Dec. 8, 1931. F. G. SCHWEISTHAL 1,834,977

FUEL PUMPING DEVICE FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 5, 1927

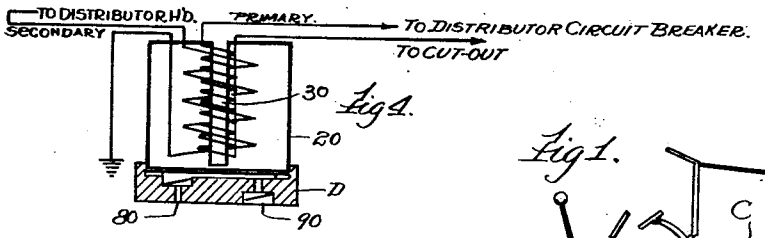



Fig 4.

Fig 1.

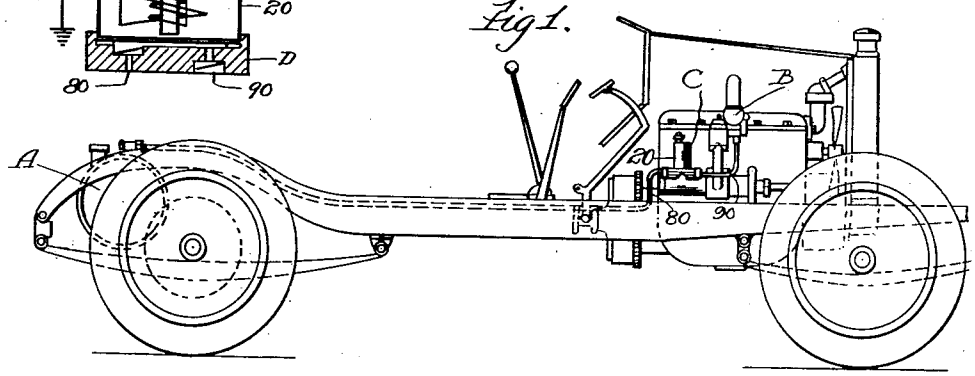



Fig. 2.

