

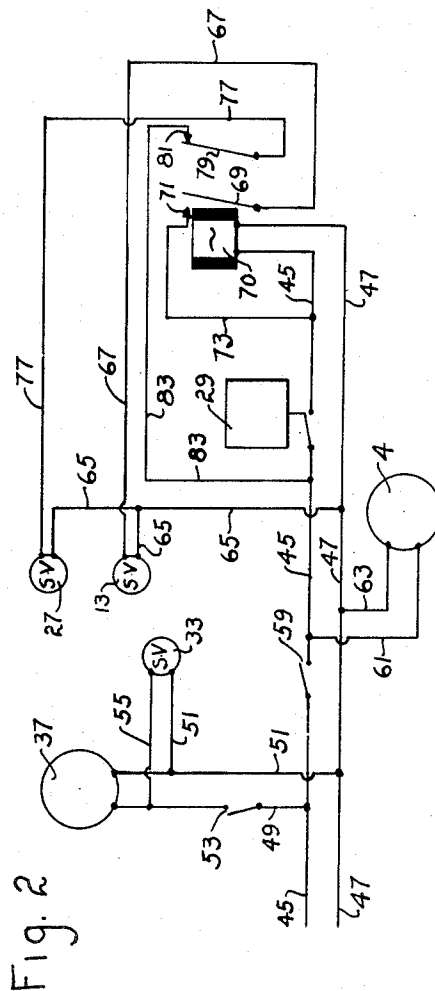
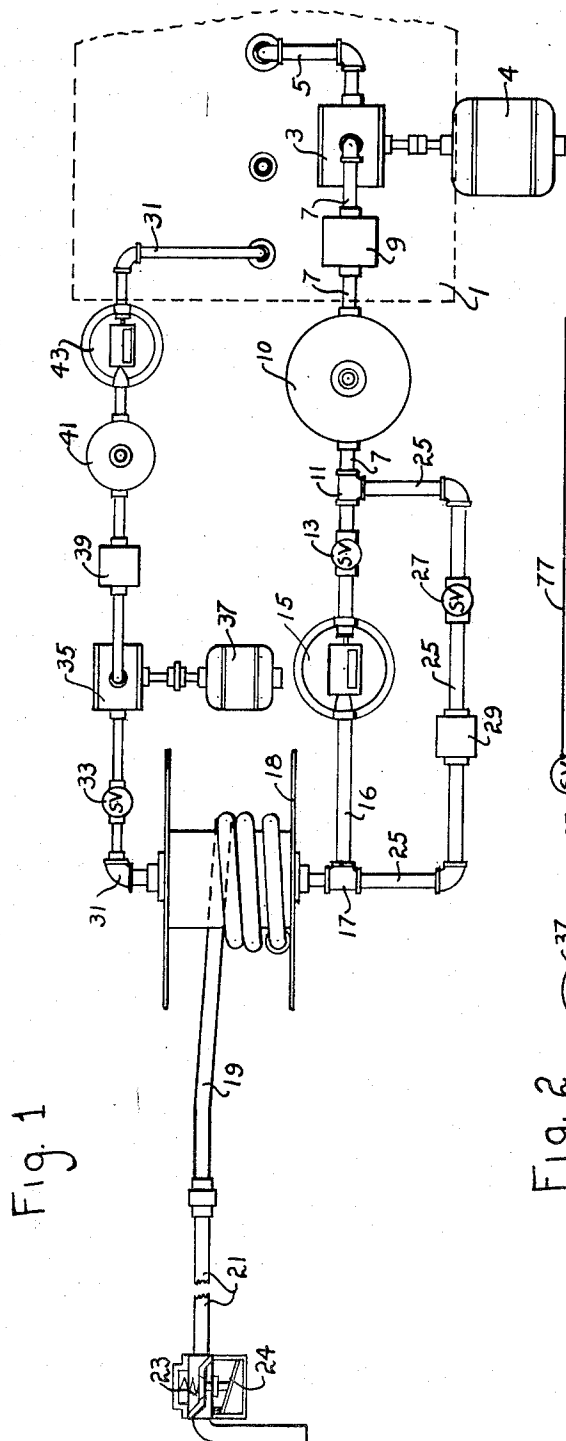
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W. W. HERDERHORST

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FUEL DISPENSING SYSTEM

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WILFRED W. HERDERHORST
INVENTOR.

