

July 31, 1945.

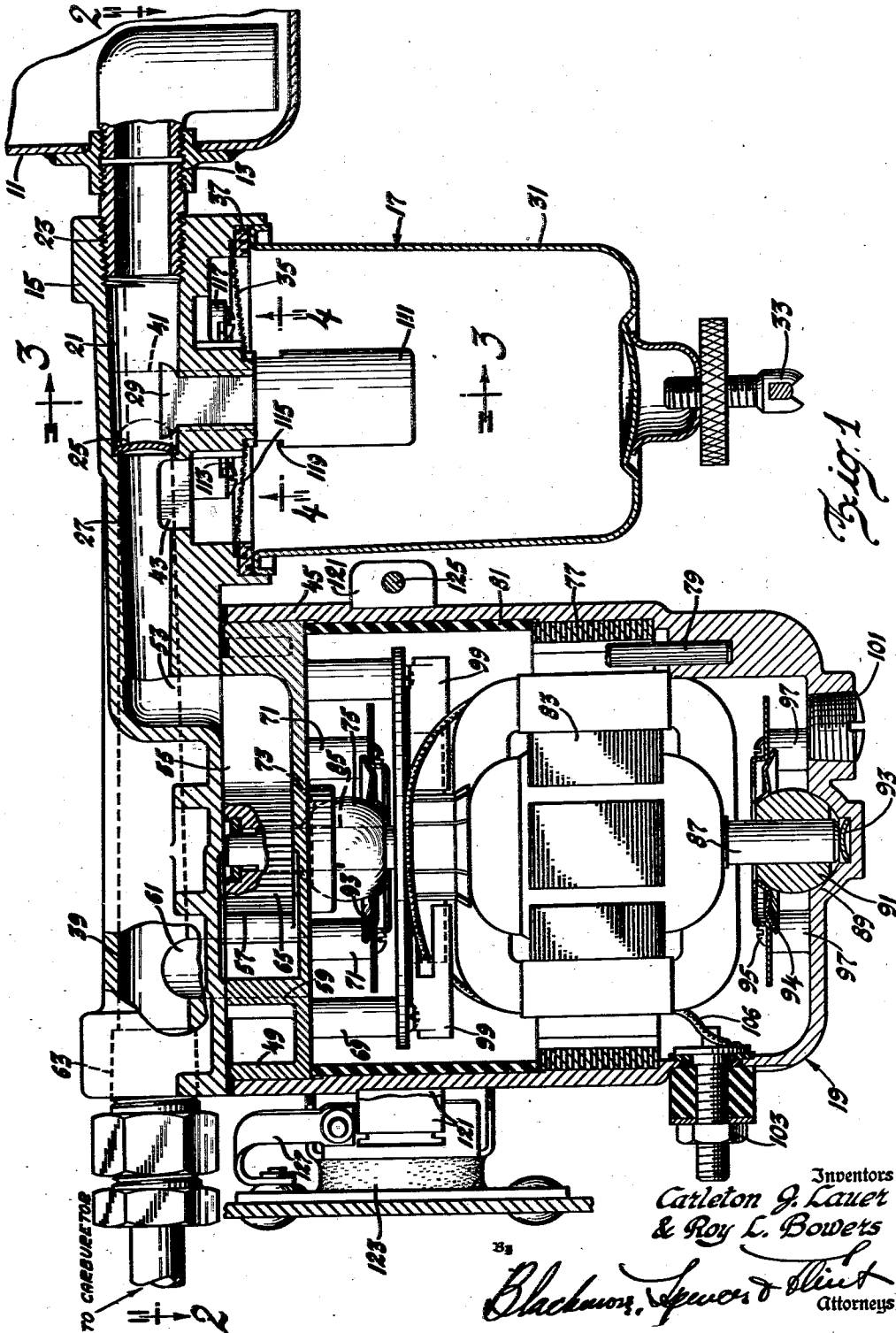
C. J. LAUER ET AL

2,380,656

FUEL PUMP

Filed Sept. 11, 1940

2 Sheets-Sheet 1



July 31, 1945.

