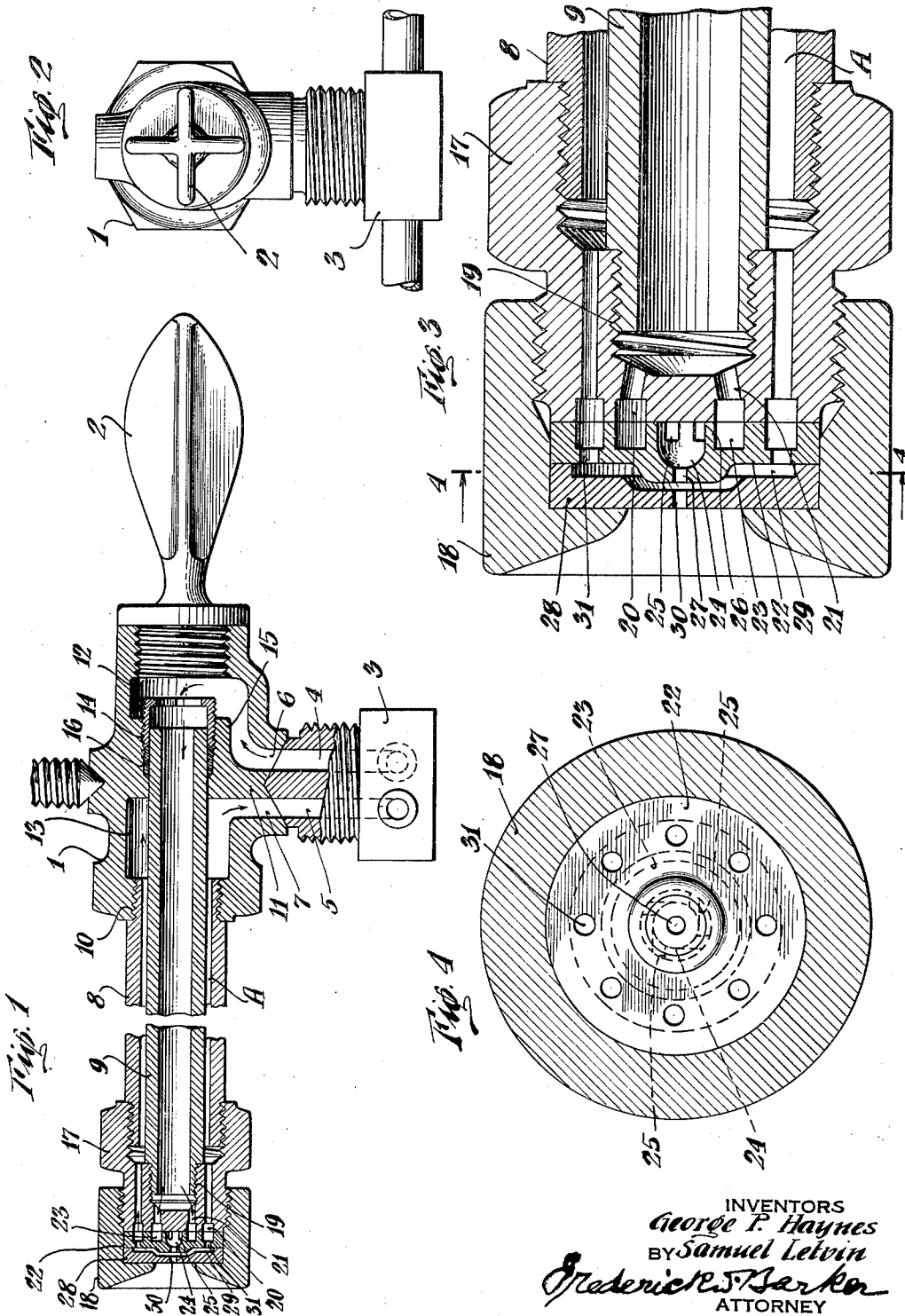
Oct. 31, 1939.

G. P. HAYNES ET AL

2,177,780

WIDE RANGE ATOMIZER

Filed May 11, 1938



INVENTORS
George P. Haynes
BY Samuel Letvin
Frederick S. Barker
ATTORNEY

UNITED STATES PATENT OFFICE

2,177,780

WIDE RANGE ATOMIZER

George P. Haynes, Rockville Centre, N. Y., and
Samuel Letvin, Weehawken, N. J., assignors to
Todd Combustion Equipment, Inc., New York,
N. Y., a corporation of New York

Application May 11, 1938, Serial No. 207,186

4 Claims. (Cl. 299—120)

This invention relates to liquid fuel atomizers having excess fuel return means for use with automatic combustion control devices which operate to maintain a constant steam pressure on boilers in accordance with the steam requirements therefrom.

For proper atomization of liquid fuel it is desirable that the pressure with which the fuel is supplied to the burner atomizing orifice shall be constant, as a variation in the delivery pressure affects the character of the spray entering the combustion chamber.

Therefore we have found it necessary to evolve a means whereby the fuel return may be caused to emanate from a point in advance of the usual atomizing orifice and to this end we have devised a second atomizer plate, spaced from the usual atomizer plate, the orifices of said plates being co-axial. The space intermediate these plates constitutes a chamber and it is from this chamber that excess fuel bleeds for return to its source, by which means the quantity of fuel atomized into the furnace can be varied within a wide range without modifying the pressure flow of the fuel for atomization.

Other features and advantages of our invention will hereinafter appear.

In the drawing:

Figure 1 is a longitudinal sectional view of our improved liquid fuel atomizer, with fuel return means, the usual air supply means not appearing, and a portion of the housing screw only representing the usual housing.

