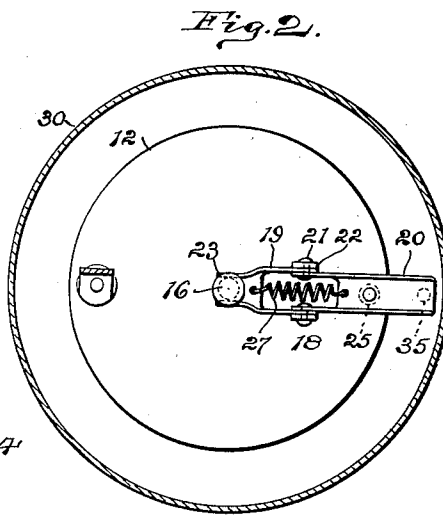


1,380,442.



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FUEL-SUPPLYING MEANS FOR MOTOR-VEHICLES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN T. TRUMBLE, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Fuel-Supplying Means for Motor-Vehicles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to devices for supplying fuel for internal combustion engines and is particularly adapted for use upon motor vehicles.

For safety and convenience of construction, fuel supply tanks of motor vehicles are usually located at a distance from the motor and usually below the carbureter level. It has been common practice to provide what is known as a vacuum feed device which is operated by engine exhaust to create a partial vacuum in a chamber to raise the fuel from the supply tank to a feed chamber above the carbureter level from which chamber the fuel will flow by gravity to the carbureter. These devices being operated by engine exhaust, are dependent upon engine operation and are more or less complicated due to the mechanism necessary for controlling fuel and to the necessity for a multiplicity of valves.

An object of this invention is to provide a device for the purpose adapted to operate at all times upon the fall of the fuel level as it is used up in the engine and which will operate independently of the operation of the engine.

A further object of the invention is to provide a construction wherein positive operation of the device is insured and a very simple and compact arrangement provided which is not liable to become clogged or get out of order in use.

With the above and other ends in view, the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which—

Figure 1 is a central vertical section

through a device illustrative of the invention, and

Fig. 2 is a transverse section of the same, substantially upon the line 2—2 of Fig. 1.

As shown in the drawing, 1 indicates a fuel chamber to receive fuel from the usual supply tank of a motor vehicle (not shown), said chamber being adapted to be supported in any convenient manner adjacent to the carbureter and above the level thereof and above the level of the supply tank. This chamber has a bottom outlet 2 which is directly connected in any suitable manner to the float bowl of the carbureter (not shown), the flow of the fuel from this chamber into the carbureter bowl being controlled in the usual manner by the usual float operated valve. Secured upon and closing the upper end of the receiving tank or chamber 1, is a casting or section 3 and upon this casting is secured a cap 4, the parts 3 and 4 having formed in their adjacent sides, suitable cups or depressions which together form a vacuum chamber 5. A flexible diaphragm 6 is secured between the parts 3 and 4 and divides the chamber 5 into two parts, the lower or vacuum half of the chamber being connected with the interior of the tank 1 by means of an outlet passage 7 which is controlled by a ball check valve 8 adapted to seat upon upward movement of the diaphragm 6 and close the passage 7 against the passage of air or fluid into the suction chamber from the top of the fuel tank 1. The member 3 is also formed with an inlet passage 9 which is connected in the usual manner by a pipe (not shown) with the fuel supply tank located at the rear end of the vehicle. A ball check valve 10 controls the passage 9 being arranged to seat and prevent passage of fluid therethrough upon the downward movement of the diaphragm 6, and thus a flexing movement of said diaphragm will cause a suction upon the passage 9 to raise the fuel from the supply tank and will force the fuel thus drawn into the lower part of the chamber 5 out through the passage 7 into the top of the chamber or tank 1.

To cause a flexing movement of the diaphragm, an electrical coil 11 is mounted upon the cap member 4 within a suitable inclosing casing 12 and within this coil is a core or plunger 13 which is secured at its lower end in any suitable manner, as by a stud 14, to the center of the diaphragm 6. Disks 15 with outturned edges, are secured against the upper and lower faces of the diaphragm 6 by the stud 14 to prevent sharp bends in the diaphragm upon flexing thereof. A stem 16 on the core 10 extends upwardly through an opening in the casing 12 and sleeved upon this stem between the casing wall and the upper end of the core is a coiled spring 17. Upon energization of the coil 11 or solenoid, the core 13 thereof will be drawn into the coil and thus flex the diaphragm 6 upwardly creating a suction through the inlet 9. Upon deenergization of the coil 11 the spring 17 will act to force the core 13 downwardly, bending the diaphragm 6 and forcing the fuel into the chamber below the diaphragm out through the discharge passage 7 into the fuel receiving chamber 1.

