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FUEL FEEDING DEVICE FOR VEHICLES AND AIRPLANES.

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1,338,323. **Patented Apr. 27, 1920.**

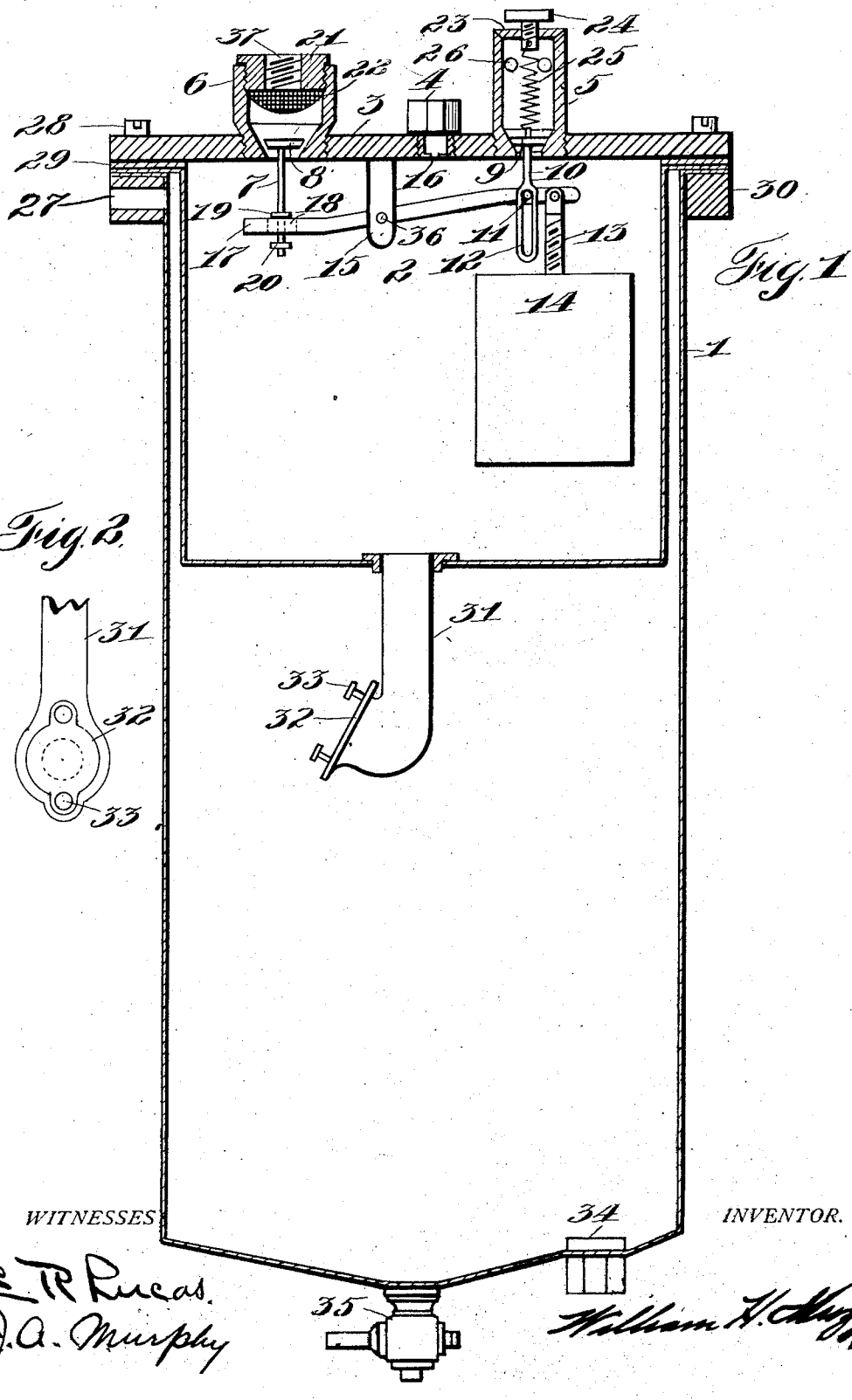

Fig. 1

Fig. 2.

WITNESSES

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FUEL-FEEDING DEVICE FOR VEHICLES AND AIRPLANES.

