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FUEL CONDITIONING DEVICE

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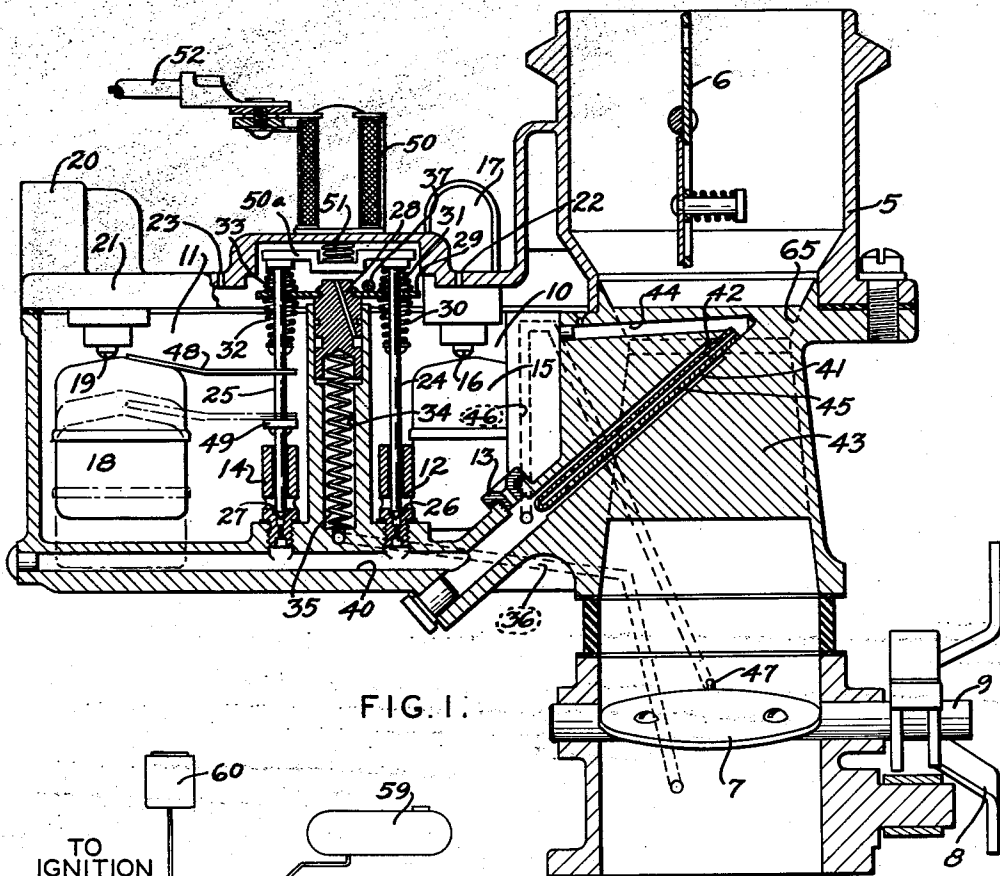


FIG. 1.

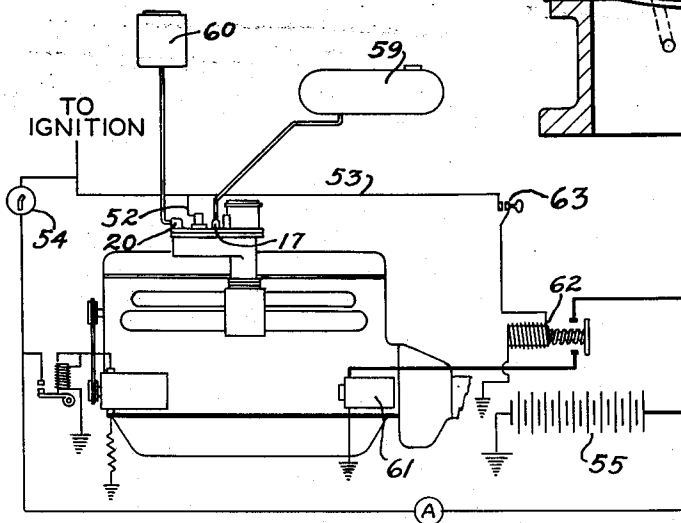


FIG. 2.

