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PRESSURE FEED SYSTEM FOR LIQUID FUEL

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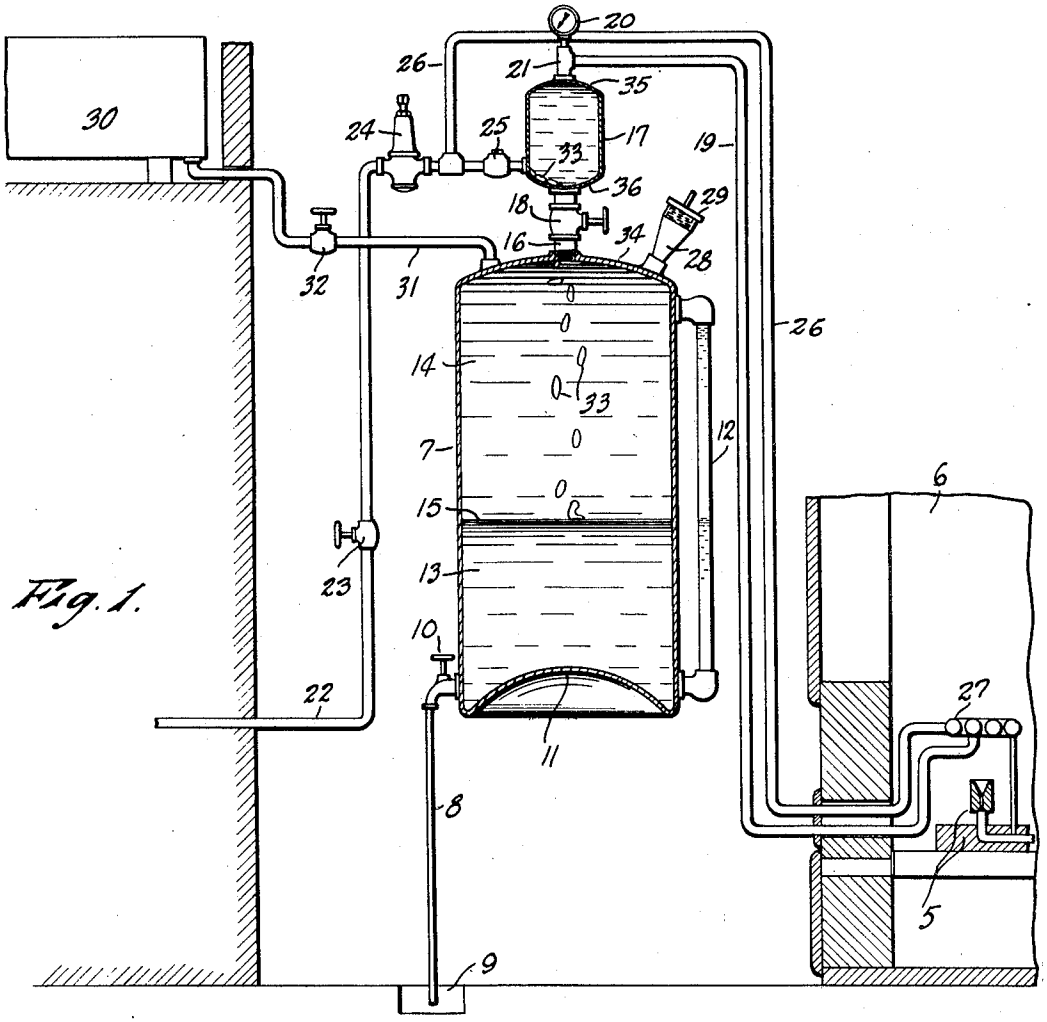

Fig. 1.

