

June 5, 1923.

1,457,721

A. M. WOLF

LIQUID FEEDING SYSTEM

Original Filed May 5, 1917

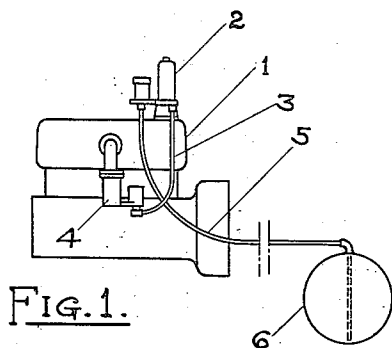


FIG. 1.

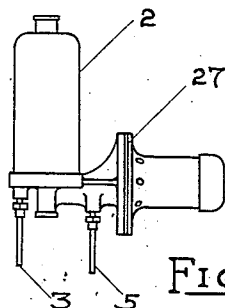


FIG. 3.

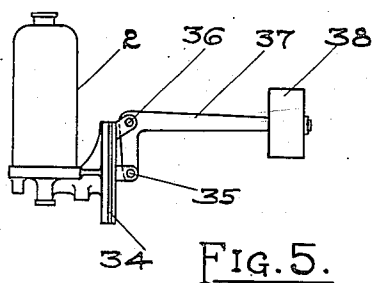


FIG. 5.

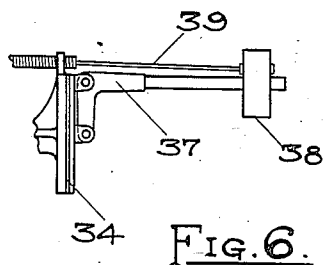


FIG. 6.

WITNESSES:
William Schuch
Everett A. Gowdy

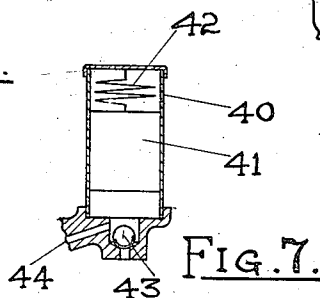


FIG. 7.

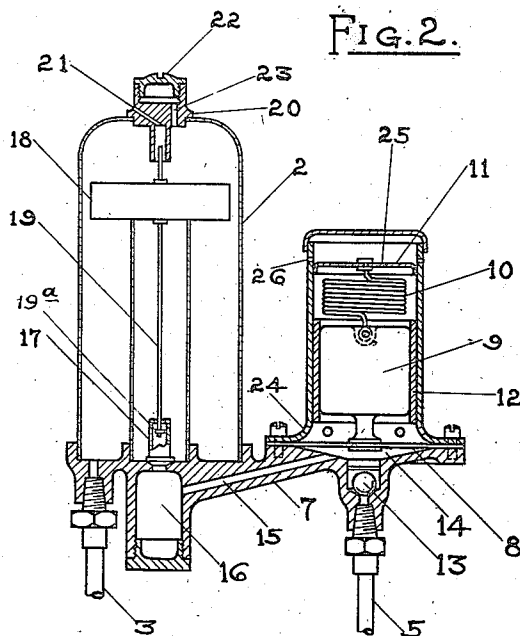


FIG. 2.

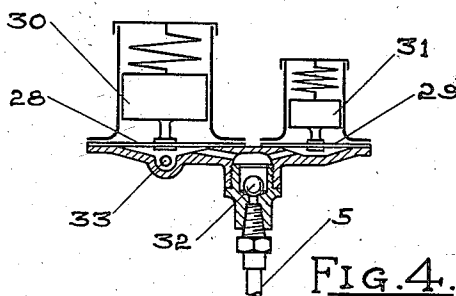


FIG. 4.

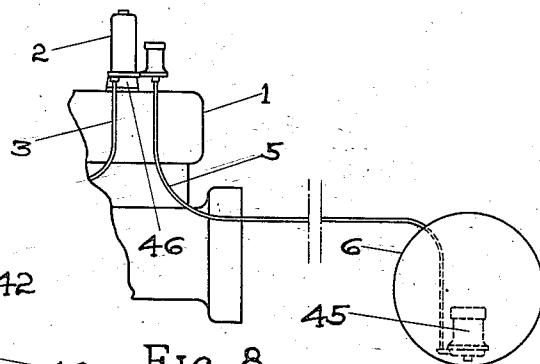


FIG. 8.