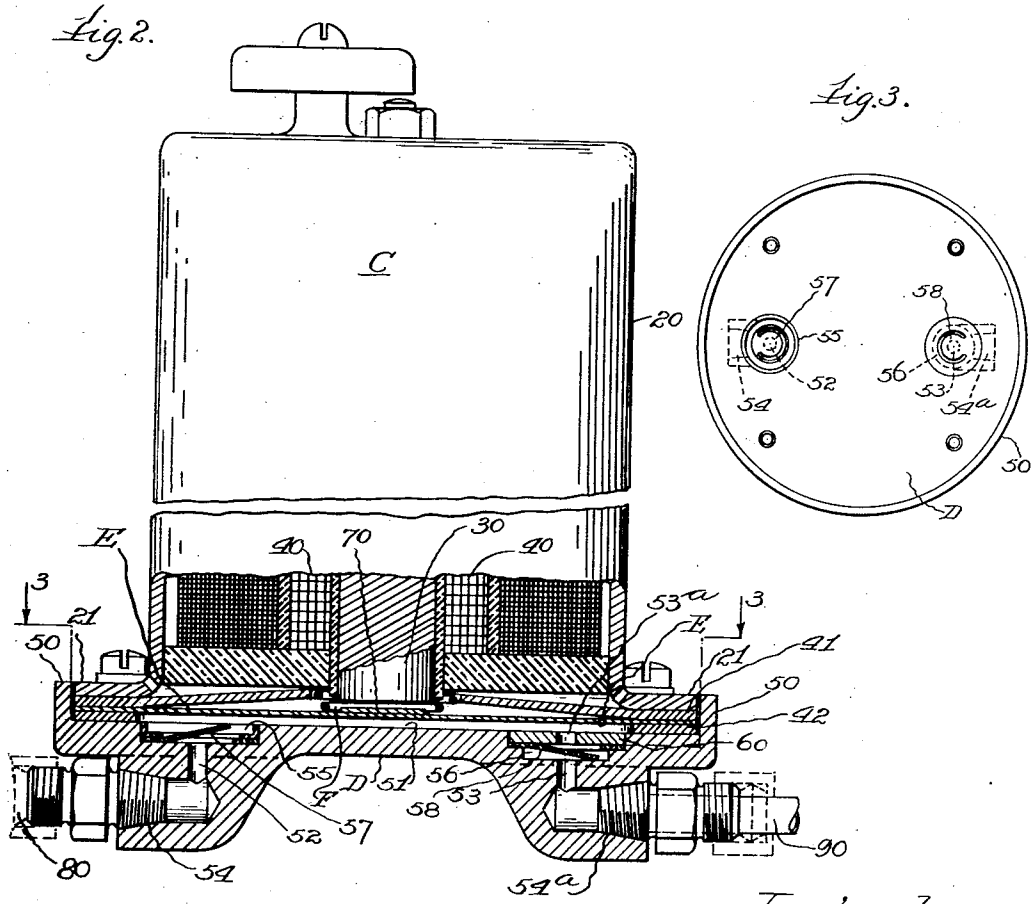



Fig. 3.




Witness.
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his Attorneys.

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# UNITED STATES PATENT OFFICE

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## FUEL PUMPING DEVICE FOR INTERNAL COMBUSTION ENGINES

Application filed December 5, 1927. Serial No. 237,809.

The purpose of this invention is to provide an improved and economically constructed device for pumping fuel to the carbureter of a motor vehicle engine from the main fuel supply tank located at a lower level than the carbureter, utilizing for that purpose the engine ignition circuit and specifically the ignition coil in which the interruptions of the circuit, alternately energizing and de-energizing the magnetic core, adapts the latter to constitute means for producing vibration or pulsation of a member which thereby may become a pumping element by association with suitable valves and condi its. The invention consists in the elements and features of construction shown and described as indicated in the claims.

In the drawings:—

Figure 1 is a diagrammatic view for showing in their relative positions on the vehicle, the main fuel supply tank, the carbureter and the pump device of this invention.

Figure 2 is an elevation of the engine ignition coil with its casing and with the device exemplifying this invention mounted on the casing, said device and the adjacent part of the ignition coil and casing being in section axial with respect to said coil and said device, the connection of the device to the main fuel tank and the carbureter float bowl or like fuel receptacle being shown diagrammatically.

Figure 3 is a plan view as at the plane indicated by the line 3—3 on Figure 2 on a reduced scale.

Figure 4 is a wiring diagram of the construction shown in Figure 2.

In the structure illustrated, A is the main fuel supply tank at a lower level than the carbureter shown at B. C is the engine ignition coil which is shown with a casing, 20, having at its lower end an outwardly turned flange, 21, approximately in the plane of the end of the core member, 30, of the primary winding indicated at 40 of the ignition circuit transformer commonly called the ignition coil. D is a cast plate having a flat face on one side and at the other side having a marginal flange, 50, dimensioned for encompassing the flange, 21, of the casing 20 and forming a recess or cavity at the side of the plate, D, from which said flange projects. Through said flat face, 51, of said plate, ports, 52 and 53, open into the cavity bounded by the flange, 50, and from the peripheral edge of the plate the ducts, 54 and 54a, in the plate, D, lead to the ports, 52 and 53, respectively, said ducts being interiorly threaded at their entrances in the periphery of the plate for pipe connections, 80 and 90, leading respectively to the main fuel supply tank and to the immediate fuel source of the carbureter. The ports, 52 and 53, are encompassed by recesses, 55 and 56, respectively, for accommodating check valves, 57 and 58, seating respectively against outflow and inflow and opening respectively for inflow and outflow with respect to the cavity formed at the inner side of the plate, the port, 53, being for this purpose furnished with a valve seat disk, 60, mounted over the recess, 56, and having a port, 53a, at which the valve, 58, seats upwardly against inflow.

