

Nov. 13, 1923.

1,473,761

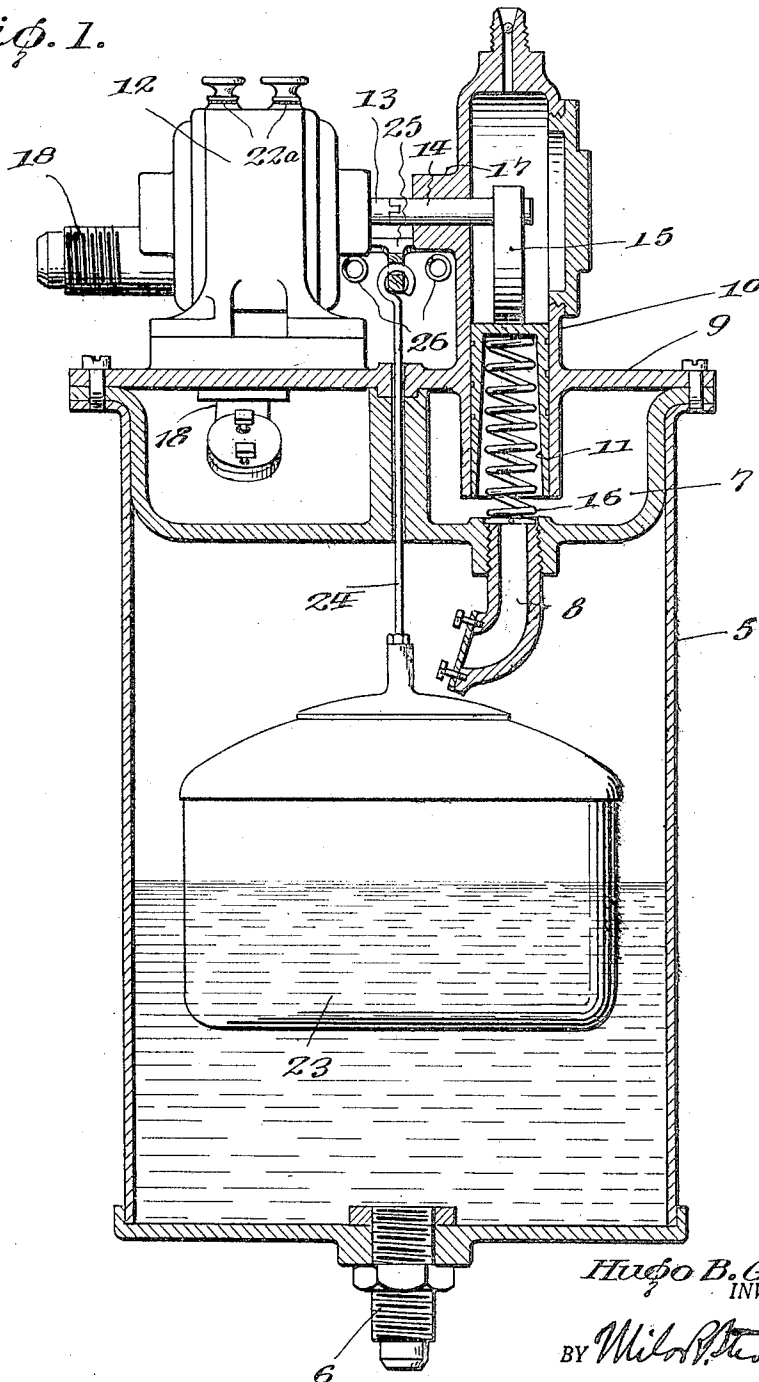
H. B. GRANT

FUEL ELEVATING DEVICE

Filed Dec. 22, 1921

2 Sheets-Sheet 1

Fig. 1.