BY Edmund W. Kamm
ATTORNEY

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FUEL DISPENSING SYSTEM

Wilfred W. Herderhorst, Fort Wayne, Ind., assignor to Bowser, Inc., Fort Wayne, Ind., a corporation of Indiana

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20 Claims. (Cl. 222—72)

This invention relates to a fuel dispensing system. More specifically, it relates to a dispensing system which may be utilized to supply fuel to a vehicle such as an airplane or to remove fuel therefrom, in measured amounts. Further, it is desired to evacuate or partially evacuate the hose utilized in such a system so that it may be more easily handled and to refill the hose, before resuming operations, without affecting the accuracy of the measurements.

It is a further object of the invention to provide a system which is simple but efficient in operation.

Another object is to provide a system which is capable of producing an accurate indication of the fuel dispensed to the vehicle or removed therefrom.

A further object is to provide a system which can be selectively operated to attain the desired function.

These and other objects will become apparent from a study of this specification and the drawings which are attached hereto and are made a part hereof and in which:

Figure 1 is a plan view of the system.

Figure 2 is a wiring diagram showing the electrical controls for the system.

Referring first to Figure 1, the numeral 1 indicates a fuel storage tank. A pump 3 driven by motor 4, has its suction line 5 communicating with the fuel in the tank and its discharge line 7 connected through a strainer 9, air separator 10, T 11, solenoid valve 13, dispensing meter 15, line 16, T 17 and hose reel 18 to a hose 19, 21 which is fitted with the usual nozzle 23 having a valve, not shown, operated by lever 24.

The hose section 19 is of the rigid or non-collapsible type while the hose section 21 is of the collapsible type which will flatten when liquid is evacuated therefrom, much in the manner of the usual pressure, fire hose.

A by-pass line 25 runs around the meter 15 and solenoid valve 13, from T 11 through solenoid valve 27 and pressure switch 29 to T 17.

A defueling and evacuating line 31 runs from hose 19 through reel 18, solenoid valve 33, pump 35, which is driven by motor 37, strainer 39, air separator 41, meter 43 to tank 1.

Wiring diagram (Fig. 2)

The wiring diagram discloses the power mains 45, 47 across which motor 37 is connected by lines 49, 51 which are controlled by switch 53. Solenoid valve 33 is connected in parallel with the motor by lines 55, 57.

A switch 59 is connected in main 45 ahead of motor 4 which is connected across the mains by lines 61, 63. Beyond the motor, a line 65 runs from main 47 to solenoid valves 27 and 13. From the valve 13 a line 67 runs to the armature 69 of a relay 70, while the contact 71 for the armature is connected by wire 73 to main 45.

The other side of solenoid valve 27 is connected by wire 77 to the second armature 79 of the relay, while the corresponding contact 81 is connected by wire 83 to main 45.

The magnet coil of the relay 70 is connected directly across the mains.

A pressure switch 29 is provided in the main between the wire 83 and the wire 73.

In the two-wire system shown the switches are in the "hot" lines although it is obvious that double pole switches may be substituted if desired.

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Operation

We shall assume that the system is shut down and that the hose has been evacuated and wound on reel 18. The operator will first withdraw the required hose from the reel and position the nozzle in the tank. Since the section 21 is collapsed, it is relieved of the weight of the liquid and may be lifted to the wing without great effort.

At the same time, the section 19 is not collapsed so that if only a portion of the full length of the hose is needed, the entire hose need not be unwound from the reel. The collapsed section must, of course be removed.

Switches 53, 59 and 29 are open. The operator will close 59 which will energize motor 4 to start pump 3 and, since armature 79 and contact 81 of the relay are normally closed, normally closed solenoid valve 27 will be energized and opened.

Fuel will then be pumped through lines 7 and 25, hose reel 18 into the hose 19 and 21 and the latter section will be expanded. This fuel is not measured.

As soon as the pressure in the hose reaches a normal operating pressure, which will occur when the hose has been fully dilated, the pressure switch 29 will be closed and the magnet of relay 70 is energized to open switch 81 which closes solenoid valve 27 and closes switch 71 which opens solenoid valve 13.

