June 4, 1935. A. M. BABITCH ET AL 2,003,420

FUEL PUMP

Filed Oct. 26, 1933 2 Sheets-Sheet 1

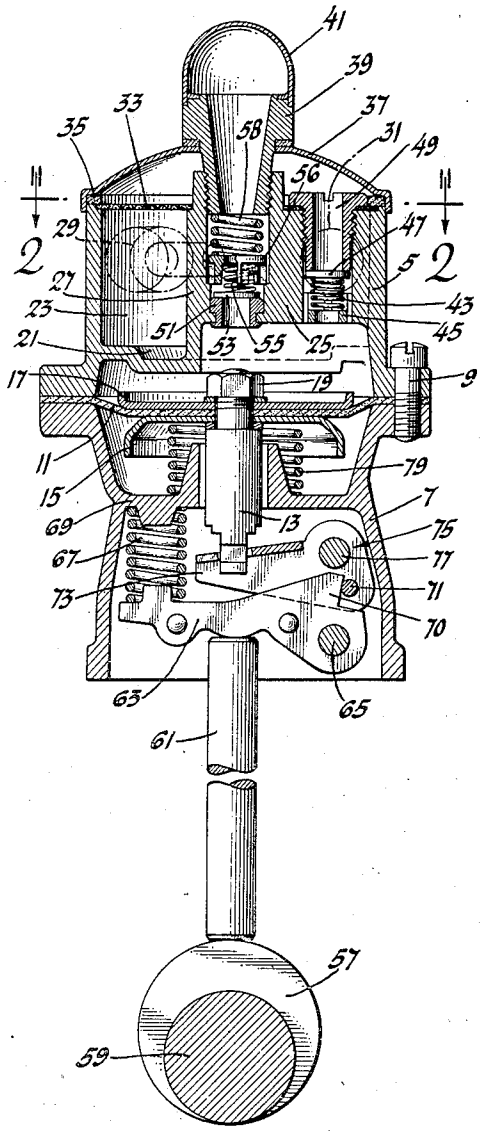


Fig. 1

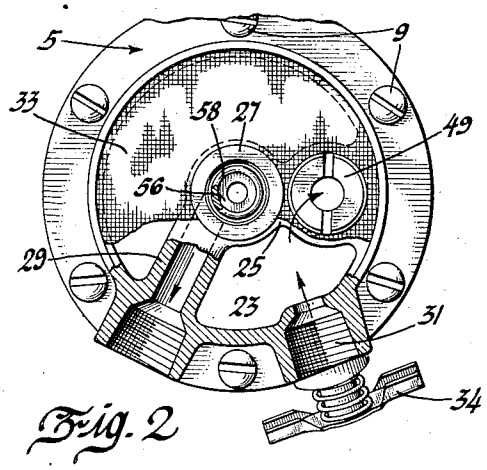


Fig. 2

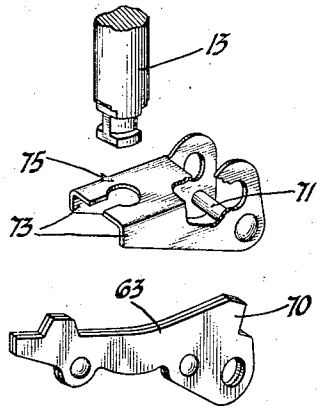


Fig. 3

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FUEL PUMP

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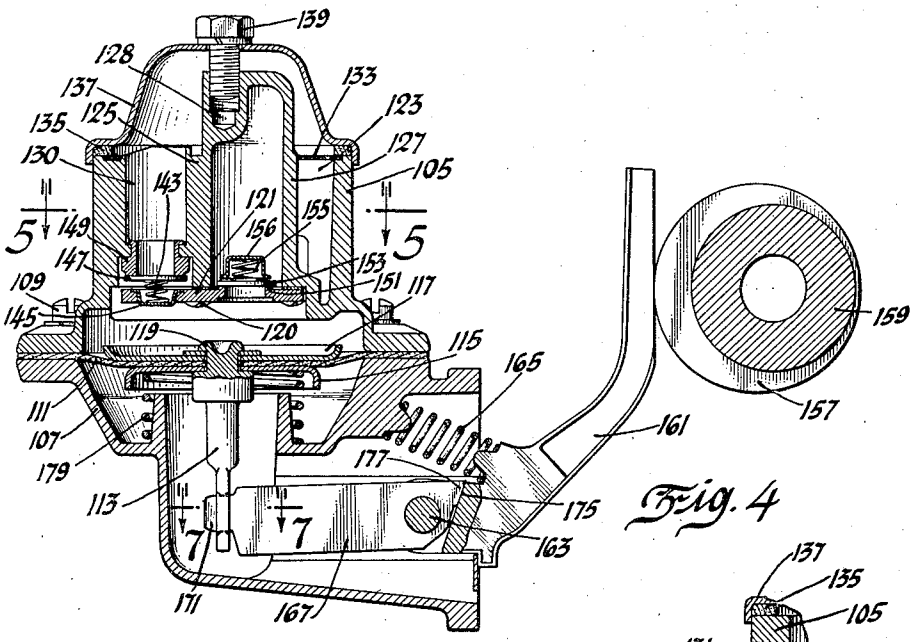


Fig. 4

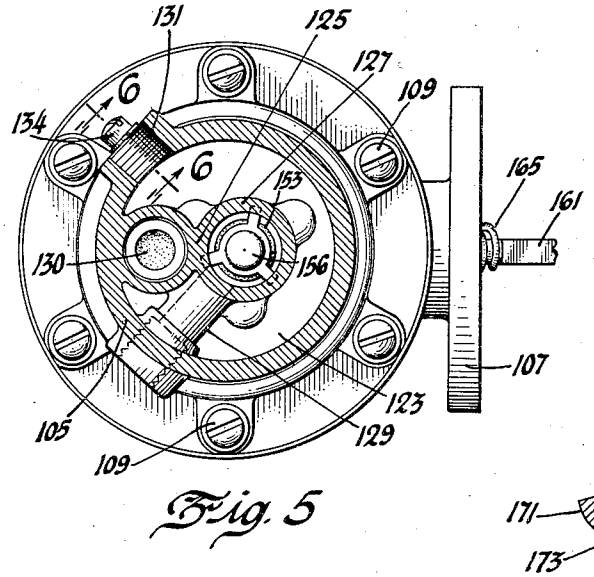


Fig. 5

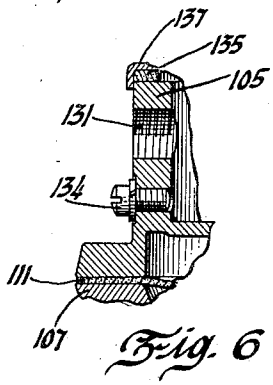


Fig. 6

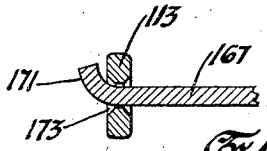


Fig. 7

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FUEL PUMP

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Application October 26, 1933, Serial No. 695,314

13 Claims. (Cl. 103—150)

This invention relates to pumping mechanism and has been designed for the purpose of supplying fuel to the engine of a motor vehicle from a reservoir.

An object of the invention is to provide an improved and simplified pump member which shall contain chambers constituting a variable volume pumping chamber, a receiving, filtering and sediment chamber, suitable valves and an air dome.

Other objects and advantages will be understood from the following description.

The application is in part a continuation of an application of Babitch and Harry for Fuel pump, Serial No. 642,342, filed November 12, 1932.

In the drawings:

Fig. 1 is a longitudinal section through the pump.

Fig. 2 is a view on line 2—2 of Fig. 1 with the cover removed and parts in section.

Fig. 3 is an exploded perspective of certain parts.

Fig. 4 is a longitudinal section through a modified form.

Fig. 5 is a section on line 5—5 of Fig. 4.

Fig. 6 is a section on line 6—6 of Fig. 5.

Fig. 7 is a section on line 7—7 of Fig. 4.