Fig. 2 is an end view thereof.

Fig. 3 is an enlarged section showing the forward portion only of the atomizer, and

Fig. 4 is a section on the line 4—4 of Fig. 3.

In said views let 1 indicate the usual coupling member, having the handle 2, and 3 indicates a union bushing which is provided with the ports 4, 5 that respectively connect with the source of fuel supply (not shown) and with passageways 6, 7 in said coupling member.

The burner has an outer tube 8 and an inner tube 9, these tubes being in spaced relation to provide an intervening passageway A. Tube 8 is threaded into coupling member 1 as at 10, and tube 9 is shown as entered through an aperture in a partition 11 that divides the interior of the coupling member into compartments 12 and 13, said tube 9 having an open ended ferrule 14 that is screwed into a boss 15 on partition 11, and a space remaining for packing material at 16 between the ferrule and boss to provide a liquid tight connection.

Compartment 12 receives fuel under pressure through passageway 6 and port 4 and delivers it to tube 9, while compartment 13 which receives return fuel from passageway A, delivers it through passageway 7 and port 5 back to the source.

So far we have described the coupling member in its relation with the tubes 8 and 9, and will proceed with the description of the atomizing assembly, which is more clearly illustrated in Fig. 3.

The nozzle body, 17, is threaded upon tube 8 and itself receives the cap 18, following the regular practice of the Todd type burners. Also, the nozzle body is interiorly threaded at 19 to receive the screw end of tube 9, and its adjacent end is provided with an annular groove 20 that is in communication with tube 9 through holes 21. The usual atomizer or closure plate 22 is placed against the nozzle body, having an annular groove 23 that registers with groove 20; also having a central whirling chamber 24 which is in communication with groove 23 by way of tangential slots 25 formed through the wall 26 that separates chamber 24 from groove 23.

Liquid fuel supplied under a predetermined working pressure through tube 9 is caused to whirl in chamber 24, from which it issues through orifice 27 in a whirling stream. Ordinarily orifice 27 would cause atomization of the fuel, but in the instance of our present invention an added member is introduced in the form of a terminal plate 28, positioned in advance of plate 22 and spaced therefrom to provide the chamber 29, said plate 28 having an atomizing orifice 30 that is co-axial with, and preferably as shown in the drawing of the same diameter as orifice 27. Chamber 29 is in communication with fuel return passageway A through holes 31 provided in plate 22 and holes 32 that extend through nozzle body 17 in registry with said holes 31.

From the foregoing description it will be apparent that while the pressure under which liquid fuel is supplied to the burner may be constant, the quantity thereof caused to issue in atomized form from orifice 30 may be a variable, depending on the control means whereby the quantity of fuel returning through passageway A is regulated.

The control means are not herein shown, being of known character, and may be applicable with one or more burners, either for use with a single boiler or a battery of boilers, so that all burners can be controlled simultaneously.

As stated above, for proper atomization with

constant character of the spray entering the combustion chamber, the pressure with which the fuel is supplied to the usual atomizing orifice 27 should be constant. Provided that the orifice 30 is at least as large as the orifice 27, as shown in the drawing, the fuel will issue from the orifice 30 with the same velocity as it issues from the orifice 27 and no back pressure will be built up in the return chamber 29. If such a back pressure existed in the return chamber, it would vary depending on the controlled amount of oil permitted to return through the passageway A, and since the pressure would be transmitted to the whirling chamber 24, the character of the spray would not be constant.

Variations within the spirit and scope of our invention are equally comprehended by the foregoing disclosure.

We claim:

1. In a liquid fuel burner, a fuel delivery passageway, a chamber communicating with the passageway and including a wall having an emission aperture therein, a second chamber including an aperture forward of the emission aperture through which fuel from the emission aperture will move, means to cause the fuel to whirl before traversing said emission aperture and to project a stream of fuel from the emission aperture, a fuel return line communicating with the second chamber whereby the quantity of fuel passing through the second aperture may be varied, the second aperture having a diameter at least as great as the emission aperture.

2. In a liquid fuel burner, a fuel delivery passageway, a chamber communicating with the passageway and including a wall having an emission aperture therein, a second chamber including an aperture forward of the emission aperture through which fuel from the emission aperture will move, means to cause the fuel to whirl before traversing said emission aperture and to project

a stream of fuel from the emission aperture, a fuel return line communicating with the second chamber whereby the quantity of fuel passing through the second aperture may be varied, the diameter of the second aperture being the same as the diameter of the emission aperture.

3. The combination in a liquid fuel burner having a delivery passageway, of a closure plate having an emission orifice therein, means for causing the fuel to whirl before traversing said orifice, an atomizing plate fitting over the closure plate and having an atomizing orifice that is axially aligned with the emission orifice, the atomizing orifice being at least as large as the emission orifice, the atomizing plate being spaced from the closure plate to provide a fuel return chamber therebetween, a circumferential series of apertures in the fuel return chamber, and a fuel return passageway communicating with said return chamber, through the series of apertures, whereby the quantity of fuel passing through the atomizing orifice may be varied.

4. The combination in a liquid fuel burner having a delivery passageway, of a closure plate having an emission orifice therein, means for causing the fuel to whirl before traversing said orifice, an atomizing plate fitting over the closure plate and having an atomizing orifice that is axially aligned with the emission orifice, said orifices being of the same diameter, the atomizing plate being spaced from the closure plate to provide a fuel return chamber therebetween, a circumferential series of apertures in the fuel return chamber, and a fuel return passageway communicating with said return chamber, through the series of apertures, whereby the quantity of fuel passing through the atomizing orifice may be varied.

GEORGE P. HAYNES.
SAMUEL LETVIN.