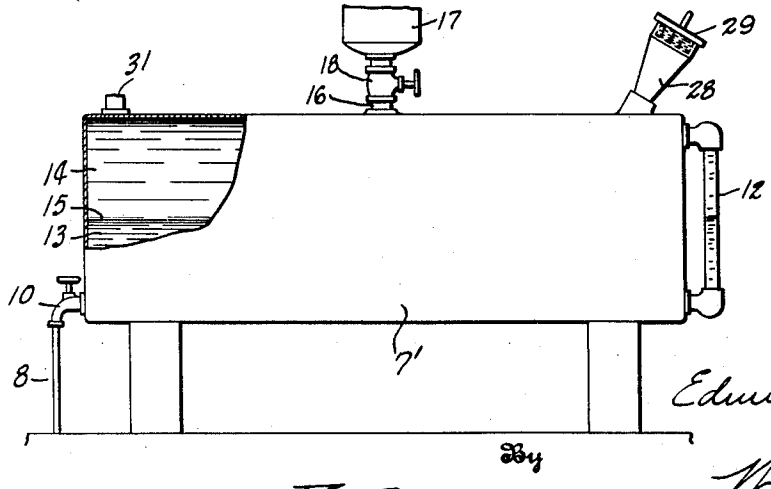

Fig. 2.

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PRESSURE FEED SYSTEM FOR LIQUID FUEL

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2 Claims. (Cl. 210—47)

This invention relates to pressure systems for delivering fuel to burners. It relates more particularly to a system for feeding liquid fuel to oil burners, and has for an object to provide a system which will retain a substantially uniform and constant pressure on the oil being supplied to the burner.

It is also an object of the invention to provide a pressure feed system in which the pressure of the water in the city mains may be employed for feeding the fuel to the burner, and also a particular object is to provide a system in which the feed of fuel to the burner may be continued indefinitely so that it is not necessary to cut off or interrupt the feed of fuel to the burner during charging operations of the system.

It is a further object of the invention to provide a system in which there is practically no danger of the oil mixing with air and thus the safety of the system is greatly increased, and further to provide a system in which the oil is cleaned to thus remove the dirt and sediment from the oil before it reaches the burner to prevent danger of clogging of the burner and also to permit the use of dirty oil.

With these and other objects in view, the invention consists in certain novel features of construction, combinations and arrangement of parts as will be more fully disclosed in connection with the accompanying drawing.

In this drawing

Fig. 1 is a sectional elevation of a fuel feed system embodying my invention, and

Fig. 2 is a partial side elevation and partial section showing the use of a different arrangement for the main pressure tank.

As illustrated in the drawing, the system is shown as used in conjunction with a liquid fuel or oil burner 5 in any suitable type of furnace 6, such, for example, as a house heating furnace or a boiler furnace. As shown, the system comprises a main pressure tank 7 of any suitable size desired, altho ordinarily it is made of a capacity to carry sufficient fuel for any desired length of time, say for example, several days or a week. This tank is provided with a discharge pipe 8 leading from the lower part thereof to any suitable location such as a connection 9 to a sewer, and this pipe is controlled by any suitable valve 10. It is preferred that the lower end 11 of the tank be curved upwardly as indicated so that sediment and dirt in the tank will tend to settle at the outer side walls at the lower end of the tank. It is also preferred that the pipe 8 communicate with the tank at substantially the lowest part thereof so that when the valve 10 is opened to discharge water from the tank, as will later be described, sediment and dirt will be carried out with the water. Any suitable means is provided for indicating the level of water and, therefore, the amount of oil in the tank. In the present instance I have shown a sight glass 12 communicating with the upper and lower parts of the tank, and as the water, indicated at 13, and the oil, indicated at 14, do not mix but remain separated, there is always a clear line of division between them indicated at 15 which will be visible in the sight glass.

Leading from the top of the tank 7 is a pipe 16 communicating with the lower part of a secondary or auxiliary pressure tank 17, and there is a valve 18 in the pipe 16 between the two tanks by means of which the communication may be closed when desired. The tank 17 may be of any capacity desired, but ordinarily it is of a relatively small capacity, say for example a gallon or two, as it is only required to hold sufficient oil to supply the burner while the main pressure tank 7 is being recharged with fuel, as will later be described.

Connected with the upper part of the tank 17 is a discharge pipe 19 leading to the burner 5, and there is a pressure gauge 20 either connected to the tank 17 or the pipe 19 to indicate the pressure on the fuel. A convenient means of mounting is to provide a T fitting 21 connected to the top of tank 17 to a side branch of which the pipe 19 is connected and the gauge 20 connected to the upper branch.