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FUEL CONDITIONING DEVICE

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6 Claims. (Cl. 123-127)

This invention relates to internal combustion engines and consists particularly in novel means for supplying two fluids, such as a hydro-carbon fuel and a fuel conditioning substance as tetra-ethyl lead, water or the like, to the engine.

Where two such fluids are supplied to the main nozzle of the usual automotive carburetor, a connection exists between the fluid supply chambers below the liquid level which will cause mixing of the fluids when the engine is inoperative. This is undesirable as it circumvents the metering means by which the proper blending of the fluids is obtained. Another disadvantage in such an arrangement would occur in case the auxiliary substance were drained from its reservoir which may permit air to be drawn therefrom into the engine thus bleeding the mixture. This may adversely affect the engine operation even to the point of causing burning of the exhaust valve.

The object of the present invention is to provide an engine fuel system with means for supplying properly proportioned quantities of two different fluids, while preventing mixing of the fluids when the engine is inoperative.

Another object is to provide means for supplying two fluids in properly proportioned quantities to an engine, while avoiding the possibility of drawing air from one of the fluid reservoirs into the engine in case the fluid in that reservoir is drained.

A more detailed object is to provide means for preventing mixing of two fluids, both connected to the main fuel nozzle, when the ignition system is cut off.

These objects and other more detailed objects hereafter appearing are attained by the structure illustrated in the accompanying drawing in which

Fig. 1 is a vertical section illustrating an automotive carburetor embodying the invention.

Fig. 2 is a side view of an automotive engine and illustrates the fuel and ignition systems diagrammatically.

The carburetor in Fig. 1, in general of a well known type, comprises a downdraft mixture or induction conduit 5 having an air inlet at the upper end controlled by a choke valve 6 and a fuel outlet at the lower end controlled by a throttle valve 7. The throttle is operated by a lever 8 rigid with throttle shaft 9. Adjacent the induction conduit are a pair of constant level liquid chambers 10 and 11 having outlet metering orifice elements 12 and 13 and 14, respectively.

A float 15 in chamber 10 operates a needle valve

16 controlling liquid inlet 17 in a manner to maintain a substantially constant level of liquid in the chamber. A float 18 in chamber 11 controls needle valve 19 in fluid inlet 20 in a manner, similarly, to maintain a constant level of liquid. Bowl cover 21 is provided with vents 22 and 23 so that atmospheric pressure exists in chambers 10 and 11.

Main orifice element 13 is constantly open. Orifice elements 12 and 14 are controlled by metering pins or valves 24 and 25 having pointed lower extremities adapted to close valve seats 26 and 27 in the metering orifice elements when the pins are fully lowered. These metering pins are carried and operated by a suction controlled plunger 28 having a cross bar 29 yieldingly connected to the valves through inter-posed coiled springs 30, 31, 32 and 33. Plunger 28 works in a cylinder 34 and is constantly urged upwardly in a direction to open the metering pins by a coiled spring 35. A stop 37 limits the upper movement of bar 29 and the plunger. A suction passage 36 connects cylinder 34 to the outlet portion of induction conduit 5 posterior to throttle 7.

Chamber 10 is intended to receive gasoline and chamber 11 is for storing a quantity of conditioning fluid, such as tetra-ethyl lead, water, or the like. Step-up metering pin 24 controlling a part of the gasoline supply is suction operated so as to enrich the mixture when relatively low suction exists in the carburetor outlet and to lean out the mixture when high suction exists therein. The conditioning compound, in the present instance, is intended to be supplied only when the engine is operating under load, so as to reduce the detonation or knocking thereof. Metering pin 25 is opened at periods of low suction in the carburetor outlet and is closed at other times. Springs 30 and 32 permit overtravel of plunger 28 after valves 24 and 25 have seated.

Metering orifice elements 12, 13, and 14 are connected to the induction conduit by a cross passage 40 and main nozzle 41 which opens into the mixture conduit through lateral ports 42 in jet bar 43 traversing Venturi tube 65. An air bleed is provided by means of a passage 44, opening into the upper portion of constant level chamber 10, and a perforated bleed tube 45. Idling fuel is supplied by a passage 46 extending from the lower portion of main nozzle passage 41 to a port 47 in the wall of the induction conduit adjacent the throttle valve when closed.

