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FUEL SALVAGE UNIT

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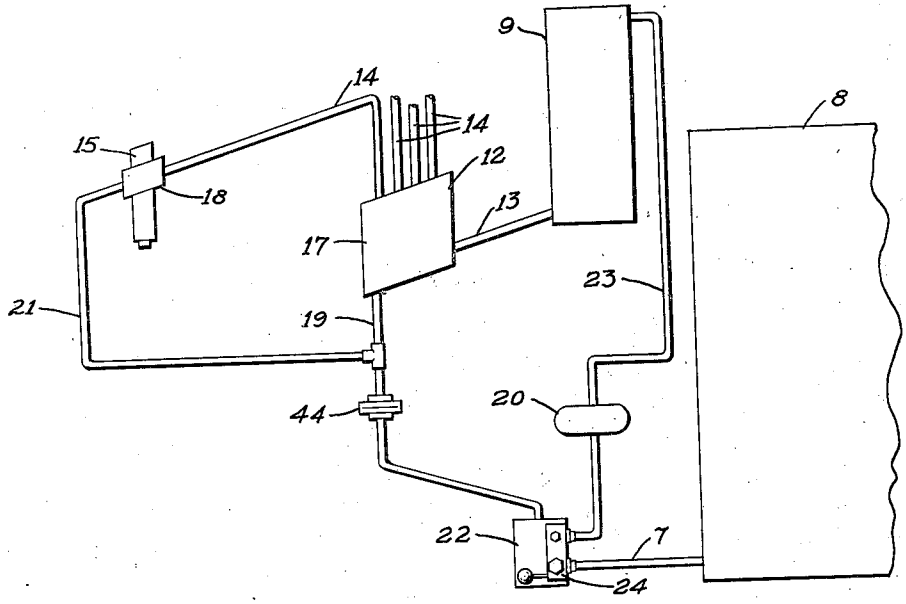


FIG. 1

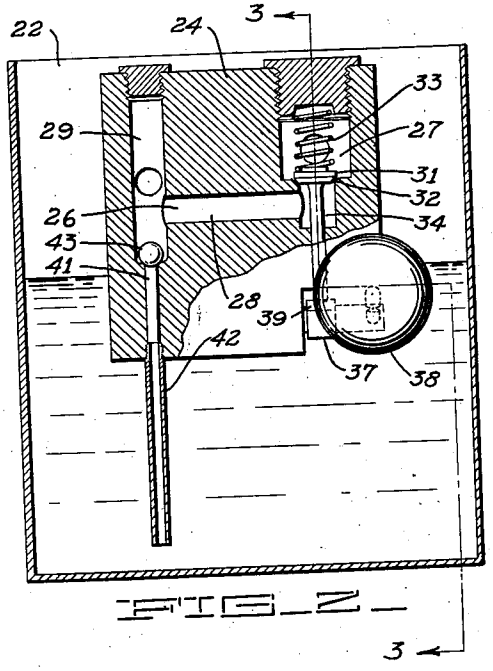


FIG. 2

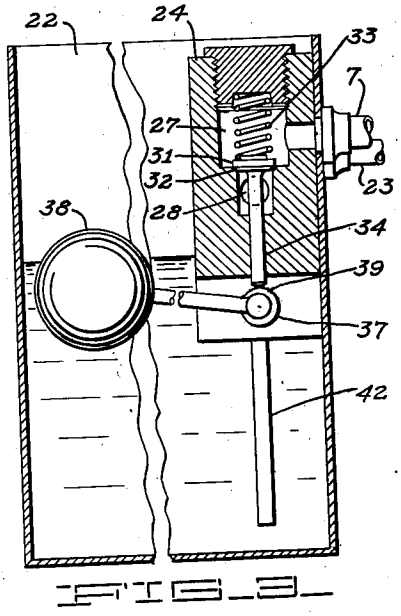


FIG. 3

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## FUEL SALVAGE UNIT

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4 Claims. (Cl. 158—36.3)

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The invention relates to a means designed for use in a fuel supply line, such as for a Diesel engine, to recover and redeliver the fuel which leaks from the fuel receiving members such as the spray valves and pumps.

An object of the invention is to provide a means of the character described, which will redeliver the leakage fuel to the supply line and automatically cut out in whole or in part the supply from the reservoir while the leakage fuel is being utilized.

Another object of the invention is to provide a means of the character described which will redeliver the leakage fuel to the members from which the fuel has been recovered, without necessitating returning the fuel to the supply reservoir or varying the amount of pressure of the fuel delivered.

A further object of the invention is to provide for the recovery and redelivery of the leakage fuel with a very simple means and without entailing any appreciable loss in temperature of the fuel.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

Figure 1 is a diagrammatic representation of a Diesel engine fuel supply system equipped with the means and arranged for use in accordance with my invention.