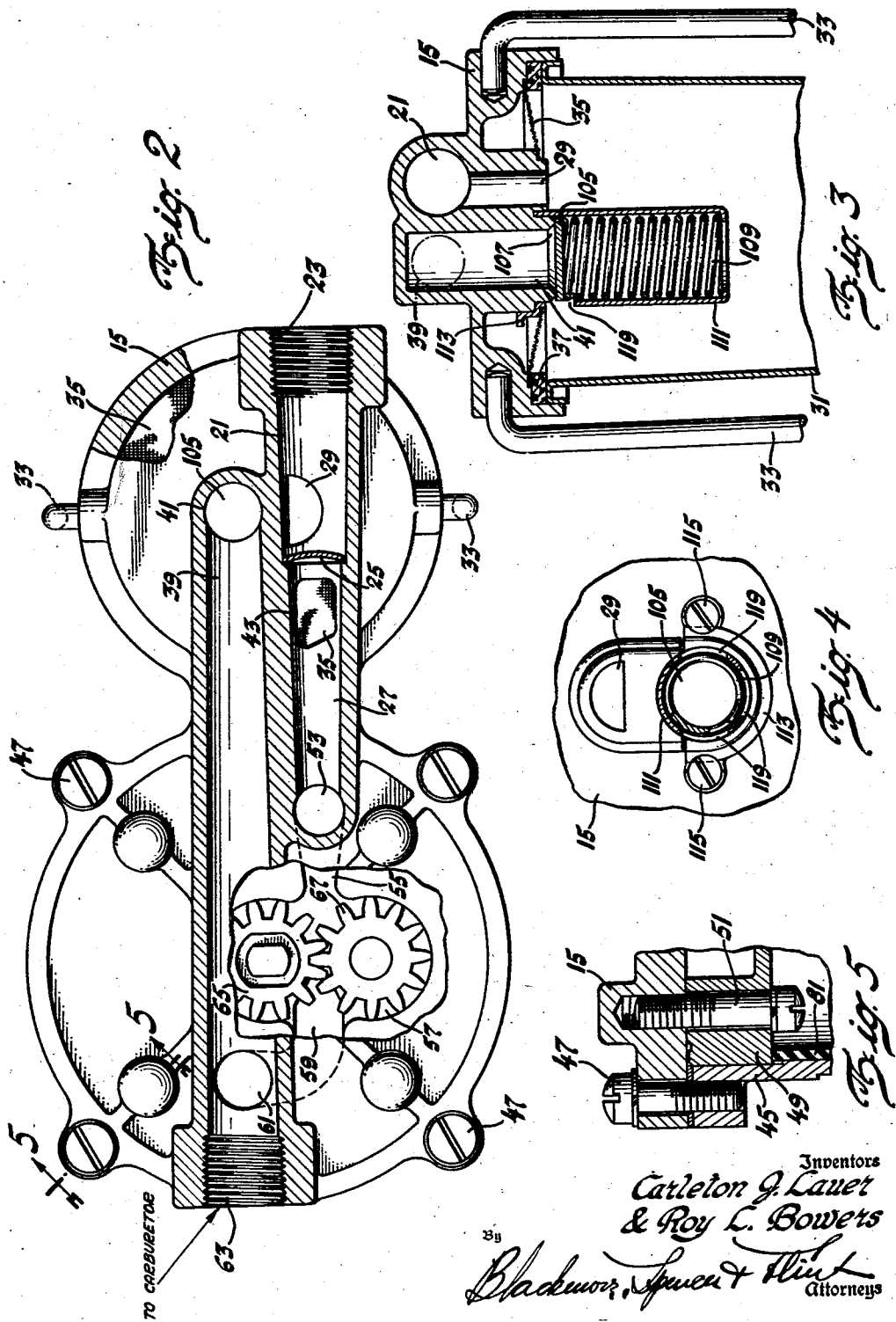
C. J. LAUER ET AL

2,380,656

FUEL PUMP

Filed Sept. 11, 1940

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,380,656

FUEL PUMP

Carleton J. Lauer and Roy L. Bowers, Flint, Mich.,
assignors to General Motors Corporation, De-
troit, Mich., a corporation of Delaware

Application September 11, 1940, Serial No. 356,266

8 Claims. (Cl. 102-42)

This invention relates to a fuel supply system for engines and more particularly to the fuel supply system for the engine of a motor vehicle.

