Nov. 10, 1925. 1,561,094

J. A. MALONE

FUEL FEEDING APPARATUS

Filed Aug. 25, 1924

Fig. 1.

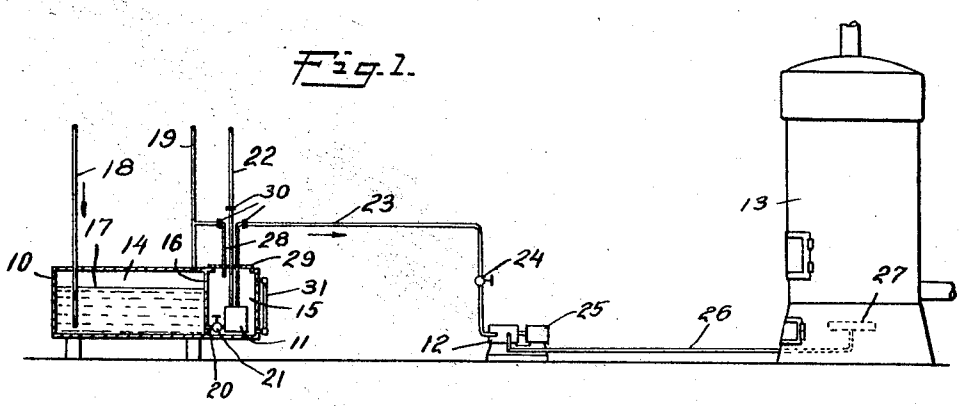


Fig. 2.

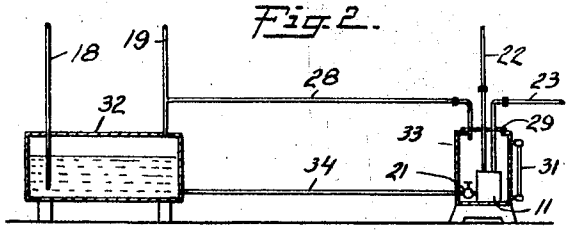


Fig. 5.

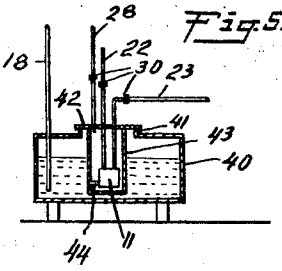


Fig. 3.

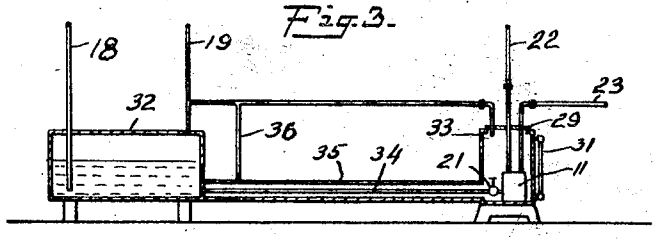
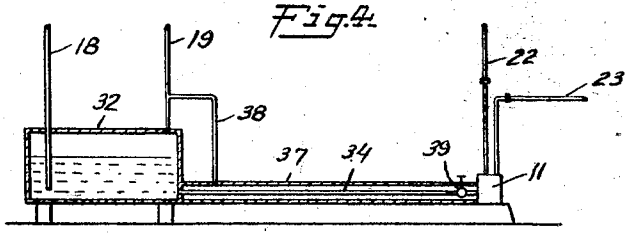


Fig. 4.



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UNITED STATES PATENT OFFICE.

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FUEL-FEEDING APPARATUS.

Application filed August 25, 1924. Serial No. 733,889.

To all whom it may concern:

Be it known that I, JOHN A. MALONE, a citizen of the United States, residing at 328 Lenox Road, Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Fuel-Feeding Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains, to make and use the same.

This invention relates to fuel feeding apparatus, more especially for feeding, liquid fuel, and the invention has for its object the provision of an improved fuel feeding apparatus, and is directed particularly to the provision of a fuel feeding apparatus which operates to reduce the fire hazard caused by leakage of fuel.