Fuel is thus diverted from the by-pass line 25 through valve 13 and meter 15. Thus when the nozzle 23 is opened, fuel will flow to the vehicle and the quantity and/or cost will be registered by the meter.

To stop the operation, the operator merely opens switch 59. This deenergizes pump 4 and relay 70, as well as valve 27.

Should it be desired to remove fuel from the tanks of the vehicle, the nozzle 23 is inserted therein and switch 53 is closed. This starts pump 35 and liquid is passed through the hose 19—21 and line 31 to the tank. The quantity of liquid removed is measured by meter 43. Care should be used not to close the nozzle valve while pump 35 is running since this will shut off the supply to the pump and hose will be evacuated. When the nozzle 23 is open the height of the tank is sufficient to supply fuel to the pump under a positive head while the pump is utilized primarily to overcome the pressure drop between it and the tank.

When defueling has been concluded, the meter reading will indicate the quantity and/or cost of fuel removed.

To evacuate the hose, pump motor 37 is started by switch 53 with the nozzle 23 closed. This will remove the liquid from the hose section 21, which is collapsed by air pressure and the hose may be wound upon reel 18.

It will thus be seen that the system described is capable of performing the four required functions of evacuation of the hose, filling of the hose, dispensing and defueling by the manipulation of only two switches.

It is obvious that various changes may be made in the form, structure and arrangement of parts without departing from the spirit of the invention. Accordingly, applicant does not desire to be limited to the specific embodiment disclosed herein primarily for purposes of illustration; but instead, he desires protection falling fairly within the scope of the appended claims.

What I claim to be new and desire to protect by Letters Patent of the United States is:

1. In a fueling system, the combination of a source of fuel, a meter, a supply and a discharge line connected to the meter, said discharge line including a hose terminating in a nozzle, a normally closed valve in the nozzle, a hose storing device, a by-pass line for said meter connected with said supply line and terminating between the meter and storing device, control means in said supply and by-pass lines for diverting fuel from said source either through the meter or through the by-pass to the hose.

2. In a fueling system, the combination of a source of fuel, a meter, a supply and a discharge line connected to the meter, said discharge line comprising a hose terminating in a nozzle, a normally closed valve in the nozzle, a hose storing device, a by-pass line for said meter terminating between the meter and storing device, control

means in said supply and by-pass lines for diverting fuel from said source through the by-pass and means responsive to filling of the hose for actuating said diverting means to close said by-pass and divert fuel through the meter.

3. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a by-pass line connected with the supply line around said meter, a valve in each line, means for creating a flow of fuel in one direction through said lines, and means responsive to the pressure in said supply line for actuating said valves to direct the flow through the meter under certain pressure conditions and through the by-pass under other pressure conditions.

4. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a by-pass line connected with the supply line around said meter, a valve in each line, means for creating a flow of fuel in one direction through said lines, and means responsive to a predetermined pressure in said supply line for opening the supply line valve and closing the by-pass valve.

5. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a by-pass line connected with the supply line around said meter, a valve in each line, means for creating a flow of fuel in one direction through said lines, and means responsive to a pressure below a predetermined pressure in said supply line for opening the by-pass valve and closing the supply line valve.

6. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a by-pass line connected with the supply line around said meter, a valve in each line, means for creating a flow of fuel in one direction through said lines, means responsive to a predetermined pressure in said supply line for opening the supply line valve and closing the by-pass valve, and means responsive to a pressure below said predetermined pressure for opening said by-pass valve and closing the supply line valve.

7. In a fuel dispensing system, the combination of a fuel supply line, including a hose, a meter in said line, a by-pass line connected with the supply line around said meter, a normally closed valve in each line, means for creating a flow of fuel in one direction through said lines, means responsive to changes in the pressure in said supply line for opening and closing said valves in predetermined patterns and additional means for withdrawing liquid from said hose.

8. In a fuel dispensing system, the combination of a fuel supply line, including a hose, a meter in said line, a by-pass line connected with the supply line around said meter, a normally closed valve in each line, means responsive to changes in the pressure in said supply line for alternately opening said valves and additional means for withdrawing liquid from said hose when the valves are closed, including an evacuation line connected to the hose, a pump in said evacuation line and a valve in the evacuation line to control the admission of fuel thereto.

