June 14, 1932. W. A. DOBLE, JR 1,863,192

FUEL SUPPLY SYSTEM

Filed Oct. 9, 1928

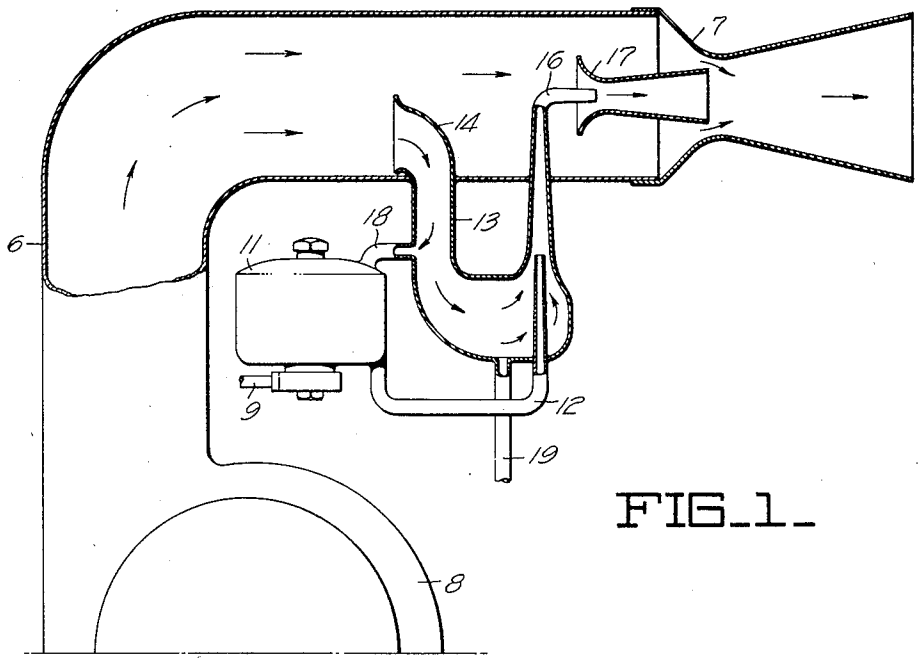


FIG_1_

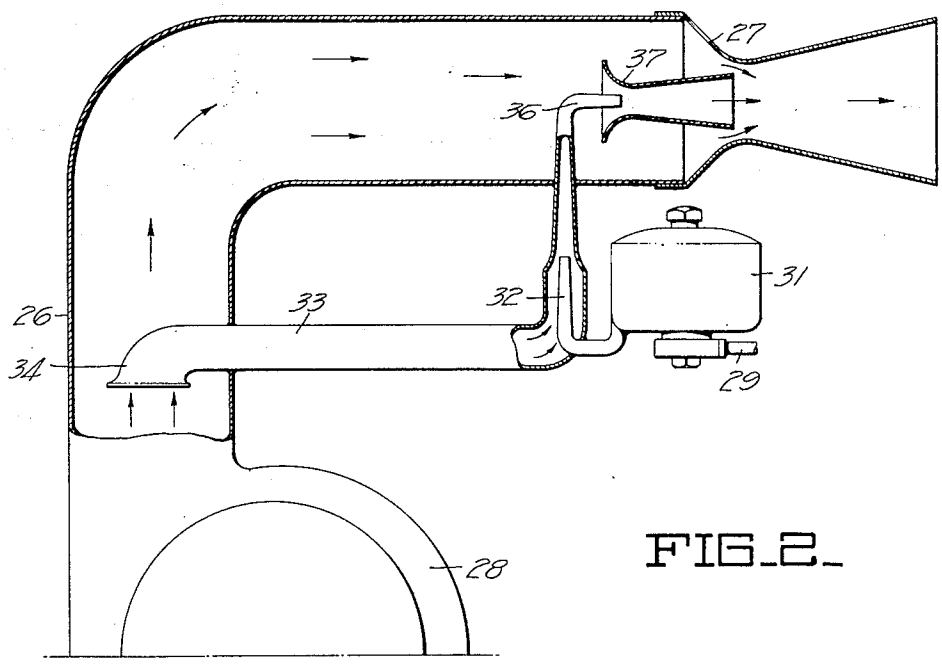


FIG_2_

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UNITED STATES PATENT OFFICE

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FUEL SUPPLY SYSTEM

Application filed October 9, 1928. Serial No. 311,368.

My invention relates to means for supplying liquid fuel to burners or engines or other fuel consumers. The fuels usually utilized for this purpose are liquid hydrocarbons of relatively light specific gravities, such as fuel oil, kerosene or gasoline.

In devices of this kind, the desirable mechanical arrangement of the various parts is sometimes rendered difficult of attainment due to the fact that the height to which a column of liquid fuel can be raised by aspiration from a nozzle is relatively low and the preferred arrangement of the parts cannot be effected because it is impossible to aspirate a solid column of liquid thru the vertical distance desired. This difficulty leads either to a less advantageous arrangement of parts or to the introduction of extraneous and additional liquid fuel feeding devices, all of which not only complicates the design, but increases the cost. Furthermore, such fuel feeding systems often work in close proximity to a heated body such as a furnace or an engine, and the heat radiated is sometimes sufficient to cause a so-called "vapor lock" in the liquid fuel channel, which not only destroys the desired proportions of fuel and air, but interferes materially with the full and continuous operation of the mechanism.

