Dec. 5, 1950 D. MEYER 2,532,851

LIQUID FUEL ATOMIZER

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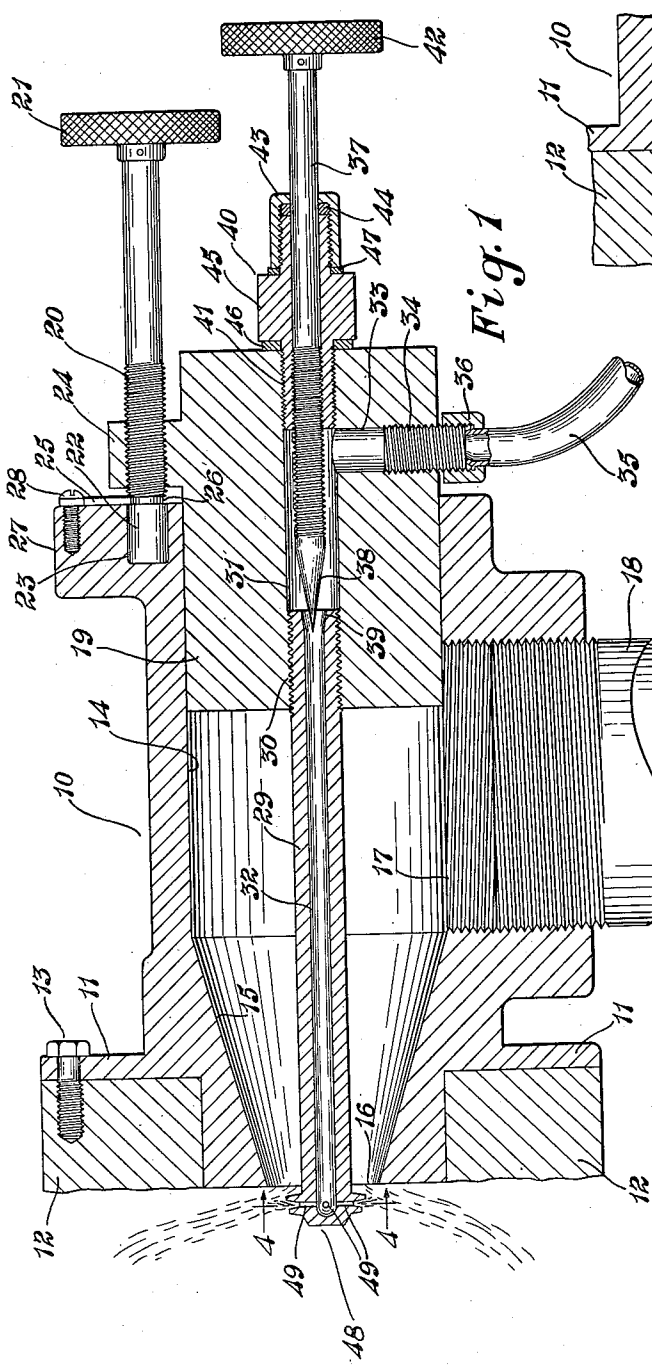


Fig. 1

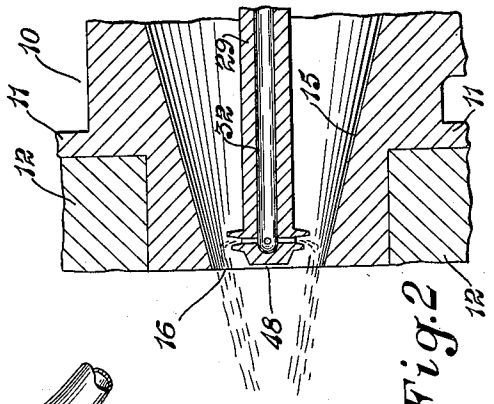


Fig. 2

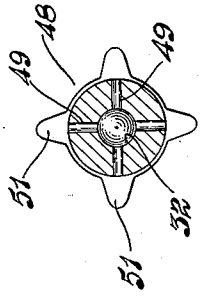


Fig. 4

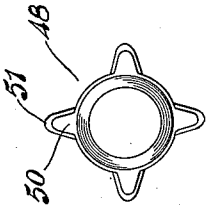


Fig. 3

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LIQUID FUEL ATOMIZER

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4 Claims. (Cl. 299—141)

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The invention relates generally to devices for atomizing liquid fuel, and more particularly to atomizing means for providing a finely divided mixture of liquid fuel and air which will be highly combustible.

Many prior constructions have provided means for atomizing or breaking up liquid fuels, such as oil or other hydrocarbon liquids, into finely divided particles and mixing the particles with air so as to produce a combustible mixture. Certain of these prior constructions have required the injection of the fuel into the air in very small jets under high pressures, and the tiny jet openings are apt to become clogged quickly with carbon or foreign matter in the fuel. Certain other prior constructions have included a complicated arrangement of passageways and ports, in an attempt to provide a very finely divided mixture which is highly combustible.

While some of these prior constructions have produced a good breaking up of the liquid fuel, a certain amount of excess fuel accumulates in the discharge jets and constantly drips therefrom. This condition obviously wastes the fuel and lowers the combustibility of the fuel and air mixture.