1,338,323. Specification of Letters Patent. Patented Apr. 27, 1920.

Application filed December 13, 1917. Serial No. 206,902.

To all whom it may concern:

Be it known that I, WILLIAM H. MUZZY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful improvements in Fuel-Feeding Devices for Vehicles and Airplanes, of which I declare the following to be a full, clear, and exact description.

This invention relates to improvements in fuel feeding systems for automobiles or the like and has more particular relation to improvements in devices of the character shown and described in my co-pending application Ser. No. 206385 for patent filed on the 10th day of December, 1917.

One of the several objects of the invention is to provide improved means in vacuum systems of the type mentioned for intermittently pumping gasolene from the rear main tank to an elevated tank and then admitting atmospheric pressure to the elevated tank to allow the gasolene to descend and be fed to the carbureter of the engine.

Another object of the invention is to provide improved means for cutting off the feed of gasolene from the main tank to the elevated tank when the latter is filled to its maximum level and at the same time opening the elevated tank to atmospheric air pressure.

A further object of the invention is to provide means for a correlated operation of parts for stopping the feed of gasolene to an elevated tank and admitting atmospheric pressure thereto.

Another object of the invention is to utilize the moving volume of fuel between the main tank and the elevated tank to impart a ram like blow to a closing cut off and thus snap an atmospheric valve off its seat against the suction of the tank, and admit atmospheric pressure to the tank as the cut off closes.

Another object of the invention is to provide an improved float and connections in a vacuum tank for governing, without operating, a cut off valve and an atmospheric valve.

In carrying these and other objects of the invention into effect I utilize certain constructions, combinations and arrangements of parts all of which will be hereinafter more particularly set forth and claimed.

In the accompanying drawings forming part of this specification;

Figure 1 represents a central vertical section through a vacuum fuel feeding tank and connections embodying my invention, and

Fig. 2 represents a detail front elevation of the flap valve.

In general terms the invention may be said to operate by the vacuum created in the manifold of the engine of the machine and which is transferred to my tank to draw the gasolene from a relatively low main fuel tank in intermittent pumping operations as described in my said co-pending application and also described in my Patents No. 1,201,077 issued Oct. 10, 1916, and No. 1,222,235, issued Apr. 10, 1917, and reference is made to these patents for any detail description of the general operation of tanks of this type. After being drawn into the elevated tank the gasolene is let down intermittently into a lower compartment where it is held under atmospheric pressure and fed to the carbureter of the engine by gravity.

In the aforesaid drawings 1 represents the outer tank or shell, 2 the vacuum tank or chamber, 3 the sealing cover of the same, 4 the air suction fitting for connection to the engine manifold and 5 the atmospheric valve cage.

The tank 1 is of cylindrical construction and is provided at its lower end with a fitting 34 for attachment of the pipe leading to the carbureter and a drain cock 35 for drawing off sediment and water. The upper end of the tank is formed with an outwardly turned flange which is secured to a ring 30 having an air vent passage 27 for admitting air to the tank 1. The tank 2 at its upper end is also provided with a similar flange which rests upon the flange of the tank 1, the parts all being secured together by screws 28, with a packing washer 29 of cork interposed between the flange of the tank 2 and the top 3. The tank 2 is thus closed air tight.

The contents of the tank 2 are discharged by gravity through a pipe 31 and a flap

valve 32 into the tank 1, the valve 32 being held in position on its seat by headed screws 33. This valve allows the passage of gasolene or air in one direction only and closes on its seat during the pumping operation.

A short lever 17 is pivoted as at 36 on a lug 15 pendant from the top 3. This lever supports a cork float 14 pivotally secured thereto by an adjusting screw 13. The opposite end of the lever is apertured as at 18 to permit the passage of a valve stem 7 carrying a valve 8 at its upper end and provided with two limiting stops 19 and 20 with which the lever contacts when moving in opposite directions. The valve cage 6 screws into the plate 3 and is formed with a valve seat 22 upon which the valve 8 seats when in its lower position and thus prevents any further gasolene passing into the chamber 2. A strainer 21 is secured in the cage 6 by an attaching nut 37 which also forms the attaching member for the pipe which connects it to the main supply tank.