An object of the invention is to avoid the conversion of liquid fuel into vapor in a supply system using a pump in the conduit leading from the tank to the carburetor.

As another object the novel supply system uses the fuel itself as the lubricating medium for the bearings of the motor which drives the pump, and the inventive idea is embodied in a construction wherein leakage and evaporation is avoided.

Many other objects and advantages will become evident as one reads the description which follows:

In the drawings:

Figure 1 is a vertical section through the novel pump and sediment collecting chamber.

Figure 2 is a section as indicated by line 2-2 on Figure 1.

Figure 3 is a section as indicated by line 3-3 of Figure 1.

Figure 4 is a section as indicated by line 4-4 of Figure 1.

Figure 5 is a section as indicated by line 5-5 on Figure 2.

Referring by numerals to the drawings, there is illustrated a fuel tank marked 11. This is intended to be the fuel reservoir mounted near the rear end of a motor vehicle. The fuel from this tank is to be delivered to the carburetor and, in most installations, this means that the fuel must be lifted for which purpose some sort of pump is required. In many vehicles a variable stroke pump is located near the engine so that its moving parts may be actuated by the moving parts of the engine. Such pumps operate as a result of the creation of suction and the suction tends to vaporize the liquid. The present invention aims to avoid the creation of any appreciable suction. In the drawings the pump shown is located near the tank and the outlet 13 from the tank is near the bottom of the tank, whereby the suction, if any, developed by the pump located near the outlet of the tank is negligible. The invention is not limited to a construction in which the fuel flows by gravity to the pump but it is intended that the position of the pump shall be such as to minimize the suction required to draw the fuel from the tank. Between the pump and the carburetor the fuel will be subject to positive pressure. The pump is driven by an electric motor as will be explained below.

The outlet 13 from the tank is connected to a

cover member 15 associated with a fuel strainer and sediment trap designated as a whole by numeral 17. Also associated with the cover member is a pump and motor assembly marked 19. The cover 15 has a passage 21 leading from its threaded end 23 where it is connected to the tank outlet 13. A plug 25 separates this passage from a coaxial passage 27. A passage 29 leads from passage 21 to and through the bottom of the cover 15. A bowl 31, for the collection of sediment and water from the fuel, is secured to the underside of the cover by conventional retaining means including a ball, screw and nut assembly 33. Between the bowl and the cover is a filter screen 35 and a gasket 37. The cover has another longitudinal passage 39 terminating over the bowl and from its end a vertical passage 41 extends to the bottom surface of the cover. It will be seen from Fig. 3 that the filter screen is fitted around the openings 29 and 41 so that the fuel from the tank enters the bowl in the region below the screen. Above the screen is an opening 43 within the cover communicating with passage 27. It will be understood that any water and sediment in the fuel is separated from the fuel by the expedient described and that it collects in the bottom of the bowl from which it can be readily removed.

A motor case 45 is secured beneath the cover by fastening means 47 (Fig. 5). A pump gear and bearing casing 49 fits within the upper part of the case 45 and is secured to the cover by fastening means 51. Referring again to the cover, it will be observed that at the end of passage 27 remote from passage 43 is a passage 53 which communicates with a space 55 in the casing 49 leading to the pump chamber 57. From chamber 57 a passage 59 extends upwardly and opens into the cover passage 39, the opening being indicated by numeral 61. The gear casing has an opening which extends from the opening 61 through the bottom wall thereof as shown by dotted lines in Fig. 1. At 63 is a threaded opening at the end of passage 39 for connection with a pipe for conveying liquid fuel from the pump to the carburetor. Within the pump chamber are pump gears 65 and 67, gear 65 being driven by an electric motor to be referred to and gear 67 being an idler. On the underside of gear casing 49 are pairs of bosses 69 and 71. There is also a spherical recess 73 for seating a bearing 75. The electric motor by which the pump gears are driven includes a fixed field assembly 77 held in position by a pin 79 extending upwardly from the base of the motor case. A spacing member 81 within the motor case is posi-