To alternately make and break the circuit of the coil 11 and thus continue the reciprocating movement of the core 13, a snap over switch, indicated as a whole at 18, is provided. This switch comprises two members 19 and 20 preferably formed of sheet metal and of channel shape in cross-section, said members being pivotally supported and pivotally connected together at their adjacent ends upon pivots 21 carried by suitable brackets 22 mounted upon the top of the solenoid casing 12. The member 19 has a forked end 23 which engages a groove 24 in the upper end of the stem 16. The member 20 is provided with a contact 25 at a distance from its pivots 21 to engage a similar contact 26 which is electrically connected to one end of the wire forming the coil 11, said contact and wire connection being insulated from the casing 12 of the coil. The bottom web connecting the upturned side flanges of the two members 19 and at 20 at their adjacent ends, is cut away to provide for a coiled spring 27 which is connected at one end to the member 19 at a distance from its pivots 21 and at its opposite end to the member 20 at the other side of the pivots 21.

When the core 13 is forced downwardly by the spring 17, the member 19 of the switch will be turned upon the pivots 21 and when the end thereof which is attached to the stem 16 passes below a horizontal plane passing through the pivots 21, the spring 27 will exert a pull upon the member 20 in a downward direction, causing it to turn quickly upon the pivots 21 or snap downward, bringing the contacts 25 and 26 to-

gether and closing the electrical circuit of the coil 11, which circuit comprises a leading-in wire 28 which is made fast to a terminal 29 carried by a suitable inclosing casing 30 secured to the cap member 4 and covering the solenoid and switch mechanism. This terminal 29 is insulated from the casing 30 and is electrically connected with one end of the wire forming the coil 11, said connection being insulated from the casing 12 of the coil.

As previously described, the other end of the wire forming the coil is electrically connected to the contact 26 and thus, when the contacts 25 and 26 come into engagement the electrical circuit is completed through the member 20, bracket 22 and casing 12, which casing, by being in electrical connection with the cap 4 and casing 30, is grounded through the vehicle frame or engine (not shown) upon which the device is mounted.

When the coil 11 is energized, the core 13 will be drawn upwardly and the member 19 of the switch will be turned on its pivot thereby. When the spring 27 is swung past the horizontal plane of the pivot 21 by such upward turning movement of the member 19, the member 20 of the switch will be turned on its pivot by the action of the spring 27 and snap upwardly into engagement with an insulated stop 31 carried by the casing 30. The electrical circuit is thus quickly broken at the upper end of the movement of the core 13, and upon such breaking of the circuit, the spring 17 will at once act to move the core downwardly. A continuous reciprocating movement of the core 13 is thus secured and this reciprocating movement will flex the diaphragm and create a vacuum below it within the chamber 5.

When the tank 1 has been sufficiently filled with fuel, the reciprocating movement of the core 13 is automatically stopped by providing a float 32 in the chamber or tank 1 which is pivotally attached to the side of the tank at 33 by a suitable arm 34. A rod 35 engages the arm 34 adjacent the pivot 33 and extends upwardly through the members 3 and 4 into the casing 30 and upward along-side the coil casing 12 with its upper end adjacent the underside of the free end of the member 20 of the switch.

As the float 32 is raised by the accumulation of fuel in the tank 1, it lifts the rod 35 endwise bringing its upper end into contact with the switch member 20 and raises said member sufficiently to break the contact between the contacts 25 and 26. As long as the float remains in raised position, the switch is held open and the solenoid remains inoperative, thus stopping the pumping action of the diaphragm. Upon the falling of the fuel level in the tank 1, the rod is

permitted to fall away from the switch and the spring 17 will operate to turn the switch member 20 on its pivot and bring the contacts 25 and 26 together, thus closing the electrical circuit which will at once start the pumping operation of the diaphragm. A level of fuel is thus automatically maintained in the chamber 1 and any fall in this level of fuel automatically closes the electrical circuit and starts the operation of the solenoid in flexing the diaphragm.