9. In a fuel dispensing system, the combination of a fuel supply line, including a hose, a meter in said line, a by-pass line connected with the supply line around said meter, a normally closed valve in each line, means responsive to changes in the pressure in said supply line for alternately opening said valves in predetermined pattern, means for closing both valves, additional means for withdrawing liquid from said hose with both valves closed, including an evacuation line connected to the hose, a pump in said evacuation line, a valve in the evacuation line to control the admission of fuel thereto and means responsive to starting the pump for opening said admission valve.

10. In a fuel dispensing system, the combination of a fuel supply line, including a hose, a meter in said line, a by-pass line connected with the supply line around said meter, a normally closed valve in each line, means responsive to changes in the pressure in said supply line for alternately opening said valves in predetermined pattern, additional means for withdrawing liquid from said hose, including an evacuation line connected to the hose, a pump in said evacuation line, a valve in the evacuation line to control the admission of fuel thereto and means responsive to starting the pump for opening said admission valve and means for closing said first mentioned valves.

11. In a fuel dispensing system, the combination of a

fuel supply line, a meter in said line, a by-pass line for said meter, a valve in each line, means for supplying fuel to said lines under control of the valves, a relay, means responsive to the starting of the supply means and controlled by the relay for opening the by-pass valve for passing liquid around said meter.

12. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a by-pass line for said meter, a valve in each line, means for supplying fuel to said lines under control of the valves, a relay, means responsive to the starting of the supply means and controlled by the relay for opening the by-pass valve for passing liquid around said meter, means responsive to a predetermined pressure in said supply line to energize said relay and means responsive to the energization of said relay for opening the meter valve and closing said by-pass valve.

13. In a fuel dispensing system, a delivery line including a hose and a meter, a fuel supplying means, means connected to evacuate said hose, means for refilling said hose from said fuel supplying means and means for preventing the actuation of said meter during refilling.

14. In a fuel dispensing system, a delivery line including a hose and a meter, a fuel supplying means, means connected to evacuate said hose, means for refilling said hose from said fuel supplying means, means for preventing the actuation of said meter during refilling and means operable, when the hose is filled, for causing the meter to be actuated when fuel is dispensed.

15. In a fuel dispensing system, a delivery line including a collapsible hose and a meter, a fuel supplying means, means connected to evacuate said hose, means for refilling said hose from said fuel supplying means and means for preventing the actuation of said meter during refilling.

16. In a fuel dispensing system, a delivery line including a hose and a meter, a fuel supplying means, means connected to evacuate said hose, means for refilling said hose without actuating said meter and means operable, when the hose is filled, for causing the meter to be actuated when fuel is dispensed, comprising means responsive to pressure in said delivery line.

17. In a fuel dispensing system, a delivery line including a hose and a meter, a fuel supplying means, means connected to evacuate said hose, means for refilling said hose from said fuel supplying means and means for preventing the actuation of said meter during refilling.

18. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a register driven by the meter, a by-pass line connected with said supply line around said meter, means for creating a flow of fuel in one direction through said lines, a by-pass valve in the by-pass line, means for preventing operation of said register and means responsive to a predetermined pressure in said supply line for closing said by-pass valve and rendering said preventing means ineffective.

19. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a register driven by the meter, a by-pass line connected with said supply line around said meter, means for creating a flow of fuel in one direction through said lines, a by-pass valve in the by-pass line, means for preventing operation of said register and means responsive to a predetermined pressure in said supply line for opening said by-pass valve and rendering said preventing means effective.

20. In a fuel dispensing system, the combination of a fuel supply line, a meter in said line, a register driven by the meter, a by-pass line connected with said supply line around said meter, means for creating a flow of fuel in one direction through said lines, a by-pass valve in the by-pass line, means for preventing operation of said register and means responsive to a predetermined pressure in said supply line for closing said by-pass valve and rendering said preventing means ineffective and responsive to a predetermined pressure lower than the first-named pressure for opening said by-pass valve and rendering said preventing means effective.

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