As far as I am aware, no construction prior to the present invention has been capable of producing an atomized liquid fuel and air mixture which when burned produces substantially complete combustion.

It is therefore a general object of the present invention to provide a novel and improved liquid fuel atomizer which is adapted to provide a liquid fuel and air mixture producing substantially complete combustion when burned.

Another object is to provide a novel and improved liquid fuel atomizer which does not require feeding the fuel into the air stream under high pressure.

Another object is to provide a novel and improved liquid fuel atomizer in which all of the fuel at the discharge jets is broken up and mixed with the air stream without causing any dripping of excess fuel.

A further object is to provide a novel and improved liquid fuel atomizer in which the liquid fuel is discharged from the central tip at the mouth or nozzle of the atomizer, and the tip is adjustable relative to the nozzle for varying the spread of the fuel and air mixture.

A still further object is to provide a simple, compact, and inexpensive fuel atomizer construction which incorporates all of the foregoing objectives, and which is easy to manufacture and operate.

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These and other objects are accomplished by the parts, elements, constructions, arrangements and combinations, which comprise the present invention, the nature of which is set forth in the following description and illustrated in the accompanying drawing, and which is particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

In general terms, the invention may be stated as including a housing enclosing a tubular air passage with a converging nozzle outlet, a body member movably mounted in said air passage and having a fuel discharge tip at the nozzle opening, said tip having radial snake mouth jets circumferentially spaced from each other for discharging fuel into the air stream, and said body member being adjustable within said air passage to move said tip into and out of said nozzle outlet.

Referring to the drawing forming part hereof in which a preferred embodiment of the invention is shown by way of example;

Figure 1 is a longitudinal section view of the improved liquid fuel atomizer showing the fuel discharge tip adjusted forwardly of the nozzle;

Fig. 2 is a similar fragmentary view showing the fuel discharge tip retracted within the nozzle;

Fig. 3 is an enlarged end elevation of the fuel discharge tip; and

Fig. 4 is a transverse sectional view thereof as on line 4—4, Fig. 1;

Similar numerals refer to similar parts throughout the several views of the drawing.

The liquid fuel atomizer embodying the present invention is adapted to be used in conjunction with a burner or other means for producing combustion of the air and fuel mixture discharged from the atomizer, and the atomizer preferably includes a tubular housing 10 having attaching flanges 11 which are secured to the wall 12 of a burner tube or the like by suitable screws indicated at 13.

Preferably, the walls of the housing form a longitudinal air chamber or passage 14 which is coaxial with the housing and which may be cylindrical. The front end of the housing preferably has a convergent bore 15 communicating with the chamber 14 and having its front end open to form a nozzle outlet 16. At one side of the housing 10, an air inlet opening 17 is provided through the housing walls, preferably at right angles to the longitudinal axis of the housing, and said inlet opening is preferably threaded as shown, so that the threaded end of an air inlet

pipe 18 can be screwed therein for supplying air under pressure to the atomizer. The air pressure used may vary from an ounce or so to several pounds, according to conditions.

A body member 19 is movably mounted in the passage 14 of the housing member and projects from its rear end. The exterior surface of the body member is preferably cylindrical and machined to have a close sliding fit with the cylindrical passage 14 of the housing. Means for adjusting the body member longitudinally of the housing preferably includes a screw 20 having a hand wheel 21 on its outer end, and having its inner end 22 journaled in a socket 23 in the rear end wall of the housing. The screw is threadedly engaged with an ear 24 projecting radially from the projecting end of the body member 19, and the screw is held in place by a latch plate 25 which engages a groove 26 in the screw, the latch plate being secured to a lug 27 on the rear wall of the housing by means of a screw 28. Accordingly, rotation of the hand wheel 21 will move the body member 19 longitudinally in the housing 10.

Preferably, a fuel tube 29 projects forwardly from the body member 19 and is coaxial with the bore 15 and nozzle outlet 16. As shown, the fuel tube may have its rear end 30 screwed into the front end of a longitudinal axial bore 31 in the body member, and the bore 32 of the tube 29 communicates with the bore 31. A transverse fuel inlet opening 33 is provided in the portion of the body member 19 which projects beyond the rear end of the housing 10, and the fuel inlet 33 communicates with the longitudinal bore 31 of the body member. Preferably, a pipe nipple 34 is screwed into the inlet 33 and a flexible fuel supply pipe 35 is connected to the outer end of the nipple by means of a suitable coupling indicated at 36 which may be of the well known ground joint type. As shown, the fuel supply pipe 35 is of relatively small diameter as compared with the supply pipe 18.

A needle valve is preferably provided for regulating the flow of fuel into the fuel discharge tube 29, and preferably includes a needle or pin 37 having a tapered point 38 adapted for seating in the chamfered rear end 39 of the bore 32. The pin 37 is preferably threaded behind the point 38 for a portion of its length for being screwed in the front end of a nut member indicated generally at 40, and the front end 41 of the nut member is in turn screwed in the rear end of the bore 31 of the body member. Preferably, the pin 37 extends through the nut member 40 and has a hand wheel 42 on its rear end. The smooth portion of the pin 37 is journaled in the nut member 40 and a packing nut 43 is screwed on the rear end of the nut member 40 for securing a packing gland 44 around the smooth part of the pin to prevent any leakage of fuel along the pin 37. Preferably, the nut member 40 has a central annular shoulder 45, and suitable washers 46 and 47 may be interposed between the shoulder and body member and between the shoulder and packing nut, respectively.