tioned between the field assembly and the gear casing 49. The motor also includes an armature assembly 83 from which extend spindles 85 and 87. Spindle 85 extends through bearing 75 and at its end non-rotatably carries gear 88. The bottom of the motor case has a concave seat 89 for the reception of a bearing 91 through which passes the spindle 87, the end of the spindle being in contact with a thrust bearing 93. Bearing 93 takes the form of a hardened welch plug which provides a compact installation and reduces friction to a minimum. The armature assembly is thus provided with self-aligning bearings. Engaging bearing 91 is a retainer assembly 94 secured as at 95 to bosses 97 projecting upwardly from the bottom wall of the motor case. A similar retainer assembly 93' for the bearing 75 is secured to bosses 71. A brush assembly marked 99 is secured to bosses 89. At 101 is a threaded plug for draining the motor case when occasion requires. Electrical connection is provided at 103. An external wire, not shown, is connected at this point and communicates with an internal lead 106.

Within the sediment trap a disc-shaped valve 105 is adapted to be held against a seat 107 at the lower end of passage 41 by a spring 109. The spring is located within and seats against the lower end of a shell 111. The upper end of the shell has an arcuate flange 113 against which are engaged the heads of threaded members 115 which are received within bosses 117 formed on the underside of the cover. The shell has openings 119 through which fluid may pass and enter the bowl when the valve disc is depressed by the pressure of liquid fuel and against the resilient resistance of the spring.

The assembly may be mounted by a bracket comprising a pair of clamping arms 121 embracing the motor unit 10. The arms 121 are engaged with a rubber carrying member 123 adapted to be attached to the vehicle frame. The assembly may be placed in any position of vertical or rotatable adjustment within the arms 121 which are adapted to be clamped by conventional screw and nut means 125. Obviously any convenient substitute may be used instead of the connection 13 illustrated to accommodate for the position of the assembly. The electrical connection preferably includes a ground lead. This may conveniently be effected by such a member as 127 between the metal parts of the brackets which are otherwise insulated by the rubber element.

When the ignition switch is closed, the motor rotates and drives the pump gears. Fuel thereupon flows to the pump from the reservoir. It flows either under the influence of a slight pressure head or, if assembled so as to require a pump developed suction, the suction will be but little owing to the fact that the pump is adjustably mounted on the frame adjacent the tank. The absence of appreciable suction avoids evaporation of fuel. From the pump to the carburetor the fuel is subject to pump pressure, whereby danger of evaporation is avoided. The capacity of the pump is sufficient to supply the maximum needs of the carburetor. Since the pump is in continuous operation and since it always supplies at least a little fuel more than the engine demands, there is at all times some flow of fuel through the bypass including the valve 105. This valve is therefore normally slightly open and fluctuates gently under the influence of the varying flow of fuel through the bypass and the pressure spring 109. It never intermittently pounds against its seat. Since the lower bearing of the motor 75

armature is at the bottom of the case, there is no danger of loss of lubricating medium from leakage. It is therefore unnecessary to provide additional sealing means at the bearing as has been done heretofore when the motor was arranged above the pump. The motor case is not open to the air and evaporation is thus avoided. This, too, helps to insure adequate lubrication. It will be understood that there is never any problem of lubricant viscosity since the bearings are lubricated with the thin fuel medium. Water should be removed by the occasional detachment of the sediment collecting bowl 31. If this is neglected and water collects within the motor case it may be removed by unscrewing the plug 101. Since the brush and commutator assembly is at the top of the motor case it will not be reached by any water which does collect in the motor case. With the low voltage required for operation of the pump there is no danger of short circuiting the motor should water collect. The only difficulty is from freezing. Stalling of the motor will not cause it to burn out. As an added precaution, low ampere fuses may be used. The use of a gear pump without valves insures quietness of operation.