Figure 2 is a vertical sectional view of the fuel control and distributor member of my invention.

Figure 3 is a transverse vertical sectional view of the member shown in Figure 2, the plane of the section being indicated by the line 3—3 of Figure 2.

In apparatus such as a Diesel engine, many parts are arranged to operate with liquid fuel at relatively high pressures, and frequently in order to permit smooth and easy operation of such parts, it is expedient to permit a certain amount of fuel leakage from the parts. Such leakage of course may entail a waste of fuel, and when the engine is located in a boat, difficulty is met in keeping a clean bilge. It was with the object of rectifying the above condition that the present invention was evolved.

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Briefly my invention as applied to a Diesel engine fuel delivery line, comprises a fuel control and distributor means which is interposed between the fuel supply reservoir and the fuel receiving members such as the fuel pump and spray valve, and has a drain connection with such members for receiving therefrom the leakage fuel, the said means functioning to permit the flow entirely of fresh fuel to said members normally but operating to shut off such flow completely or partially and permit the leakage fuel to be redelivered to said members with or without the fresh fuel when the leakage fuel accumulates to a predetermined amount.

A more detailed explanation will now be given.

As illustrated in Figure 1, the means of my invention is incorporated in a fuel supply or delivery line such as for a Diesel engine (not shown) and such line as here shown includes a pipe 7 extending from a fuel supply tank or reservoir 8, a day tank 9, a fuel pump 12 having an inlet pipe connection 13 extending from the day tank, and one or more outlet pipes 14 from the pump to the different fuel spray valves 15 of the engine cylinders, one only of such valves being indicated.

Enclosing the pump 12, or otherwise positioned in relation thereto, as to catch the fuel leaking therefrom, is a casing 17, and likewise associated with the spray valve 15 is a casing 18 for catching the fuel leaking therefrom. These casings are connected with pipes 19 and 21 respectfully, through which the fuel may be drained from the casings and conveyed to a leakage fuel accumulating tank 22. The day tank 9 is located at a relatively high level and preferably the pipe 13 extends downwardly to the pump, so that any fuel in such pipe, whether normal or leakage, will descend to the receiving member or casing associated therewith.

The pipe 7, as will be clear from Figure 1, is arranged for operative connection with a pipe 23 leading to the day tank 9 and having therein a transfer pump 26 for forcing the fuel to the tank, the said connection between pipes 7 and 23 being effected through means of a fuel control and distributor member 24 which is preferably located directly within the leakage fuel accumulator tank 22. Within the member 24 is a passage 26 having its opposite end portions connecting with the inlet and outlet pipes 7 and 23, and as shown best in Figure 2, such passage includes sections 27 and 29 connected by an intermediate section 28 and associated respectively with ends of the passage connected to the pipes 7 and 23.

Flow of the fuel from pipe 7 through the passage 26 is controlled by a valve 31 which is urged to closed position against a seat 32 by a spring 33. The valve is held in open position by engagement of the stem 34 thereof with a rotatably mounted cam 37, and in such position, the fuel is permitted to flow freely from pipe 7 through the passage sections 27, 28 and 29, and into the pipe 23. This flow of the fuel is for the normal supply from fuel reservoir 8, and means are provided for automatically cutting off or reducing such supply and utilizing the leakage fuel in the tank 22 when a predetermined amount of such fuel has drained into and accumulated in the tank 22. Arranged in the tank 22 and secured to the rotatable cam 37 is a float 38 which is secured to the cam in such relation that when the float is in a depressed position in the tank, such as when the leakage fuel is at a low level therein, the high spot of the cam will be presented to the valve stem so that the valve 31 will be kept fully open, but that when the float is in an elevated position in the tank, such as when the leakage fuel is above a certain level, the float will have rotated the cam to present a depressed portion 39 to the valve stem and thus permit the valve to seat and close the passage against admission of fuel from pipe 7.

The valve 31 and its seat are preferably located in the passage section 27, and in order that the fuel from tank 22 may be introduced into the fuel line and drawn to the fuel receiving members while the valve 31 is closed, a port 41 is provided in the member 24 and arranged to communicate the interior of the tank to the passage section 29 which connects with the outlet pipe 23. The port 41 is connected with a pipe 42 which preferably depends to a point adjacent the bottom of the tank 22. A check-valve in the form of a ball 43 is provided at the top of port 41, and such valve is kept in closed position when the pressure is maintained in passage 26, such as when valve 31 is open, and so prevents entry of the leakage fuel into the passage section 29. On the other hand when valve 31 is moved to closed position, the valve 43 by reason of the fact that the section 29 is on the suction side of the transfer pump 20, is displaced to open position and the leakage fuel in the tank 22 is drawn upwardly through port 41 and section 29 and out into pipe 23 for delivery to the day tank in the same manner as, but in place of or along with the fresh fuel from the reservoir. It has been found in practice that under ordinary conditions the accumulation of fuel in tank 22 is such that the valve will be maintained in a semi-closed position, rather than either a fully closed or open position, and in this manner the leakage fuel will be drawn through the member 24 in small amount but continuously with the fuel directly from the reservoir. In other words, it is only when an abnormal amount of leakage fuel is deposited in the tank 22 or the latter becomes practically empty that the valve 31 is moved to fully closed or fully open positions.