Accordingly, the needle valve 38, 39 provides for a fine adjustment of the amount of liquid fuel flowing into the bore 32 of the fuel discharge tube 29 so that the bow can be regulated independently of the adjustment of the body member 19.

The novel fuel discharge tip is indicated generally at 48, and is formed on the front end of the fuel discharge tube 29. By manipulating the adjusting screw 20 to move the body member 19 longitudinally in the housing 10, the tip 48 can be adjusted from a position outside and in front

of the nozzle discharge outlet 16, such as shown in Fig. 1, to a position within the nozzle bore 15, such as shown in Fig. 2, so that the spread of the air and fuel mixture being discharged from the nozzle is varied from a relatively wide cone as indicated in Fig. 1 to a relatively narrow cone as indicated in Fig. 2.

The tip 48 preferably includes circumferentially spaced radially extending passageways or channels 49 which are disposed at right angles to the longitudinal axis of the tube 29 and which communicate with the bore 32 at their inner ends. Four of these channels are shown in the drawings, but it will be understood that the number of channels may be varied considerably without departing from the scope of the invention, the important consideration being that they are spaced apart a substantial distance circumferentially.

At the outer end of each channel 49, longitudinally or axially spaced front and back lips or lobes 50 and 51 are provided forming a discharge mouth communicating with said channel and open at the sides, and the lips are preferably tapered or substantially semi-elliptical as shown, so that the mouth formed by the lips simulates a snake head. As indicated in the drawings, the spaces between the lips form side discharge openings and the tapered shape of the lips provides for the fuel being discharged in jets from the mouths to be contacted on all sides by the air stream flowing through the nozzle and past the tip 48. The result is that the fuel jets are agitated and highly atomized by the air stream so as to produce very finely divided particles of fuel mixed with the particles of air to form a mixture which is substantially entirely combustible, and no oil remains to drip from the mouths.

Because of the agitation and atomization of the fuel discharging from the lips 50 and 51, the fuel may be fed by a gravity flow from a reservoir through the supply pipe 35, and is not required to be injected under high pressure into the air stream. Moreover, due to the size of the channels 49 and the agitation at the mouths thereof, there is no carbon or other deposit formed which will cause clogging of the channels.

The novel and improved atomizer construction is simple and inexpensive to construct and easy to operate for providing a fuel and air mixture which is substantially entirely combustible.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of construction or of the method.

Having now described the invention, the construction, the operation and use, and a preferred embodiment thereof, and the advantageous new and useful results obtained thereby; the new and useful constructions, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. Fuel atomizer construction including a housing having an air inlet port and a nozzle outlet communicating therewith, a body member movably mounted in said housing and having a fuel inlet, a fuel discharge tip communicating with

said fuel inlet and located at said nozzle outlet, said tip having circumferentially spaced radial discharge channels each terminating between two axially spaced semi-elliptical lobes, the pairs of lobes being circumferentially spaced apart, and means for adjusting said body member in said housing for moving said tip relative to said nozzle outlet to vary the spread of the air and fuel mixture discharging from said nozzle.

2. Fuel atomizer construction including a housing having an air inlet port and a nozzle outlet communicating therewith, a body member movably mounted in said housing and having a fuel inlet, a fuel discharge tip communicating with said fuel inlet and located at said nozzle outlet, a needle valve in said body for regulating the amount of fuel flowing to said fuel discharge tip, said tip having circumferentially spaced pairs of radially extending semi-elliptical lobes, the lobes of each pair being axially spaced apart and the tip having radial channels discharging into the spaces between the lobes of each pair, and means for adjusting said body member in said housing for moving said tip relative to said nozzle outlet to vary the spread of the air and fuel mixture discharging from said nozzle.

3. Fuel atomizer construction including a tubular housing having an air inlet and a discharge nozzle communicating therewith, a fuel discharge tip located in said discharge nozzle, means for conducting air under pressure to said air inlet, and means supplying fuel to said tip, said tip including circumferentially spaced pairs of radially extending semi-elliptical lobes and channels extending radially into the spaces between the

lobes of each pair, whereby fuel discharging from said channels between said lobes is substantially enveloped by the air stream to produce a high degree of atomization.

4. Fuel atomizer construction including a tubular housing having an air inlet and a discharge nozzle communicating therewith, a fuel discharge tip located within and coaxially of said nozzle, means for conducting air under pressure to said air inlet, means supplying a regulated amount of fuel to said tip, said tip having a radially extending channel for discharging fuel at right angles to the air stream in the nozzle, and axially spaced semi-elliptical lobes at the outer end of said channel providing a widened discharge mouth open at the sides for discharging a jet of fuel into the air stream.

DAVID MEYER.

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