The pressure for feeding the oil to the burner is derived from water under pressure either from a suitable pump or from the city mains. In the present instance, I have shown a water pipe 22 leading from the city mains, not shown, controlled by a suitable valve 23 and leading through an adjustable pressure reducing and regulating device 24 to the tank 17, preferably adjacent the lower part thereof, although not necessarily so, and there is also provided a non-return check valve 25 in this pipe. If steam is to be used in the burner 5, a branch 26 may be led from the pipe 22 between the pressure reducer 24 and check valve 25 to the burner or a steam generating element 27 associated therewith. Liquid fuel may be supplied to the tank 7 by any suitable means. For example, it may be supplied by pouring it in by hand through a funnel inlet 28 connected to the top of the tank and closed by a tight removable closure 29, but it is preferred

that there be provided a storage tank 30 located at any desired position such as under ground outside the house, from which a pipe 31 leads to the upper part of the tank 7 with a valve 32 in this pipe.

In placing the system in operation, after the valve 10 is closed, the tank 7 may be filled with the liquid fuel which may be any desired type of fuel oil, or even dirty crank case oil. During this operation, the valve 18 should be closed, then after the system is filled with oil, with the valve 18 open pressure may be applied to the system by opening the water supply valve 23 which will supply water to the tank 17, and as the water is heavier than the oil, it will pass down through the connection 16 into the tank 7 as indicated at 33. The pressure of this water, therefore, forces the oil into the top of the tank 7 and through the connection 16 into the tank 17 and out through the pipe 19 to the burner. The pressure on the oil is indicated on the gauge 20 and may be regulated by means of the adjustable pressure reducing and regulating device 24. If the burner 5 is a steam burner, using steam for atomizing the oil and drawing air into the burner, the water for generating the steam may be supplied through the pipe 26.

Assuming now the system is in operation, oil will be supplied continuously to the burner by the pressure of the water, and only sufficient water flows into the tanks to take the place of the oil supplied to the burner. Thus, the level 15 of the water in the tank 7 gradually rises and is visible in the sight glass 12. When the level of the water reaches a level adjacent the top of the tank 7, the tank should then be recharged with fuel. This is accomplished by first closing the valve 18 to close off communication between the tanks 7 and 17, and opening the valves 10 and 32. Thus, the water and sediment in the lower part of the tank 7 passes out through the pipe 8 and liquid fuel enters to the upper part of the tank through the pipe 31 maintaining the tank 7 full of liquid at all times so that there is no chance of formation of air pockets in the tank. If desired, fuel may be supplied through the funnel opening 28. After the tank 7 is filled with the desired amount of oil, as indicated by the water level in the glass 12, the valves 10 and 32 are closed and the valve 18 opened. However, during the operation of filling the tank 7 and while the valve 18 was closed the feed of fuel to the burner was not interrupted because there was a certain supply of fuel oil in the tank 17, and as the water pressure was on this tank, the same pressure was maintained on the fuel and it was supplied to the burner in the same manner during the time required to fill the tank 7 as in normal operation. That is, during the time tank 7 was being filled water was flowing into the tank 17 and maintaining the pressure therein to force the fuel to the burner. It is, therefore, only necessary that tank 17 be of relatively small capacity as it is required to have only sufficient capacity to supply the burner during the time the main pressure tank 7 is being filled. During the operation of filling the tank 7, water accumulates in the lower part of the tank 17, and then when the valve 18 is opened after the tank 7 has been filled the water which has accumulated in the tank 17 immediately passes through the connection 16 and through the oil to the lower part of the tank 7. It will thus be seen that the operation of feeding fuel to the burner is a continuous one with a constant and uniform pressure, and the operation of the burner does not have to be interrupted during the time required to fill the main pressure tank as is the case in systems where a single pressure tank corresponding to the tank 7 alone is used.