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2 Sheets-Sheet 2

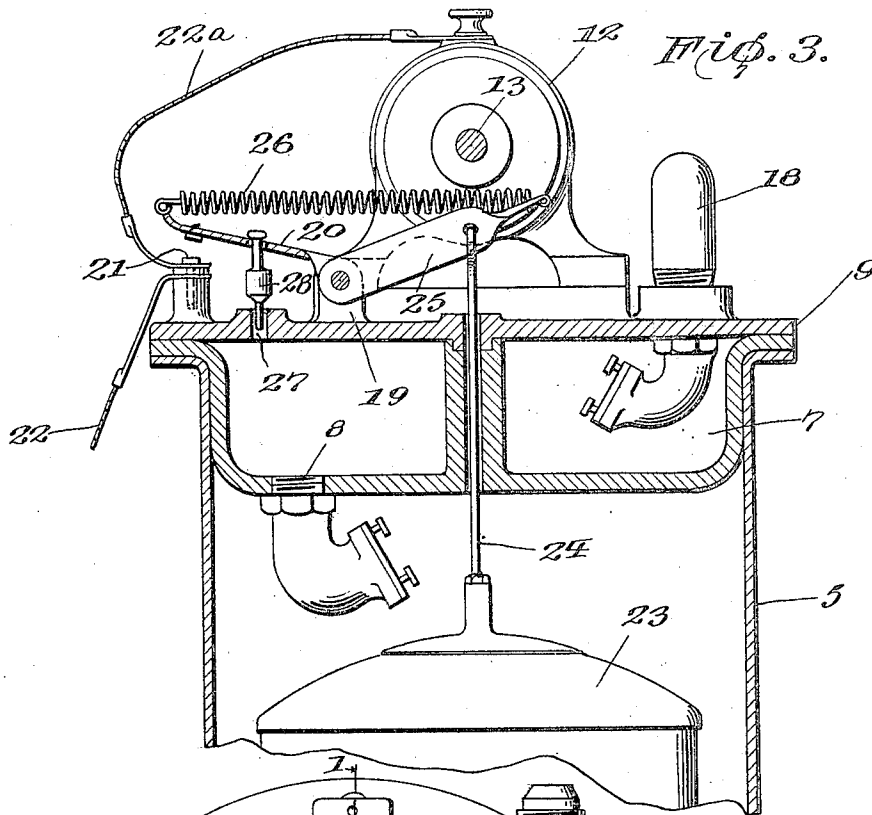


Fig. 3.

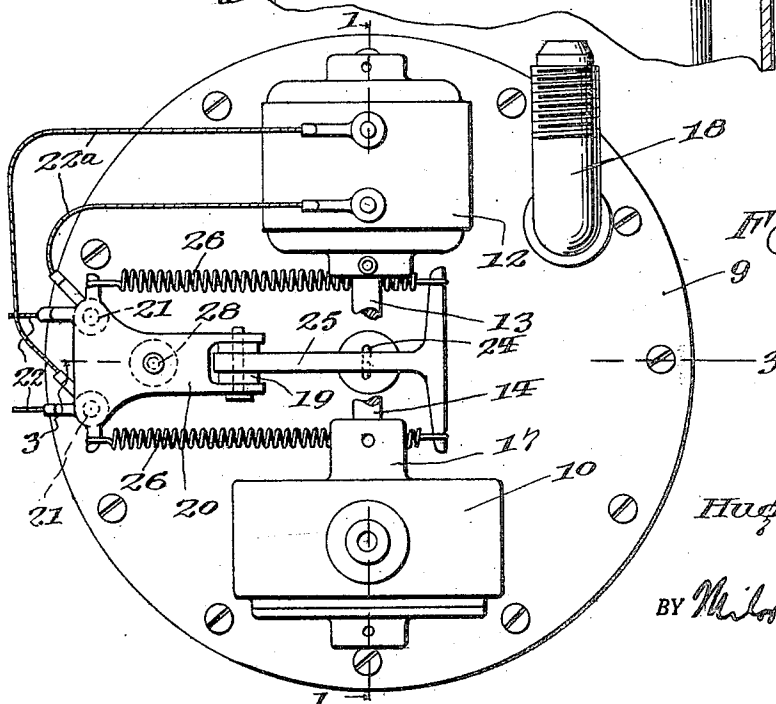


Fig. 2.