INVENTOR.
Austin M. Wolf.

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UNITED STATES PATENT OFFICE.

AUSTIN M. WOLF, OF PLAINFIELD, NEW JERSEY.

LIQUID-FEEDING SYSTEM.

Application filed May 5, 1917, Serial No. 166,574. Renewed July 12, 1922. Serial No. 574,541.

To all whom it may concern:

Be it known that I, AUSTIN M. WOLF, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Liquid-Feeding Systems, of which the following is a specification.

My invention relates to devices designed to supply a liquid fuel to an internal combustion engine in which the supply of fuel is at a lower level than the carburetor or vaporizing device of the engine and, therefore, requires elevating the fuel to a higher level.

At the present time there is in existence the vacuum system of supplying fuel to a tank elevated above the carburetor level, the suction in the intake pipe being utilized for this purpose. The disadvantages of this method lies in the fact that air is allowed to go into the intake manifold, thereby upsetting chiefly the low speed carburetor adjustment. Should the motor be adjusted for idling position, without such a device, it is impossible to have it idle at the same low speed with the vacuum supply tank attached. Another kind of feed system is one in which there is a diaphragm which is operated upon by the pressures within the engine cylinder. The disadvantage of this method is that the compression volume of the cylinder is increased and the diaphragm is not able to stand up for a long period under the influence of the heat that is conducted to it from the engine.

In order to overcome these objections and to obtain a device which would in no way influence the operation of the engine, I will proceed to describe my invention.

In the accompanying drawings, Fig. 1 shows the device installed on an engine; Fig. 2 is a cross section of the device with a vertical pumping element; Fig. 3 shows the device with a horizontal pumping element; Fig. 4 shows a unit comprising a plurality of pumping elements; Figs. 5, 6, and 7 show possible modifications of the device and Fig. 8 shows the use of a plurality of pumping elements located in different places.

Referring to Fig. 1 the internal combustion engine 1 has secured to it by means of a bracket the pumping device 2 which feeds fuel through the pipe 3 to carburetor 4. Fuel is drawn through the pipe 5 from the

tank 6 which is at a lower level. The tank 6, if on an automobile, may be in the usual place at the rear end of the car, or elsewhere on the chassis. If this device is used in a motor boat the tank 6 would be located in the bilge of the boat. If the prime mover is a stationary engine, the tank 6 is probably located in the foundation or bed plate.

In order to provide a means for actuating the pump of my device, I am utilizing the vibration that is set up by the engine and, in the case of an automobile, also the vibration set up by the car in motion, this vibration actuates a weighted member which causes the pumping action.

Referring to Fig. 2, to the base casting 7 is secured the diaphragm 8. Above this diaphragm is the weight 9 with a downwardly projecting stem by means of which it is attached to the diaphragm 8, and above it and supporting it is the flexible spring 10 which is held to the stationary disc 11. In order to minimize the friction of the weight 9 in moving up and down under the influence of engine or car vibration, the sleeve 12 surrounds it. This sleeve can be an oil, impregnated wood bushing, forming a bearing which is self-lubricating and requires no attention whatsoever. It is possible to provide equally efficient means for avoiding friction. For instance, the weight 9 could be surrounded by a block of graphite working within a guiding sleeve. The spring 10 balances the weight 9 and in this position the diaphragm 8 can be perfectly flat. When the weight 9 flexes the diaphragm 8 due to vibration, the feed pipe 5 supplies fuel by the ball check 13, into the space 14, on the upward movement of the weight and diaphragm. On the descending movement of same, the fuel that has been drawn into space 14 is now forced through passageway 15 to the sediment chamber 16 and by the valve 17. The tank 2 will become filled with fuel until the float 18 to which is affixed the wire 19, rises and when the proper level is reached a small ferrule 19^a on the lower end of wire 19 will hold up the valve 17, thereby, preventing the diaphragm from pumping more fuel by the ball check 13. Fuel feeds from the bottom of tank 2 to the carburetor by means of pipe 3.

In the top of tank 2 is located the plug 20 which is provided with a centrally drilled

hole to act as upper guide for the wire 19 and is also provided with a vent hole 21. A cap 22 is provided which, when the tank is first installed on an engine, allows the tank to be primed by pouring fuel in the top of the cap 20 which will pass through a drilled hole 23 into the float chamber.