In feeding liquid fuel to domestic heating apparatus, such, for example, as an oil burning heating plant for a dwelling, the oil is taken from a supply tank to an appropriate mixing chamber or carburetion device where it is, to a greater or less extent, vaporized to produce an inflammable mixture of air and fuel. This mixture is drawn from the carbureter by a suction pump and fed to the burner of the heating apparatus.

It is important that apparatus of this character should be of simple construction and have as few moving parts and as few devices which require adjustment or attention as possible. It is also important that such apparatus be relaitvely low in first cost, as well as in the cost of maintenance and operation.

The simplest method of transferring fuel from the supply tank to the carburetion device is by gravity feed, inasmuch as this eliminates the necessity of providing a suction pump for withdrawing the liquid from the fuel tank by suction. Such an additional pump is usually electrically operated and is undesirable because it increases the cost of the apparatus, and it is also objectionable for the reason that it increases the noise attendant upon the normal operation of the equipment.

Although gravity feed is thus very desirable, it possesses one disadvantage which is well recognized as being of great importance. It is practically impossible to install an apparatus employing the gravity feed system in such a way that the possibility of leakage is not always present, and if a leak does occur, there is a chance that the entire contents of the fuel supply tank may be emptied upon the cellar floor, thus constituting a fire hazard the magnitude of which will at once be apparent.

My invention aims to retain the advantages of the gravity feed system in an apparatus of this kind, and yet eliminate, or greatly reduce, the dangers attendant upon its employment. According to the invention, the carburetion device is placed with respect to the body of liquid fuel so that the fuel will flow into the carbureter by gravity, and a chamber is provided to surround the carburetion device so as to prevent any leakage of liquid fuel as it is fed into the carbureter. An air inlet communicates with the carbureter from the exterior of the chamber so as to admit air to the carbureter to be mixed with the fuel, and the mixture of fuel and air is withdrawn from the carbureter by suction in the usual manner and conveyed to the burner, or other consuming device.

Preferably the body of liquid fuel is contained in a suitable tank, and a portion, or all, of the parts of the apparatus, from the point where the liquid fuel leaves the tank to the point where it is carbureted to produce the inflammable mixture of air and fuel, is enclosed in a closed safety jacket which serves to collect liquid fuel leaking from these parts of the apparatus. This jacket is so constructed that at least a portion thereof extends upwardly to or above the top of the tank, that is, above the highest elevation which the liquid may assume in the tank, and, preferably, the jacket is vented through a relatively small opening so that if a leak should occur the liquid fuel would rise in the jacket to the level of the fuel in the supply tank. An indicating device is associated with this enclosed jacket so that the presence of a leak will immediately be made known by the rise of the fuel in the jacket, in order that the leak may be promptly repaired.

The invention will be better understood by referring to the accompanying drawings which illustrate, by way of example, and somewhat diagrammatically, the application of the invention to a domestic heating plant. In these drawings

Fig. 1 is a view, partially in section and partially in elevation, showing the arrange-

ment of the apparatus in accordance with the principles of the invention;

Figs. 2, 3, and 4 illustrate several modified arrangements; and

Fig. 5 illustrates a modified form of fuel tank.

Referring to the accompanying drawings, the apparatus comprises, in general, a supply tank 10 for liquid fuel, a carbureter 11 where the mixture of air and fuel is formed, a pump 12 which draws the inflammable mixture from the carbureter 11 and supplies it to the heating boiler or other apparatus 13 in which it is burned. The tank 10 is divided into two compartments 14 and 15 by means of a division wall 16. A body of fuel 17 is contained in compartment 14, the usual filling pipe 18 and vent pipe 19 being provided.

In accordance with this form of my invention, the carbureter 11 is placed within the auxiliary compartment 15 and is in communication with the body of fuel 17 through the conduit 20 which is provided with a hand valve 21 by which the flow of fuel to the carbureter may be cut off in case it is necesary to make repairs to the carbureter. The carbureter 11 being in communication with the fuel compartment near the bottom thereof, the fuel is fed into it by gravity and the carbureter contains a suitable liquid fuel controlling device such as a float valve (not shown) to regulate the quantity of fuel which it is desired to maintain within the carbureter.