E is a flexible diaphragm which may be inherently resilient, and which is shown associated with a spring, F, for resilient reaction independently of any inherent resiliency of the diaphragm. This diaphragm is diametered for being marginally clamped between the end of the casing, C, and the margin within the flange, 50, of the flat face, 51, of the plate, D, and spaced from both the clamping margins of both said parts by the spacing means indicated at 41 and 42, each being of suitable thickness to space the center of the diaphragm at its normal position away from the end of the core, and also away from the opposite inner face of the casing, C, both said spacing means being adapted to make the junction of the diaphragm with the parts between which it is clamped airtight. As shown, the spacing means, 41, is an annular iron disk which extends over a considerable annular area of the diaphragm having a central aperture of sufficient diameter to accommodate a spirally-coiled spring, F, said disk, 41 being flexed toward the solenoid and away from the diaphragm within the annular margin by which it is clamped to allow ample room for the flexture of the

diaphragm toward the solenoid core. The diaphragm, E, may consist of certain well-known impregnated fabric or of paramagnetic metal as steel, but if as on some accounts preferable, it is made of diamagnetic metal, such as brass or aluminum, or if made of the impregnated fabric mentioned, it will be furnished with a central part of para-magnetic metal which may be in the form, as shown, of a button, 70, mounted fixedly at the center of the diaphragm.

When the ducts, 54 and 55, are connected by pipes as indicated at 80 and 90, respectively, with the fuel supply tank and with the immediate fuel source of the carbureter, the operation may be understood to be that at each closing of the ignition circuit for energizing the ignition coil, the diaphragm being magnetically attracted to the pole of the core, 30, acts to draw in fluid through the port, 52, and on each succeeding opening of the ignition circuit de-energizing the coil and de-magnetizing the core, the resilient re-action of the diaphragm will force the fluid so drawn in through said port, 52, out through the port, 53, toward the carbureter which will be thus supplied with fuel for operating the engine as long as the engine ignition circuit is operated for igniting the fuel mixture and causing it to operate the engine.

I claim:

1. In combination with the ignition coil of an internal combustion engine a member having a chamber of which one wall is formed by a diaphragm construction adapted at its central part to respond to magnetic attraction and react resiliently, said chamber being mounted at one end of the ignition coil with the diaphragm spaced from the pole of the core of the coil, said member having an inlet duct and an outlet duct, check valves controlling the ports to said ducts opening respectively for inflow and outflow and seating respectively against outflow and inflow, the inlet duct being adapted for connection to a chamber in which partial vacuum is to be produced.

2. In a liquid fuel feeding system for internal combustion engines, the combination with the ignition circuit for the engine, the ignition coil and its core, and a magnetic head on said core exterior of the coil, of a pump casing having an operating member therein including an armature, and said head located in operative relationship to said armature.

3. In a liquid fuel feeding system for internal combustion engines, the combination with the ignition circuit and the ignition coil unit including its core, of a fuel feeding magnetically operated pump comprising as the pumping member a flexible diaphragm, said diaphragm having fixed to it an armature for coaction with said core by responding to magnetic attraction of the core when the latter is energized, and a compression spring reacting on the diaphragm at the side thereof toward the ignition coil unit for retracting the armature from the core.

4. In a liquid fuel feeding system for internal combustion engines, the combination with the ignition circuit and the ignition coil unit including its casing and core, of a fuel feeding magnetically operated pump having a pumping chamber mounted on the ignition coil casing and comprising as the pumping member a flexible diaphragm, the ignition coil casing having for such mounting an outwardly projecting annular flange dimensioned for cooperating with the marginal annular area of the pumping chamber for clamping the diaphragm pumping member between the pumping chamber body and said flange; means associated with said flange for spacing the diaphragm therefrom and rendering the junction of the diaphram therewith air-tight for making air-tight the chamber of which the diaphragm constitutes a wall.

5. In a liquid fuel feeding system for internal combustion engines, the combination with the ignition circuit, the ignition coil and its core, of a fuel feeding magnetically operated pump having its pumping member provided with an armature for co-action with the core.

In testimony whereof, I have hereunto set my hand this 18th day of November, 1927.

FRED G. SCHWEISTHAL.