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C. J. LAUER ET AL

2,352,958

ELECTRIC FUEL PUMP

Filed June 22, 1942

2 Sheets-Sheet 1

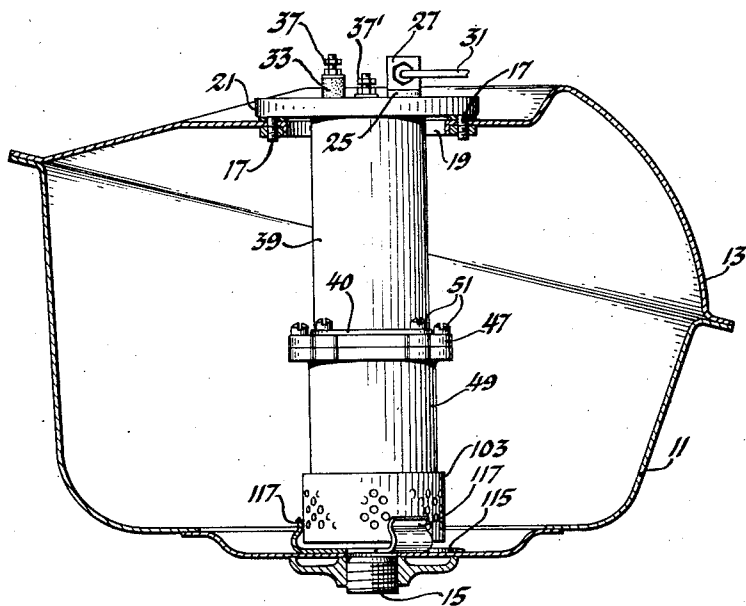


Fig. 1

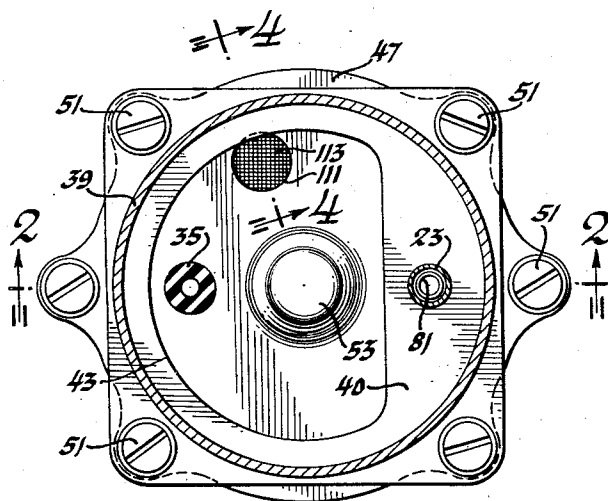


Fig. 3

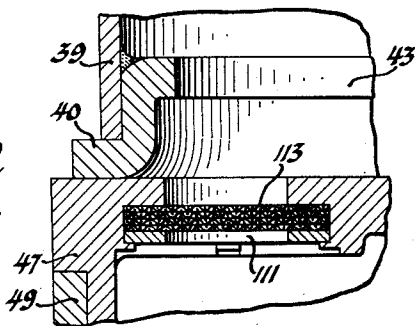


Fig. 4

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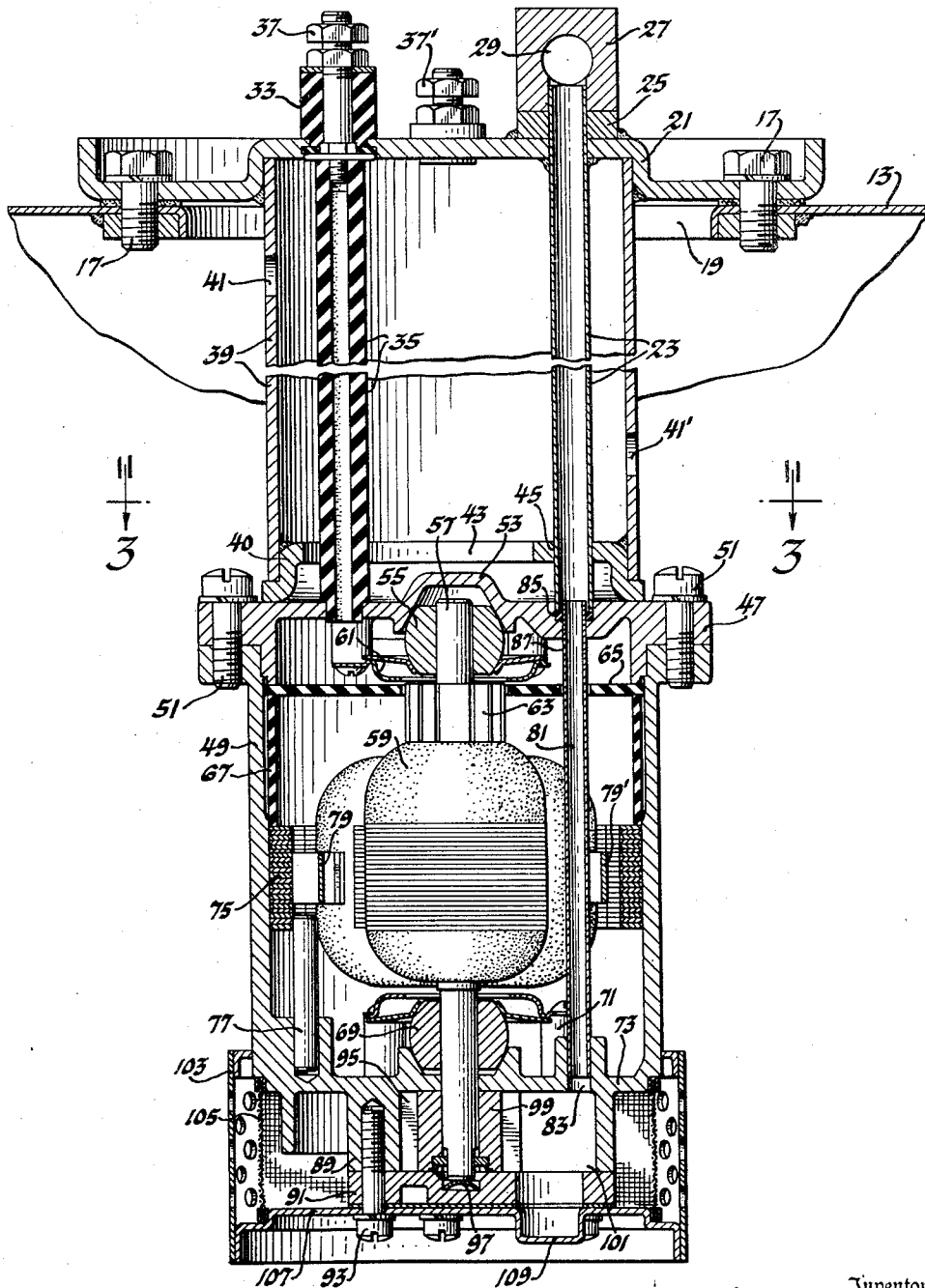


Fig. 2

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UNITED STATES PATENT OFFICE

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ELECTRIC FUEL PUMP

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1 Claim. (Cl. 103—87)

This invention relates to the fuel supply system for engines such as are used on motor vehicles, on boats, aircraft and in stationary power plants. It is more particularly concerned with the delivery of fuel from the reservoir or tank to the engine. It is intended to replace a well-known older means of delivering fuel—the engine operated suction producing pump. In this older system, the fuel flowing from the reservoir under the influence of reduced pressure, has had a tendency to vaporize under excessive heat conditions and it is one of the primary objects of the present invention to devise a fuel supply system which puts the fuel under pressure and thus avoids the disadvantages of fuel vaporization and "vapor lock" which, in the case of an engine operated pump, has interfered with the delivery of liquid fuel to the float bowl of the carburetor.