Preferably a filter 44 is provided in the drain pipes to insure that only clean fuel is admitted to the accumulator.

Summarizing the operation of the fuel delivery system as above described, fuel will be delivered from pipe 7 to pipe 23 exclusively in the operation of the engine, so long as the leakage fuel remains below a predetermined level in the accumulator tank. When said level is reached the shut-off valve 31 will by action of the float, be



automatically moved to a sufficiently closed position to cause the suction in line pipe 23 to displace check valve 43 and draw the leakage fuel from the accumulator tank into pipe 23 along with a correspondingly reduced amount of fuel from pipe 7. Should the leakage fuel become exhausted to a predetermined amount, the float will then drop and cause the valve 31 to move to fully open position and the check-valve to closed position. The full flow of fuel from the reservoir will then continue until the leakage fuel again accumulates in tank 22.

It will now be clear that a smooth, uniform, and uninterrupted flow of fuel to the engine will be assured notwithstanding the periodic introduction of the leakage fuel, the cost of operation of the engine will be materially reduced, the engine and the surrounding surfaces will be kept clean, no expensive or complicated parts are required, and no power is taken from the engine for operating the unit.

I claim:

1. In a liquid fuel salvage system, the combination with a fuel reservoir and a fuel supply line including a fuel receiving member and a suction pump interposed between said member and reservoir and having its suction side communicating with the reservoir, a liquid receptacle, a pipe between said member and receptacle for draining fuel from said member, fuel control means including a valve in said line between the suction side of the pump and the reservoir, a fuel passage from said receptacle to said line between said valve and the pump, a valve in said passage designed to move to close said passage when the pressure in said line exceeds the pressure in the passage between the valve and said receptacle and operative to move to open position when the pressure differential is reversed, and a device operating to close or open said first valve respectively as the level of the fuel in the receptacle raises or lowers relative to a predetermined level.

2. In a liquid fuel salvage system, the combination with a fuel reservoir and a fuel supply line including one or more fuel receiving members and a suction pump interposed between said members and reservoir and having its suction side communicating with the reservoir, a liquid receptacle, a means between said members and receptacle for draining fuel from said members and depositing same into said receptacle, a fuel control unit connected in said line and having a passage connecting a portion of the line leading to the suction side of said pump and to the reservoir, a valve in said passage for controlling the flow of the fuel from the reservoir to the pump, a device in said receptacle operating to move said valve to closed or open position in accordance with the elevation or recession of the level of the fuel therein relative to a predetermined height, a fuel passage from the receptacle to said first passage between said valve and pump, and a valve operative to close or open said second passage respectively as the pressure in said first passage becomes greater or lesser than the pressure in the second passage between the receptacle and the second valve.

3. In a liquid leakage fuel salvage system, the combination with a fuel reservoir and a fuel supply line including one or more fuel receiving members and a suction pump interposed between said members and reservoir and having its suction side communicating with the reservoir, a fuel control unit having a passage with one end op-

eratively connecting with said reservoir and the other end with said pump, a valve in said passage to control the flow of fuel therethrough from the reservoir, an accumulator receptacle having a drainage connection with the fuel receiving members, a fuel passage means leading from said receptacle to said unit passage between said valve and the line, a check valve controlling the flow of fuel from said passage means to said unit passage, and a float in said receptacle operative to close or open said valve according to the level of the fuel in the receptacle.

4. In a liquid leakage fuel salvage system, the combination with a fuel reservoir and including a fuel receiving tank and a suction pump interposed between said tank and reservoir, a liquid receptacle for the accumulation of salvage fuel,



a control member mounted in said receptacle and having separate passage sections one of which is arranged for connection to said reservoir and the other of which is arranged for connection with the suction side of said pump, an intermediate passage section connecting said first passage sections, fuel passage means from said receptacle to the passage section connected to the pump, a check valve in said last mentioned passage means controlling the flow of fuel from said receptacle to said last mentioned passage section, a valve in the passage section connected with the reservoir, and a float operatively connected with said second valve arranged to effect the opening and closing thereof as the level of the fuel in the receptacle recedes and raises.

ERNEST V. PARKER.