An air inlet conduit 22 connects with the casing of the carbureter 11 and extends upwardly through the top of compartment 15 so as to provide a supply of air for the carbureter from the exterior of chamber 15. An outlet pipe 23 also leads from the casing of the carbureter 11 to the pump 12 and is provided with a valve 24 for regulating the suction of the pump. The suction may, however, be regulated by varying the speed of the electric driving motor 25 of the pump. A conduit 26 connects the discharge end of the pump with the burner 27 underneath the heating boiler 13. It will be understood, therefore, that when the pump 12 is operating, it will draw in air through the inlet conduit 22 to the carbureter 11, where this air will be mixed with the liquid fuel in a well understood manner to form an inflammable mixture of a vaporous or gaseous nature. The mixture of air and fuel thus formed in the carbureter is drawn through the pipe 23 by the suction of the pump, thence through the pump, and discharged into conduit 26, which conveys it to the burner 27.

The chamber or jacket 15 for the carbureter is preferably provided with a vent pipe 28 which may conveniently be connected to vent 19 from the fuel compartment 14. The pipes 22, 23, and 28 are arranged to pass vertically through suitable apertures in a removable cover 29 for a manhole, or other suitable opening, in the top of chamber 15, and unions 30 are placed in each of these three pipes so that they may be easily disconnected if desired.

The cover 29 for the top of chamber 15 is secured in place by a sufficient number of bolts, or other fastening means, to render the joint tight. By removing this cover, however, access may be had to the carbureter 11 for repairs, and when it is desired to remove the cover, it will be found convenient to slide it upwardly upon the three pipes 22, 23, and 28. It is through this opening in the top of the chamber 15 that the cut-off valve 21 is actuated.

Because of the presence of the vent 28, if a leak should occur in the conduit 20, valve 21, or the casing of the carbureter 11, liquid fuel would gradually flow through this leak from the fuel compartment 14 and rise in the chamber 15 up to the level of the fuel body 17. This, however, would not interfere with the operation of the carbureter, inasmuch as its air supply is through the inlet 22 from the exterior of chamber 15. It is preferable to carry this pipe to a point above the top of the fuel tank, and usually to about the same height as the vent 19.

Although the presence of liquid fuel in the chamber 15 will not interfere with the operation of the carbureter, its presence there is not desirable because, if a leak should by any chance occur in the walls of the chamber itself, the object of the invention, namely, the reduction of the fire hazard, would be defeated. Consequently, an indicating device, such as a float, or, as shown in the drawings, a gauge 31, is provided in chamber 15, which will immediately indicate the presence of any fuel which has leaked into the chamber. Hence, if a leak should occur in the conduit 20, valve 21, or in the carbureter casing, it will be indicated by the device 31 and the apparatus can be promptly repaired.

In the form of apparatus shown in Fig. 2, the fuel tank 32 has only a single chamber and the carbureter 11 is removed some distance from the tank and enclosed in a tight chamber or jacket 33, which corresponds to chamber 15 of Fig. 1. In this arrangement of the apparatus, a relatively long liquid conduit 34, corresponding to conduit 20 of Fig. 1 and joining the tank with the carbureter, is necessary. In other respects the apparatus is similar to Fig. 1, and operates in the same manner. The degree of protection afforded by this arrangement is somewhat less, however, inasmuch as a large portion of conduit 34 unenclosed by the jacket 33. In installations where

pipe 34 can be protected in other ways, however, this arrangement of the fuel feeding apparatus gives a relatively high degree of protection, inasmuch as provision is made against the leakage from valve 21 and from the carbureter itself.