Among other objects to be attained are substantially noiseless operation, high pumping capacity, promptness in delivering fuel, comparatively low pump speed, an arrangement whereby faulty engine operation is avoided when liquid fuel becomes vaporized in the pipe line, an improved arrangement for freeing the fuel from foreign matter, and an improved means to insure lubrication of the motor shaft bearings in the case of an empty fuel tank.

The invention includes certain improvements over a similar fuel supply system shown and described in Patent No. 2,139,370, assigned to the assignee of this application. The purpose of these improvements is to insure a better flow of fuel to the engine, to prevent turbulence in the motor chamber which may retard rotation of the armature and also volatilize some of the liquid fuel, and to avoid the creation of gum in the fuel.

Still further objects and advantages will be understood from the description which follows.

In the drawings which show an illustrative embodiment of the invention:

Fig. 1 is a transverse section through a gasoline tank of a motor vehicle showing a novel combined motor and pump in elevation.

Fig. 2 is a vertical section through the motor and pump assembly, the section being substantially on line 2—2 of Fig. 3.

Fig. 3 is a section on line 3—3 of Fig. 2.

Fig. 4 is a section on line 4—4 of Fig. 3.

Referring to the figures, numerals 11 and 13 together represent a fuel tank. Provision for drainage is marked 15.