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UNITED STATES PATENT OFFICE.

HUGO B. GRANT, OF CHICAGO, ILLINOIS, ASSIGNOR TO STEWART-WARNER SPEEDOMETER CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF VIRGINIA.

FUEL-ELEVATING DEVICE.

Application filed December 22, 1921. Serial No. 524,332.

To all whom it may concern:

Be it known that I, HUGO B. GRANT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Fuel-Elevating Devices, of which the following is a specification.

This invention relates to apparatus or devices for conveying liquids from a storage tank or other source of supply to another tank or receptacle located at a higher level, so that the liquid may flow from the latter by gravity to the place of use.

The apparatus has been designed more particularly for use in connection with motor vehicles driven by internal-combustion engines, for feeding fuel to the carburetor, and it employs the well-known vacuum feed principle, a fuel receiving vessel being provided which is connected to the carburetor, and which is kept supplied with liquid fuel from a storage tank, the flow of fuel from said tank to the receiving vessel being produced by a vacuum or partial vacuum in a chamber having an inlet connection with the tank and an outlet connection with the receiving vessel.

In fuel feeding systems of the kind stated where the vacuum is produced by the suction of the motor, it frequently happens that at low engine speed there is not produced enough suction to draw fuel into the receiving vessel, and the invention therefore has for its object to eliminate this defect, and to provide a simpler and more efficient means for producing a vacuum, and also to eliminate a great many working parts in the apparatus now in general use.

The object stated is attained by means of an electric-motor driven air-pump having its cylinder opening into the vacuum chamber for drawing air therefrom, and automatically controlled by a novel and improved mechanism to be hereinafter described and claimed, the vacuum chamber being also provided with a vent valve which opens to admit air to the vacuum chamber when the pump stops upon the liquid reaching a certain predetermined level in the receiving vessel, in order that a constant liquid level may be maintained in said vessel.

The objects stated are attained by means of a combination and arrangement of parts to be hereinafter described and claimed, and in order that the same may be better under-

stood, reference is had to the accompanying drawings forming a part of this specification.

In the drawings,

Figure 1 is a cross section of the apparatus on the line 1—1 of Fig. 2; Fig. 2 is a plan view, and Fig. 3 is a cross section on the line 3—3 of Fig. 2.

Referring specifically to the drawings, 5 denotes a liquid-receiving vessel having an outlet 6 at the bottom for connection to the carburetor. In the upper portion of the vessel is located a vacuum chamber 7 having a bottom outlet 8 into the vessel. A plate 9 forming the top of the chamber 7 is provided with an air-pump cylinder 10 which opens into said chamber and contains a reciprocating plunger 11 which is driven by an electric motor 12 supported on the plate 9. Any suitable driving connection between the motor shaft 13 and the plunger 11 may be provided. The drawings show the motor shaft coupled to a shaft 14 carrying a cam 15 engageable with the plunger for forcing it in one direction, and a spring 16 forcing it in the opposite direction. The shaft 14 extends into the cylinder 10 and is journaled in a bearing 17 thereon.

The plate 9 is also provided with a suitable fuel connection 18 to the supply tank, said connection being arranged to discharge the fuel drawn from said tank into the vacuum chamber 7, from which latter it is discharged into the vessel 5 through the outlet 8.

On the plate 9 is mounted a post 19 to which is fulcrumed at one of its ends a switch lever 20 adapted to have its other end engage and bridge a pair of stationary switch contacts 21 to close the circuit of the motor 12, and to break said circuit upon leaving the contacts. At 22 are shown the lead wires to the switch, and at 22^a the conductors leading from the switch to the motor.