The means for creating suction to raise the fuel from the supply tank to the receiving chamber is operated entirely independent of the operation of the engine, that is, it is operated electrically instead of being dependent upon the suction or exhaust action of the engine. Therefore, if for any reason the fuel level falls in the receiving chamber, the solenoid will at once operate the diaphragm and draw more fuel from the supply tank even though the internal combustion engine may be inoperative. Further, in this construction the operation of the diaphragm or other pumping device is not dependent upon a vacuum created by engine operation and therefore is not liable to become clogged or get out of order, and the device is always in operative condition. Obviously, any suitable form of pumping or suction device may be employed and an electro-magnet or other suitable electrical device may be employed to operate the pumping or suction device. Further, changes in the construction and arrangement of parts may obviously be made without departing from the spirit of the invention and I do not, therefore, limit myself to the particular construction or arrangement of parts shown.

Having thus fully described my invention, what I claim is:

1. In a device of the character described, the combination of a receiving chamber having an outlet, suction means for discharging fuel into said chamber, electrically operated means for operating said suction means, an electrical circuit for said electrical means, a switch operated by movement of said suction means for controlling said circuit and a float in said receiving chamber for opening said switch.

2. In a device of the character described, the combination of a receiving chamber having an outlet, suction means for discharging fuel into said chamber including a reciprocable member, an electrical coil surrounding said reciprocable member, an electrical circuit for said coil, a snap over switch for controlling said circuit operated by said reciprocable member, and means operated by fuel level in the receiving tank for holding the switch inoperative.

3. In a device of the character described,

the combination of a receiving chamber, means for discharging fuel into said chamber, electrical means for operating said discharging means, an electrical circuit for said electrical means, a switch for controlling said circuit operated by the operation of said discharging means, and separate means operated by fuel level in said receiving chamber for operating said switch.

4. In a device of the character described, the combination of a receiving chamber, suction means for discharging fuel into said chamber, including a reciprocable member, an electrical coil for moving said reciprocable member in one direction, a spring for moving said reciprocable member in the opposite direction, an electrical circuit for said coil, a two part switch having pivotally connected adjacent ends and being pivotally supported at said pivotally connected ends, the free end of one part of said switch being operatively connected to said reciprocable member, and a coiled spring connected at its ends to said parts.

5. In a device of the character described, the combination of a receiving chamber, a suction device for discharging fuel into said chamber, electrically operated means for operating said suction device including an electrical coil and an electrical circuit for said coil, a switch for controlling said electrical circuit, said switch being connected at one end to said suction device to be opened and closed by movement thereof, a float in said receiving chamber, and means operated by a movement of the float for engaging the opposite end of said switch and opening and holding the same in open position.

6. In a device of the character described, the combination of a receiving chamber, a member secured upon said receiving chamber and having a chamber formed in the upper part thereof, with a valve controlled passage communicating with said chamber, a cap member formed with a chamber corresponding with the chamber in said member which is secured upon said receiving chamber, a diaphragm secured between said members and extending across between the chambers formed therein to provide a suction chamber below the diaphragm, electrically operated means for flexing the diaphragm, an electrical circuit for said electrical means, a switch in said electrical circuit connected to and operated by said means for flexing the diaphragm, a float in the receiving chamber, and means operated by the float for engaging and opening said switch.

7. In a device of the character described, the combination of a receiving chamber, a member secured upon the receiving chamber and formed with a vacuum chamber and valve controlled passages communicating therewith, a diaphragm extending across the

vacuum chamber, a reciprocable member secured to the diaphragm for flexing the same, an electrical coil surrounding said reciprocable member for moving the same in one
5 direction, a spring for moving the reciprocable member in the opposite direction, an electrical circuit for said coil, a snap over switch connected to and in said circuit operated by said reciprocable member, a float
10 in said receiving chamber, and a rod oper-

ated by said float for engaging said switch at its upper end to open the same and hold it in open position.

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

JOHN T. TRUMBLE.

Witnesses:

LEWIS E. FLANDERS,
ANNA M. DORR.