In order to allow the weighted member 9 to move up and down freely, vent holes 24 are provided beneath it. In the case of an automobile, the road jounce is far more severe than the vibration coming from the engine, when same is turning over very slowly. In order that the pump be operative under all conditions, the pump element must necessarily be sensitive to the smallest vibration occurring. When the engine is idling the weighted member 9 and the spring 10 are such as to be sensitive to this smallest vibration. In order to prevent damage to these parts when the automobile is going over very rough roads or causing considerably higher vibration than the engine would itself in idling and when the car is not moving, the disc 11 seals the chamber above the weight 9. A small hole 25 in the disc 11 restricts a violent movement of the weight 9, the whole mechanism being in effect a dash-pot. Holes 26 above the disc 11 are provided in order that the air pulsating through the hole 25 have free access to the atmosphere. It will be understood that it is possible to provide a construction in which the weight 9 will be immersed in the fuel in which the dash-pot effect would be the same, excepting that a liquid medium would be used instead of air.

Referring to Fig. 3 it will be seen that the tank 2 is provided with a vertical diaphragm 27 in which case the pump element vibrates on a horizontal plane. This device would be used on engines in which the reciprocating parts are moving in a horizontal plane or on the V engines in which there is a considerable horizontal component to the engine vibration. The diaphragm 27 would be sensitive to such vibration. It will be seen that it is equally possible, depending on the engine vibrations, or the device or body in which the engine is suspended, to place the diaphragm at an angle.

Referring to Fig. 4, two diaphragms 28 and 29 have the weighted members 30 and 31 respectively. In using a plurality of pumping elements, it is possible to make each one susceptible to certain vibrations. For instance, in the case of an automobile, the pumping unit 29, 31 could be sensitive to engine vibrations whereas the unit 28, 30 would be influenced by the vibration of the automobile in motion. The fuel is supplied through the ball check 32 in the same manner as previously described. It is possible to use a plurality of valves, if so desired. The passageway 33 communicated with the

tank 2 and the remaining operations of the device are the same. It will be seen that it is possible to arrange one pump element in a different plane from the other in order to make them correspond to vibrations that may occur in different planes.

Referring to Fig. 5 the tank 2 is provided with the diaphragm 34 to the center of which is affixed the clevis 35. The fulcrum 36 supports the bell crank 37, the latter being attached to the clevis 35 of the diaphragm. Suspended at the end of the bell crank 37 is the weight 38 which under the influence of the vibration actuates the diaphragm 34 and causes the pumping action previously described.

Referring to Fig. 6 the bell crank 37 supports the weight 38 so that same can be slid on the bell crank and thereby vary the distance at which the weight can be placed from the fulcrum. The wire 39 or a similar control means, controls the sliding movement of the weight 38 on the bell crank. The wire 39 is connected to the throttle or to the controlling element of the engine; in such a way that when the engine is running slowly the weight 38 will be at the greatest distance from the fulcrum and when the engine is running at an increased speed the weight 38 is placed nearer to the fulcrum.

Referring to Fig. 7, the cylinder 40 is provided with a piston 41 which is suspended by the spring 42. Under the piston is located the ball check 43 which acts as the inlet valve for the pump and the fuel is discharged through the passageway 44. In this way it will be seen that the weighted element can be used as a piston without any intervening mechanism. The weighted member can actuate a rod passing through a stuffing box, the pump valves being located in the customary way for pumping action.

Referring to Fig. 8, it will be seen that the engine 1 is provided with the feeding device 2 attached to it. In the tank 6 which we will assume is located on the automobile, is the pumping unit 45. It is placed at the bottom of the tank in order that it may draw fuel until the tank is empty and feeds the tank 2 through the pipe 5. In this construction it will be seen that the pumping element immediately adjacent the tank 2 located on the engine, can be made sensitive to engine vibration whereas the pumping unit 45 would be operative when the automobile goes over the road. It will be seen that with a plurality of pumping elements that they can be located at different points. In this particular case the pumping units are located so as to be best influenced by the vibrations to which they are to be susceptible. The bracket 46 which secures the pumping device 2 to the engine can be made of such a nature as to allow the entire device to vibrate, in which case the entire mass

vibrating would be an aid to the pumping element. In this case the valves can be arranged so that their opening and closing corresponds to the direction of the vibration of the device, thus aiding their opening and seating and not interfering with their action.