In the vessel 5 is located a float 23 having an upwardly extending stem 24 which is connected at the top to the outer end of a lever 25 which is fulcrumed at its other end to the post 19. The outer ends of the levers 20 and 25 are connected by a pair of parallel coiled springs 26, said levers having lateral extensions at their ends to which the springs are anchored as shown in Fig. 2.

The levers 20 and 25 are so arranged that when the maximum liquid level is obtained

in the vessel 5 and the float 23 has risen, the lever 20 has been swung free of the contacts 21 so that the motor circuit is now broken and the air pump is not operating, and as there is now no suction in the vessel 5, the flow thereinto from the supply tank ceases. As the liquid flows from the vessel 5 to the carburetor, its level is gradually reduced, and when a predetermined low level is reached, the descending float 23, through its stem 24 swings lever 25 to engage lever 20 with the contacts 21 to close the motor circuit. The air pump now operates to create suction in the chamber 7, and the flow of fuel into said chamber from the supply tank is resumed. When the maximum liquid level is again obtained in the vessel 5, the motor circuit is again automatically broken to stop the motor and the air pump.

The chamber 7 also has an air vent port 27, the same being made in the top plate 9. This port is provided with a valve 28 which is connected to the switch lever 20 so that simultaneous with the breaking of the motor circuit, the valve is opened to destroy the suction, whereas when the motor circuit is closed, the valve is also closed.

The current for operating the motor 12 may be obtained from any suitable source on the car, preferably the one which supplies current to the ignition system, so that when the ignition switch is turned on, the apparatus is also cut in for operation.

The apparatus is highly efficient in operation at all engine speeds, as the vacuum is not produced by the suction strokes of the engine. The apparatus eliminates the necessity of changing gears to low speed for the purpose of speeding up the engine to produce more vacuum, as is frequently necessary with apparatus in which the suction in the apparatus is produced by the engine. In this type of apparatus it frequently happens that with a wide open throttle on a full load there is not produced enough suction to obtain a feed of fuel from the supply tank to the apparatus. This trouble is entirely eliminated by the motor-driven air pump controlled as hereinbefore described. The engine will not be called upon to do anything but to propel the car, and hence it will be able to operate at full capacity at all times, and with increased power and reduced wear from racing the engine on hard pulls by shifting to lower speeds. Hard

pulls and steep grades can be negotiated in high gear because the fuel supply will be ever present to supply the engine at all speeds.

I claim:

1. In a liquid-fuel supply-apparatus, a liquid receiving vessel having an outlet, a vacuum chamber having a liquid outlet to the vessel and a liquid inlet, and also provided with an air-vent port, an air pump having its cylinder opening into the vacuum chamber, an electric motor driving the pump, a switch controlling the motor circuit, a valve for the vent port, and means for simultaneously operating said switch and valve.

2. In a liquid-fuel supply-apparatus, a liquid receiving vessel having an outlet, a vacuum chamber having a liquid outlet to the vessel and a liquid inlet, and also provided with an air-vent port, an air pump having its cylinder opening into the vacuum chamber, an electric motor driving the pump, a switch controlling the motor circuit, a valve for the vent port, a float in the vessel, and an operative connection between the float and the switch and valve for simultaneously operating said switch and valve.

3. In a liquid-fuel supply-apparatus, a liquid receiving vessel having an outlet, a vacuum chamber having a liquid outlet to the vessel and a liquid inlet, and also provided with an air-vent port, an air pump having its cylinder opening into the vacuum chamber, an electric motor driving the pump, a switch controlling the motor circuit, said switch including a lever, a valve for the vent port operatively connected to the lever, a float in the vessel, and an operative connection between the float and the lever.

4. In a liquid-fuel supply-apparatus, a liquid receiving vessel having an outlet, a vacuum chamber having a liquid outlet to the vessel and a liquid inlet, and also provided with an air-vent port, an air pump having its cylinder opening into the vacuum chamber, means for operating the pump, a valve for the vent port, and means controlled by the liquid level in the vessel for controlling the pump and the valve simultaneously.

In testimony whereof I affix my signature.

HUGO B. GRANT.