The atmospheric valve 9 is carried by a stem 10 having an elongated slot 12 through which a pin 11, mounted on the lever 17, projects. The valve 9 seats upon a valve seat formed in the lower end of the cage 5, which latter is screwed into the top 3. The valve 9 normally tends to move upward under the impulse of a coil spring 25 which connects it to an adjusting screw 24 mounted in a disk 23 which loosely sets upon the top of the cage. By this means the disk 23 may be rotated and the tension of the spring 25 adjusted without rotating the valve 9. Apertures 26 are formed in the cage 5 to permit the free passage of air.

The attachment 4 which is suitably connected to the manifold of the engine is provided with a reducing port 16 of much less area than the port covered and uncovered by the valve 9.

The operation of the parts is as follows:

When the float 14 is in its lower position the pin 11 contacting with the lower wall of the slot 12 draws the valve 9 down upon its seat against the tension of the spring 25 and the suction in the chamber 2 holds it there after the float rises. As the gasolene is drawn from the main tank into the tank 2 through the cage 6 the float 14 rises and gradually draws the valve 8 downward until the maximum level has been reached when the valve 8 will have been brought into such a position as to fall under the influence of the suction in the chamber 2 and the impact of the fuel seeking to enter the chamber 2 with the result that the valve will be forced down upon its seat with a ram like snapping action altogether independent of the movement of the float 14. As a matter of fact the float is partly lifted by this action which is like a hammer stroke and can be distinctly heard outside of the tank. I take advantage of this peculiar hammer stroke to snap the valve 9 off of its seat against the vacuum suction in the chamber 2. After the valve is off its seat it is drawn upward out of the influence of the suction by the spring 25 and the air passing in through the cage 5 relieves the vacuum in the chamber 2 and allows the fuel therein to flow through the pipe 31 into the tank 1. The valve 9 is permitted to spring upward independently because of the slot and pin connection 11 and 12. As the float 14 descends the valve 9 is gradually drawn downward until it again seats under the action of the air passing into the chamber 2 and is held on its seat by this suction when the float again rises, when the above action is again repeated. When the tank becomes full the float 14 remains in its upper position until sufficient gasolene has been used to cause the tank to again resume its pumping operations.

Heretofore floats have been used for opening atmospheric valves in vacuum tanks of the class herein described, such floats either being of sufficient size to force the valves off their seats because of the buoyancy of the float, or to put spring devices under tension for snapping the valves off their seats, but as far as applicant is aware he is the first to employ either the suction itself or the ram like action of the moving fuel to disengage an atmospheric valve from its seat against the operation of such suction. It will of course be understood that while I have shown a certain lever arrangement between the two valves, the fulcrum of the lever may be moved as desired so that the suction on the valve 8 would always give sufficient of a hammer blow on the valve stem 10 to disengage atmospheric valve 9 from its seat and allow it to snap upward. When the blow is delivered it will be understood that the pin 11 moves freely and quickly in the slot 12 until it strikes the upper wall of the slot when the valve 9 will be forced off its seat.

It will be seen from the above that while the float sets the valve 8 for operation, it is not of sufficient size by itself to force the valve 9 open by straight pressure, and the only way this valve could be opened is by the hammer blow delivered to it from the valve 8 through the lever 17. The float may be thus said to set the parts for operation, but the real action is effected by the suction on the valve 8 and the impact of the fuel on this valve. This last is no slight force as it has back of it all the moving liquid in the pipe connecting the main tank to the cage 6.

I do not wish to limit myself to any specific mechanism for utilizing the suction in the tank or the impact of the moving fluids for accomplishing the desired result as I believe I am the first to utilize such elements in this way.

It will of course be understood that the suction port 16 remains constantly open and that what gas accumulates in the chamber 2 is fed constantly to the engine without any break or interruption such as might interfere with the proper operation of the engine. The float 14 is also of such small size as to be cheap and be readily manufactured without being built up from cemented laminations which separate under the disintegrating influences of the gasoline.

The whole operation is simple and effective and not subject to any disarrangement from road jars of the machine.

The operation of the valve 8 it will be observed prevents any overflow of the chamber 2 either from overpumping or because of the main tank being moved to an elevation above the vacuum tank as when descending a steep grade, or if employed on an air-plane when a vol-plane is being made.