We claim:

1. In combination, a fuel tank of a motor vehicle and a conduit therefrom to supply the carburetor of the engine, said conduit having a first part and a second part, a fuel pump assembly mounted between said first part and said second part of the conduit, said assembly including a motor case, a motor and a superposed pump within said case, means forming a bypass between the high and low pressure sides of said pump, said pump having an outlet, means forming passages to deliver fuel from said outlet to the motor case where it serves to lubricate bearings, to the second part of the conduit for supplying the carburetor and to the bypass whereby the pump may be driven continuously regardless of the fuel demand of the engine.

2. The invention defined by claim 1 together with a pump gear casing within said case, said casing having a through opening constituting the passage from the pump outlet to the motor case and also having a bearing surface for one of the bearings of the armature of the motor, the bottom wall of the motor case shaped to form a bearing surface for a second armature bearing.

3. The invention defined by claim 1, said assembly also including a sediment trap adjacent the first part of the conduit and through which the fuel passes to the pump, and a spring loaded valve within said trap and affording communication between the pump outlet and the trap and thus becoming a part of said bypass.

4. In combination with the fuel tank of a motor vehicle and a conduit extending therefrom to supply a carburetor, a fuel supply assembly for pumping fuel from said tank to the carburetor, said assembly constituting a part of said conduit and including a cover containing first and second passages, the first for connection with the tank, the second for connection with the carburetor, a pump casing secured to and beneath said cover, pumping means in said casing, said casing having passages whereby the inlet and outlet of the pump communicates with the first and second passages respectively, a motor case beneath said pump casing, a motor therein operably connected to said pumping means and a sediment trap constituting a part of said first mentioned passage.

5. In combination with the fuel tank of a motor

vehicle and a conduit extending therefrom to supply a carburetor, a fuel supply assembly for pumping fuel from said tank to the carburetor, said assembly constituting a part of said conduit and including a cover containing first and second passages, the first for connection with the tank, the second for connection with the carburetor, a pump casing secured to and beneath said cover, pumping means in said casing, said casing having passages whereby the inlet and outlet of the pump communicates with the first and second passages respectively, a motor case beneath said pump casing, a motor therein operably connected to said pumping means and a sediment trap constituting a part of said first mentioned passage, said pump casing having a passage therethrough whereby fuel may be supplied to the motor bearings.

6. In combination with the fuel tank of a motor vehicle and a conduit extending therefrom to supply a carburetor, a fuel supply assembly for pumping fuel from said tank to the carburetor, said assembly constituting a part of said conduit and including a cover containing first and second passages, the first for connection with the tank, the second for connection with the carburetor, a pump casing secured to and beneath said cover, pumping means in said casing, said casing having passages whereby the inlet and outlet of the pump communicates with the first and second passages respectively, a motor case beneath said pump casing, a motor therein operably connected to said pumping means and a sediment trap constituting a part of said first mentioned passage, together with passages forming a bypass between the outlet and inlet of the

pump, a spring loaded valve in said sediment trap forming a part of said bypass.

7. In combination with the fuel tank of a motor vehicle and a two part conduit extending therefrom to supply a carburetor, a fuel pump assembly mounted between said parts of the conduit, said assembly including a motor case, a motor and a pump above the motor and within said case, means forming a bypass between the high and low pressure sides of said pump, said pump having an outlet, means forming passages to deliver fuel from said outlet to the motor case where it serves to lubricate bearings, to the second part of the conduit for supply the carburetor and to the bypass whereby the pump may be driven continuously regardless of the fuel demand of the engine.

8. In combination with the fuel tank of a motor vehicle, and a conduit extending therefrom to supply a carburetor, a fuel supply assembly for pumping fuel from said tank to the carburetor, said assembly constituting a part of said conduit and including a cover containing first and second passages, the first for connection with the tank, the second for connection with the carburetor, a pump casing beneath said cover pumping means and a driving motor therefor within said casing, said casing having passages whereby the inlet and outlet of the pump communicate with the first and second passages respectively, a sediment trap constituting a part of said first mentioned passage, said pump casing also having a passage whereby fuel may be supplied to the motor bearings.

CARLETON J. LAUER.
ROY L. BOWERS.