While I have shown a number of constructions of my device, it will be readily seen that various modifications in detail and arrangement are possible within the scope of my invention.

What I claim and desire to secure by Letters Patent is:

1. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover of a vibratory character, and means mounted on said prime mover for pumping fuel from said supply to said destination by means of the vibration of said prime mover.

2. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover of a vibratory character, and means for pumping fuel from said supply to said destination by means of the vibration of said prime mover and of the body containing said prime mover.

3. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover of a vibratory character, a mass susceptible to the vibration, of and mounted on said prime mover, and means for pumping fuel from said source to the said destination when said mass vibrates.

4. In a device of the kind described, a source of fuel supply, a tank containing a limited supply of fuel, a liquid pump, a vibratory character, a pump susceptible to the vibration of and mounted on said prime mover, means for transferring fuel from said source to said tank as required by means of said pump.

5. In a device of the kind described, a source of fuel supply, a prime mover of a vibratory character, a tank containing a limited supply of fuel, a liquid pump, a weighted mass susceptible to the vibration of said prime mover connected to said pump to supply said tank as required.

6. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover, means for pumping fuel from said supply to said destination, and a resilient element mounting said means on said prime mover.

7. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover, a pump for transferring fuel from said supply to said destination, a resilient bracket mounting said pump on said prime mover, and valves in said pump functioning synchronously with the vibration of the pump.

8. In a device of the kind described, a liquid pump, a vibratory mass connected to said pump, and means for restricting the vibrations of said mass by air pressure.

9. In a device of the kind described, a pump, a vibratory mass connected to said pump, a flexible element supporting said mass, and a dash-pot for restricting the vibrations of said mass.

10. In a device of the kind described, a diaphragm, a chamber containing liquid on one side thereof, an inlet, and discharge valve in said chamber, a prime mover of a vibratory character, and vibratory means susceptible to the vibration of said prime mover for actuating said diaphragm.

11. In a device of the kind described, a diaphragm, a chamber containing liquid on one side thereof, an inlet, and discharge valve in said chamber, a prime mover of a vibratory character, and a weighted mass susceptible to the vibration of said prime mover actuating said diaphragm.

12. In a device of the kind described, a diaphragm, a chamber containing liquid on one side thereof, an inlet, and discharge valve in said chamber, a prime mover of a vibratory character, a weighted mass susceptible to the vibration of said prime mover secured to said diaphragm, and flexible means for suspending said mass.

13. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover of a vibratory character, a plurality of masses susceptible to the vibrations of and caused by said prime mover and means for pumping fuel from said source to said destination when any of said masses vibrates.

14. In a device of the kind described, a source of fuel supply, and destination therefor, a plurality of masses each susceptible to a vibration of different intensity, and means for pumping fuel from said source to said destination when any of said masses vibrates.

15. In a device of the kind described, a source of fuel supply, and destination therefor, a mass susceptible to vibration, means for pumping fuel from said source to said destination when said mass vibrates, and automatic means for varying the intensity of vibration of said mass.

16. In a device of the kind described, a source of fuel supply, and destination therefor, a prime mover, means for pumping fuel from said supply to said destination by means of the vibration of said prime mover, and independent means located in said source for pumping fuel.

17. In a device of the kind described, a source of fuel supply susceptible to vibration, a chamber containing a limited supply of fuel, an engine, means for feeding fuel to said engine from said chamber, a pump

located in said source, and means for transferring fuel from said source to said chamber by means of the vibration of said source.

18. In a device of the kind described, a diaphragm, a chamber containing liquid on one side thereof, means allowing atmospheric pressure on the other side thereof, an inlet, and discharge valve in said chamber, and a weighted mass actuating said diaphragm.

19. In a device of the kind described, a diaphragm, a chamber containing liquid on one side thereof, means allowing atmospheric

pressure on the other side thereof, an inlet, and discharge valve in said chamber, means for guiding said mass, a spring suspending same, and a dash-pot for restricting the vibration of said mass.

Whereunto I have affixed my signature in the presence of two witnesses this 2nd day of May, 1917.

AUSTIN M. WOLF.

Witnesses:

WILLIAM SCHUCH,
MARGARET B. WOLF.