It will also be understood that the invention is not limited to use of automobiles as it can equally well be employed on air-planes, boats or any other vehicles.

It will be understood that the valves 8 and 9 counterbalance each other as far as atmospheric pressure is involved as the pressure is practically the same whether it is direct from the air onto valve 9 or indirectly on the valve 8 through the gasolene entering the inlet port. The valve 9 is thus practically relieved of the atmospheric pressure which holds it closed when the valve 8 approaches its seat and falls directly under the influence of the vacuum in the vacuum chamber.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a fuel feeding system the combination with an elevated tank having a vacuum chamber and a supply chamber, of a vacuum pipe connected to the vacuum chamber, a supply pipe also connected to the vacuum chamber, a cut-off for the supply pipe; an atmospheric valve operating in conjunction with the cut-off, and connections between the atmospheric valve and the cut-off, said valve, cut-off, and connections being arranged to counterbalance the atmospheric pressure on said valve and cut-off.

2. In a fuel feeding system, the combination with an elevated tank having a vacuum chamber, of a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected with the vacuum chamber; means exposed to atmospheric pressure for cutting off the fuel supply, and devices operated by the atmospheric pressure transmitted through said means for opening the chamber to the atmosphere.

3. In a fuel feeding system the combination with an elevated tank having a vacuum chamber, of a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected to the vacuum chamber, a cut off for the fuel supply, an atmospheric valve operated for opening by the closing movement of the cut-off, and a float connected with the cut-off for initiating said closing movement.

4. In a fuel feeding system the combination with an elevated tank having a vacuum chamber, of a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected to the vacuum chamber, a cut off for the fuel supply operated by the moving fuel and an atmospheric valve operated in closing direction by the cut-off.

5. In a fuel feeding system the combination with an elevated tank having a vacuum chamber, of a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected to the vacuum chamber, a cut off for the fuel supply position for being closed by atmospheric pressure and an atmospheric valve operated for opening by the closing movement of the cut-off.

6. In a fuel feeding system the combination with an elevated tank having a vacuum chamber, of a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected to the vacuum chamber, a cut-off valve for the fuel supply closing in the direction of the inward flow of the fuel, an atmospheric valve operated by the cut-off valve, and a float in the vacuum chamber for bringing the cut-off valve into the active path of the fuel whereby it is snapped closed.

7. In a fuel feeding system the combination with an elevated tank having a vacuum chamber and a supply chamber, of a valve between the two chambers, a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected to the vacuum chamber, a cut-off valve for the supply pipe, an atmospheric valve for the vacuum chamber, operated for opening by the closing movement of the cut-off valve, and means for initiating said closing movement of the cut off valve by the rise of the liquid to a predetermined high level in the vacuum chamber.

8. In a fuel feeding system the combination with an elevated tank having a vacuum chamber and a supply chamber, of a valve between the two chambers, a vacuum pipe connected to the vacuum chamber, a fuel supply pipe also connected to the vacuum chamber, a cut-off for the supply pipe positioned for being closed by the inflow; an atmosphere inlet valve for the vacuum chamber; devices loosely connecting the cut-off and the atmosphere inlet valve for opening the latter by the closing movement of the former, whereby the cut-off moves through a limited distance and the moving parts acquire momentum before the atmosphere inlet valve is attacked by said movement for

opening it, and a hammer blow is thus delivered for causing the opening movement of the atmosphere inlet valve.

9. In a fuel feeding system the combination with an elevated tank having a vacuum chamber and a supply chamber, of a valve between the two chambers, a vacuum pipe connected to the vacuum chamber, a supply pipe also connected to the vacuum chamber, a cut-off valve for the supply pipe, an atmosphere valve operated by connections from the cut-off valve; means for lost motion in said connections, means for moving the atmosphere inlet valve for opening through the range of said lost motion, the cut-off valve being adapted to be seated by the inflow and atmospheric pressure after its seating movement has been initiated, and means for initiating such seating movement; the operating connections between the cut-off valve and the atmosphere inlet valve causing a lost motion connection with the atmosphere inlet valve; and means for initiating said seating movement of the cut-off valve operating within the range of said last mentioned lost motion.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM H. MUZZY.

Witnesses:
E. R. LUCAS,
J. A. MURPHY.