The combined motor and pump assembly including a spacer is secured to the top member 13 of the tank. To that end fastening means

including bolts 17 secure to the tank about an opening 19 therein a top cover 21. Through an opening in the cover extends a delivery pipe 23. Around the pipe end is a spacing ring 25 secured to the cover and to ring 25 is secured a fitting 27 having one or more outlets 29 to which may be connected a pipe or pipes 31 for supplying an engine or engines as the case may be. An insulating sleeve 33 outside the cover and an insulating tube 35 within the cover are associated with means for supplying electric current from a terminal 37 to motor to be referred to. Numeral 37' is used to mark the other terminal. Secured to the cover as by welding is a cylindrical spacer 39 having openings 41 and 41'. This spacer projects down into the tank through opening 19. To the lower end of the spacer 39 is welded a lower cover 40. Cover 40 has a large opening 43 and a small opening 45. The insulating tube 35 extends through the large opening and the fuel delivery tube 23 extends through the small opening. Both are received within openings on the top cover 47 of the casing 49 for the electric motor.

The top cover 47, the casing 49 and an attaching flange of the lower cover 40 of the spacer are secured together by fastening means 51. The cover 47 is formed at its center 53 to receive a bearing 55 for the spindle 57 of the armature 59. Some suitable retaining means 61 engages the bearing and may serve to hold in position a lubricant carrying packing. The commutator of the motor is seen at 63. The brush carrier plate is identified by numeral 65, and 67 is used to refer to a cylinder of paper or the like. At the lower end of spindle 57 is a similar bearing 69. Here also there may be used an oil saturated packing and retainers, the latter secured to formations 71 extending upwardly from the lower integral end 73 of the casing 49. The surrounding motor field 75 is positioned by a pin 77 and coil retainers 79, 79'. Extending through the motor casing is a standpipe 81. It is fitted into an opening 83 in the bottom wall 73 of the casing. Its upper end extends through an aligned opening in the upper pump casing cover and into the lower end of delivery pipe 23 where a suitable seal of rubber or the like is provided at 85. A vent from standpipe 81 near the top of the motor casing is marked 87. The bottom wall 73 of the motor casing on its side remote from the motor is formed with a downwardly extending wall 89 to which is secured a closure 91 by fastening means 93. The chamber 95 formed by the parts 73, 89 and 91 is the pump chamber. Through it

extends the lower end of spindle 57 and the closure 91 carries a thrust bearing 97 for the spindle. Secured to spindle 57 within the pump chamber is a pump gear 99, the cooperating gear not being shown, but being like that in the patent referred to. The outlet space of the pump chamber is marked 101 and is in communication with standpipe 81.

A fuel filtering assembly including an apertured wall 103, a screen 105 and a lower cover 107 is carried by the lower end of the assembly already described and may be held to the bottom wall of the motor casing by the fastening means 93 already referred to for attaching the closure 91. The pump delivery space 101 is in communication with a depression 109 in cover 107 which is arranged to deliver fuel to a bypass which is not illustrated but which may be none other than that shown in our patent referred to.

The top of the motor casing has an opening 111 leading to the spacer. This opening is covered by a fire screen 113 as shown by Figs. 3 and 4.

The armature is streamlined as being enveloped in a suitable synthetic plastic or fitted with a suitable smooth cover. The smooth surface so formed prevents turbulence in the motor casing. Turbulence obviously resists rotation of the armature and adds to the load of the motor. It also tends to convert the liquid fuel to vapor. It has been found that the action of copper as a catalyst in producing gum in the fuel can be avoided by the substitution of silver. The commutator is therefore of silver and the bearings 55 and 69 are of sintered silver.

There may be used a clip 115 suitably secured to the bottom of the tank and having resilient arms 117 to engage and position the assembly from lateral movement.

The operation will be obvious. The motor operates the pump which takes fuel from the tank through screen 105 and delivers it to the engine through pipes 81 and 23 and suitable external conduits. The fuel also flows through opening 87 and fills the motor casing. It lubricates the bearings. The use of silver in the bearings and for the commutator prevents development of gum. The streamlining of the armature reduces the load on the motor and prevents turbulence and volatilization of fuel. The screen at 113 serves to prevent flame propagation in the event of any combustible mixture forming in the motor chamber. The fuel may overflow the motor casing passing through the screen and returning to the tank by way of openings 41, 41' in the spacer.

We claim:

In a fuel supply system, a fuel tank, an electric motor and pump combination within said tank, said combination including a casing for said motor, said casing having a top wall, a spacing sleeve attached to said casing and secured to the top of said tank, a standpipe delivering fuel from said pump and extending through said motor casing, an extension pipe sealed to said standpipe and connected to an external fuel supply conduit, said standpipe having a vent opening leading into the motor casing near its top, means forming an opening in the top wall of the motor casing leading to said sleeve, a fire screen in said last named opening and means forming openings in the wall of the sleeve leading to the interior of the tank.

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