The apparatus shown in Fig. 3 is similar in all respects to that shown in Fig. 2, except that an additional jacket 35, enclosing the liquid conduit 34 from the point where it leaves the fuel tank to the carbureter, is provided. Jacket 35 may advantageously be secured to the surface of tank 32 by a flanged connection, or by welding, so as to positively ensure that a tight joint is obtained, and, at the other end, conduit 35 may be placed in connection with the jacket 33 (as shown in Fig. 3), or jacket 35 may be made to form a chamber separate from that of jacket 33. In the latter cases a second vent pipe 36 from jacket 35 is necessary. This vent may also be used with the apparatus shown in Fig. 3, although it is not necessary unless the pipe 34 and jacket 35 contain bends or traps (a vent should be made for each trap).

In Fig. 4, I have shown a still further modification of the apparatus in which a jacket 37 is provided for the liquid fuel conduit 34 only, no jacket being used to enclose the carbureter 11. Jacket 37 is vented through a pipe 38 and affords protection against leakage for the entire length of the liquid conduit 34, including the shut-off valve 39.

Referring now to Fig. 5 of the accompanying drawings, there is here shown a modification of the fuel tank illustrated in Fig. 1 having a plurality of compartments. As shown in Fig. 5, the tank 40 is provided at its top with a relatively large manhole, or other opening, 41. A cover 42 is held in place over this opening by appropriate fastening means, and removably secured either to the side of the manhole or the cover 42 there is a receptacle 43. The receptacle 43 is of proper length to extend substantially to the bottom of tank 40, and constitutes a safety jacket, similar to chamber 15, for the carbureter 11 which is contained within it.

The air inlet and outlet conduits 22 and 23, respectively, as well as the vent 28, are provided as in the various other arrangements of the apparatus above described. The liquid fuel inlet to the carbureter 11, however, is of extremely simple construction, and consists of a passageway 44 communicating between the interior of carbureter 11 and the exterior of receptacle 43. It is unnecessary to provide a valve in this passageway. When it is desired to repair the carbureter 11 or a leak to the interior of receptacle 43, it is merely necessary to uncouple the unions 30, and remove the cover 42, after which receptacle 43 is removed from immersion within the body of oil in the fuel tank.

This invention affords a simple and inexpensive means of greatly reducing, or entirely eliminating, the fire hazard attendant with the employment of gravity feed between a fuel tank and a carburetion device. By enclosing the parts of the apparatus from which the danger is most likely to occur in the safety jacket, it is impossible for harm to result from the occurrence of a leak in the system. The occurrence of a leak does not interfere with the operation of the fuel consuming apparatus, inasmuch as, in most of the forms of the apparatus, the supply of fuel to the carbureter is not cut off by the occurrence of a leak, even when leakage is at a relatively high rate. However, the presence of the leak is at once indicated and the apparatus can be repaired in time to prevent any possible loss by fire having its origin in the ignition of fuel leaking from the apparatus.

Although I have chosen to illustrate and describe my invention in connection with a domestic heating outfit, in which the mixture of air and fuel is burned in a furnace, it will be understood that the principles of the invention and the apparatus above described may be equally well utilized where the mixture of air and fuel is fed to some other form of fuel consuming device, such, for example, as an internal combustion engine. Thus the liquid fuel piping and carbureter of a motor vehicle may be provided with the safety jacket of my invention. In such an installation, the fuel tank illustrated in the drawings herein might be either the main fuel supply tank for the motor vehicle, or an auxiliary tank into which fuel is drawn in limited quantities by suction, and from which it is fed by gravity to the carbureter.

I claim:

In a fuel feeding apparatus including a fuel tank, a carburetion device, a fuel consuming device, a conduit for conveying liquid fuel by gravity from the tank to the carburetion device, and a second conduit for conveying a fuel and air mixture from the carburetion device to the consuming device, the combination of a chamber adjacent said fuel tank and enclosing the carburetion device and the liquid fuel conduit to collect liquid fuel leaking therefrom, said chamber having a portion extending upwardly above the highest elevation of liquid in the tank to prevent the escape of liquid from said chamber, and an air inlet for admitting air to the carburetion device from the exterior of said chamber.

In testimony whereof I affix my signature.

JOHN AMBROSE MALONE.