It is therefore an object of my present invention to provide means for aspirating liquid fuel from a solid column thereof thru greater vertical distances than are ordinarily possible.

Another object of my invention is to permit any desired arrangement of the parts to afford greater freedom in design and to prevent the formation of a vapor lock.

An additional object of my invention is to provide a very thorough mixing of the liquid fuel and air for combustion.

The foregoing and other objects are attained in the embodiment of the invention shown in the drawing, in which

Fig. 1 is a diagram of one modification of my invention, the larger part of the view being in cross section.

Fig. 2 is a diagrammatic showing of another modification of my invention, the figure likewise disclosing in cross section the major portion of the device.

In its preferred form, my invention comprises a conduit thru which a current of air flows and with which is associated an air duct shunting the main conduit and encompassing a fuel nozzle from which the fuel is aspirated.

In the form of my invention shown in Fig. 1, there is provided an air conduit 6 terminating in a venturi 7 which is adapted to be used in conjunction with a burner. To induce a current of air to flow thru the conduit, I provide a blower 8 of any customary kind and preferably one which is driven by an electric motor. The blower customarily operates at a constant speed and propels or induces a flow of air thru the conduit at a relatively constant rate. The pressure of the air within the conduit 6 is usually super-atmospheric and its velocity varies together with the pressure somewhat in accordance with the contour of the conduit.

In providing a combustible mixture, I utilize any of the customary liquid fuels preferably those comparable to fuel oil, gasoline or kerosene. The fuel is introduced from a source of fuel, not shown, thru a pipe 9 into a float chamber 11 or other suitable regulating device. From the chamber 11 the fuel is led to a nozzle 12 and normally stands in the nozzle a short distance below the tip thereof. Under certain conditions, it is desirable to have the nozzle 12 at a considerable vertical distance below the conduit 6 and in some instances this vertical distance is so great that the current of air flowing thru the conduit 6 is not sufficient to aspirate the fuel from the nozzle 12.

I therefore provide a duct 13 which is generally of U shape and which shunts the conduit 6. This duct is provided with an inlet 14 extending into the air stream within the conduit 6 and faces the current of air so that a portion thereof is diverted thru the duct. The outlet 16 of the duct is preferably turned into and terminates within the throat of an auxiliary Venturi tube 17 disposed within the conduit 6 adjacent the venturi 7. The portion of the air current which is diverted thru the duct is thus reintroduced adjacent

the venturi 7 after it has encompassed and passed over the nozzle 12.

The fuel which is supplied by nozzle 12 is preferably in such an amount that when mixed with the current of air flowing in the conduit 6, it will form a combustible mixture. The duct 14, however, is considerably smaller than the conduit 6 and diverts such a proportion of air thru the conduit and past the nozzle, that the mixture resulting and flowing from the outlet of the duct is usually non-combustible since it is entirely too rich in fuel. With the described apparatus, no difficulty is experienced in aspiring fuel from the nozzle 12 and lifting it thru considerable vertical distances. Furthermore, a thorough intermixture of the diverted or shunted proportion of air with the aspirated fuel is made within the duct so that the discharge adjacent the venturi mixes easily with the balance of the current of air to form a homogeneous combustible mixture.

In addition to the foregoing arrangement, I sometimes provide a tube 18 for communication between the duct 13 and the float chamber 11, so that the air pressures in the two chambers will be substantially equal. A drain 19 preferably leading back to the source of fuel may also be provided at the lowest portion of the duct 13 in order to carry away any condensate that may form and collect.

In the modification of my invention disclosed in Fig. 2, there is shown a similar conduit 26 provided with a venturi 27 and connected to a blower 28 for inducing a current of air to flow thru the conduit. Fuel is brought from a source thru a pipe 29 and enters a float chamber 31 from which it is discharged into a nozzle 32. Surrounding the nozzle and shunting the conduit 26 is a duct 33 having an inlet 34 facing the air stream and an outlet 36 opening into an auxiliary venturi 37 disposed adjacent the venturi 27. The action of this modification is in the major respects similar to the action of the one previously described and is effective to divert a portion of the air current from the conduit 26 thru the duct 33 which encompasses the nozzle 32 and accomplishes aspiration of the fuel therein. The mixture is thus made homogeneous and is lifted a considerable vertical distance and discharged adjacent the venturi 27 to mix with the main current of air.

It is to be understood that I do not limit myself to the forms of the fuel supply system shown and described herein, as the invention, as set forth in the following claims may be embodied in a plurality of forms.

I claim:

A fuel supply system comprising a continuously open and uninterrupted conduit having a substantially horizontal portion, means for causing a current of air in said conduit, a source of liquid fuel, a fuel nozzle located below said horizontal portion and supplied with fuel from said source, an air duct shunting said conduit and having a terminus adjacent the center of said horizontal portion, said duct passing said nozzle to aspirate liquid fuel therefrom to form a mixture of fuel and air, a substantially horizontal auxiliary Venturi tube surrounding said terminus and disposed in said horizontal portion, and a substantially horizontal venturi at the end of said conduit and surrounding said Venturi tube.

In testimony whereof, I have hereunto set my hand.

WILLIAM A. DOBLE, JR.