In order to prevent the drawing of air into the main nozzle from chamber 11 in case this chamber should be drained of conditioning fluid, an

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arm 48 projects laterally from float 18 and is disposed to engage a shoulder 49 on metering pin 25 when the float drops, as indicated in broken lines. This closes valve 25 on outlet seat 27. Spring 33 yields at such time so that pin 25 may seat independently of plunger 28.

When the carburetor is inoperative, metering pins 24 and 25 are urged upwardly by relatively heavy spring 35. However, this would permit mixing of the liquid in chambers 10 and 11 through the outlet orifices and cross passage 40. To prevent this, an electromagnet 50 is mounted on top of the bowl cover and provided with an armature 50a constantly urged downwardly by a coil compression spring 51 which is stronger than spring 31 and 33 so as to normally close pins 24 and 25 against the latter. Space is provided between plunger 28 and the armature, in their normal positions, to permit such seating movement of the pins. Magnet 50 is connected by a lead 52 to the hot side of the ignition system, the other end of the magnet coil being grounded. As shown in Fig. 2, lead 52 connects to a wire 53 which connects with ignition switch 54 and the negative terminal of battery 55. Gasoline tank 59 is connected to inlet 17 and tank 60, for conditioning fluid, is connected to inlet 20, both for gravity flow. However, liquids may be supplied from tanks 59 and 60 by suitable pumps. The diagram also illustrates a starter motor 61 operated from the battery through solenoid 62 and starter switch 63.

By means of the arrangement shown, opening of ignition switch 54 permits dropping of armature 50a and closing of valves 24 and 25. This effectively prevents mixing of the liquids as the conditioning liquid is supplied only when both outlets are opened and the fuel and conditioning fluid are being drawn through the main nozzle.

Also, in case of draining of chamber 11, valve 25 is cut off to prevent the drawing of air through valve seat 27 into the main nozzle. When the ignition circuit is closed armature 50a is picked up to release valve pins 24 and 25 for suction operation.

The invention may be modified in various respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In an internal combustion engine, an induction conduit, a pair of separate fluid chambers each having an outlet, normally open metering valves controlling said outlets, passage means connecting said outlets to said induction conduit, an ignition system, and means responsive to opening of said system for operating one of said valves to close the corresponding outlet.

2. In an internal combustion engine, a mixture conduit, a pair of separate fluid chambers each having an outlet, engine suction operated metering valves for said outlets, passage means for connecting said outlets to said mixture conduit, an ignition system, and means responsive to opening of said system for operating one of said valves to cut off the corresponding outlet.

3. In an internal combustion engine, an induction conduit, a pair of separate fluid chambers each having an outlet, metering valves for said outlets, engine suction operated means hav-

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ing lost motion operative connections to said valves for operating the same, passage means connecting said outlets to said induction conduit, a float in at least one of said chambers for controlling the level of fluid therein, and an operative connection between said float and the metering valve in said last mentioned chamber for closing said valve responsive to excessive lowering of the level in said chamber irrespective of said suction means.

4. In an internal combustion engine, an induction conduit, a pair of separate fluid chambers having outlets, a passage connecting said outlets to said induction conduit, a normally open valve for one of said outlets, a float in the corresponding chamber for controlling the normal level of fluid therein, an ignition circuit, means for operating said valve by said float to close the corresponding outlet upon excessive lowering of the fluid level in said last-mentioned chamber, and means for closing said valve responsive to opening of said ignition circuit.

5. In an internal combustion engine, an induction conduit, a pair of separate liquid chambers each having an outlet, a valve for each outlet, a spring normally maintaining said valves open, a single passage joining said outlets below the working liquid level in one of said chambers and extending to said induction conduit, a float in each of said chambers for maintaining the liquid level therein substantially constant, an operative connection between one of said floats and the corresponding valve for closing said valve when the liquid level drops excessively, an ignition circuit, and means for closing said last mentioned valve responsive to opening of said system.

6. In an internal combustion engine, an induction conduit, a pair of separate liquid chambers each having a metering orifice element, a main fuel nozzle discharging into said induction conduit, connections between said nozzle and said orifice elements below the working liquid level in one of said chambers, normally open metering valves for controlling said orifice elements, an operative connection between one of said floats and the corresponding metering valve for closing the same upon excessive lowering of the liquid level to prevent drawing of air from said last mentioned chamber into said nozzle, an ignition circuit, and means for closing both of said metering valves responsive to opening of said circuit.

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