It is preferred that the upper end 34 of the tank 7 be dome shaped and the conduit 16 connected at the highest part thereof so as to prevent the formation of air pockets, and it is also preferred that the upper end 35 of the tank 17 be dome shaped and the pipe 19 lead from the highest point thereof for the same reasons. It is further preferred that the lower end 36 of the tank 17 be rounded downwardly as indicated to prevent collection of sediment in the lower part of this tank and to facilitate passage of the water from this tank to the tank 7. I have found that the passage of the water down through the oil carries with it dirt and sediment which collects in the lower part of the tank 7 and is carried off through the discharge pipe 8. Thus, the oil is thoroughly cleaned and effectively filtered so that dirt is not carried to the burner for clogging it, and clean oil is supplied at all times. I have found this to be true even when dirty crank case oil was fed to the tank 7. It is preferred that the secondary or auxiliary tank 17 be placed above the tank 7 and connected therewith by a single pipe connection, but this is not absolutely necessary, it being merely required that this tank be so located and so connected to the tank 7 that the water can flow from the lower part of the tank 17 to the tank 7 and that oil can flow from the upper part of the tank 7 to the tank 17.

In Fig. 1 the tank is an upright tank and this arrangement can be used for systems of relatively small capacity, that is for heating small houses and the like, but in larger systems where it is desirable to have greater fuel capacity for the main pressure tank so it will be capable of supplying the system for a desired length of time, it is desirable to use a tank having a greater fuel capacity for the main pressure tank so that it is not required to be refilled so often. For these larger tanks, it may be more desirable to use horizontal tanks rather than upright tanks and I have shown such an arrangement in Fig. 2. Here the main pressure tank corresponding to tank 7 is shown as a horizontal tank 7' of much greater capacity. It is connected at its upper part to the auxiliary tank 17 by the connection 16 controlled by the valve 18, the same as in the first arrangement. A discharge pipe 8 controlled by a valve 10 leads from the lower part thereof for carrying off water, dirt and sediment the same as in the first arrangement, and fuel may be supplied to this tank from a storage tank 30 through a connection 31 as in the first arrangement, or by hand through the filler funnel 28 closed by the filler cap 29. Also the level of water may be indicated to the operator by any suitable means such as the sight glass 12.

It will be apparent from the foregoing description that I have provided a pressure feed system for liquid fuel which will provide a constant and uniform pressure on the fuel by use of water through a connection to the regular city main or any other source of water under pressure; and that this pressure will be maintained indefinitely and, therefore, the burner does not have to be shut off during the operation of priming or filling the main pressure tank,

but on the other hand, the burner is kept in operation continuously. This system also thoroughly cleans the oil, and the danger from fire or explosions is reduced to a minimum because should the operator forget or neglect to refill the tank 7 at the proper time, the system will merely operate until water passes to the burner to automatically extinguish it. Automatic means may be provided to shut off the water when this occurs. The system is also very economical in operation as only sufficient water is required to replace the volume of fuel used in the burner.

Having thus set forth the nature of my invention, what I claim is:

1. In a pressure feed system for liquid fuel burners, a pressure tank for receiving the liquid fuel, a discharge leading from the lower part of said tank, means for supplying liquid fuel to said tank, an auxiliary pressure tank above the first tank, a discharge leading from the upper part of the first tank to the lower part of the auxiliary tank of sufficient size to simultaneously permit water to flow freely from the auxiliary tank to the first tank and liquid fuel to flow freely from the first tank to the auxiliary tank, a control valve in said connection, a water supply pipe leading to the auxiliary tank for continuously feeding water under pressure to the lower part of the auxiliary tank to force liquid fuel from said tank while the main tank is being filled with liquid fuel and also to force said liquid fuel from the main tank to the auxiliary tank after the filling operation, and a discharge pipe leading from the upper part of the auxiliary tank.

2. In a pressure feed system for liquid fuel burners, a pressure tank for receiving the liquid fuel, an auxiliary pressure tank, valve controlled means for simultaneously conducting liquid fuel freely from the upper part of the first tank to the auxiliary tank and water from the lower part of the auxiliary tank to the first tank, means for continuously feeding water under pressure to the lower part of the auxiliary tank to force liquid fuel from said tank while the main tank is being filled with liquid fuel and also to force said liquid fuel from the main tank to the auxiliary tank after the filling operation, and a fuel discharge conduit from the upper part of the auxiliary tank.

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