Referring by reference characters to Figs. 1–3 inclusive, numeral 5 is the upper body member and 7 is the lower member, these two members preferably formed by die casting. Parts 5 and 7 are secured together by fastening means 9, and clamp between them the peripheral portion of a gasoline impervious diaphragm 11. The diaphragm is secured at its center to a pump stem 13 by means of discs 15 and 17 and a nut 19 threaded to the stem.

The upper part 5 is recessed to form a variable volume pump chamber between the diaphragm 11 and a partition 21. Above the partition the body 5 is formed into another chamber 23 which is segmental in shape, being closed by a radial wall 25 extending from a central boss 27 to the periphery. From the central boss there is also a radial extension constituting a conduit 29 which merely extends through the segmental chamber 23 but does not close it. An opening 31 in the wall of body 5 communicates with the chamber 23. A screen 33 engages a shoulder on the top of the peripheral part of body 5 and is held in place in the following manner. A ring 35 is located above the peripheral part of the screen as shown. A cover 37 is supported above the ring 35 and overlies its edge. An apertured cap 39 is threaded at its lower end into the central boss 27 and holds the cover in position. At the upper end of the cap 39 is a cup 41 constituting an air dome. The screen, near its center, is seated on a shoulder of the central boss. The radial wall 25 has a passage extending therethrough from a point above the screen to the pump chamber. Within the passage is a spring 43 seated on a shoulder 45 and pressing upwardly on a disc valve 47 which engages a valve seat constituted by the lower end of a hollow threaded plug 49. The fluid from opening 31 enters the chamber 23, is freed from foreign matter by the screen, flows through the hollow plug 49, passes the valve 47, and enters the pump chamber. This flow of fluid is produced by the suction stroke of the pump. Foreign matter which collects in the segmental chamber 23 beneath the screen 33 may be removed by a valve member 34.

The central boss is apertured as shown and carries a valve seat 51. The valve seat 51 is engaged by a valve 53 normally held to its seat by any suitable resilient means such as 55. The resilient means 55 engages a seat 56 held down by a spring 58. From the central boss an opening above the valve 53 permits the flow of fluid through the passage in part 29. From this outlet any suitable conduit may be provided to deliver the fuel to the carburetor of the engine. The outflow of fluid is produced by the discharge stroke of the diaphragm.

The cam 57, which is on an engine cam shaft 59, operates to push upwardly on a rod 61. Rod 61 engages a lever 63 which preferably may be of laminated form as shown. The lever 63 is pivoted at 65 to the pump housing. A spring 67 in abutment with a housing wall 69 engages the lever 63 and operates to hold the end of the rod 61 in contact with the lever and cam. It is through this partition 69 that the pump stem 13 extends. The lever 63 has a lug 70 which may engage a pin 71 extending between the arms 73 of a second lever 75 also pivoted to the pump casing at 77. The outer end of lever 75 has a known form of interlocking connection with the pump stem 13 whereby the assembly of these parts may be conveniently made.

By the construction described an upward movement of rod 61 produced by the cam rocks the lever 63 clockwise and when the lug 70 engages the pin 71 the lever 75 is rocked counterclockwise and the plunger and diaphragm execute a suction stroke. In this way the fuel is drawn into the pump chamber from the reservoir through the inlet valve 47. The discharge stroke is made by a spring 79. This spring is in abutment with the partition 69 and the diaphragm disc 15. The

pump therefore has a variable stroke depending upon the built-up pressure in the pump chamber and the strength of spring 79. When the built-up pressure in the pump chamber, resulting from a relatively small consumption of fuel, overcomes the spring 79, the lever 75 assumes a position such that its pin 71 is engaged by the lug 70 of lever 63 only at the latter part of the stroke of lever 63. The pump therefore has a variable stroke to supply fuel in accordance with the demands of the engine without the provision of means for bypassing or overflow.

This pump has special utility in those installations where rotation of the cam is such that a rod reciprocated thereby moves in a direction the opposite of that required by the diaphragm in making the suction stroke. The use of the two levers 63 and 75 constitutes a very simple means whereby the necessary operation is effected. It will be understood that the lost motion present in this pump takes place between the lug 70 and the pin 71.

Referring now to the modified form shown by Figs. 4–7 inclusive, numeral 105 is the upper body member and 107 the lower member. Parts 105 and 107 are secured together by fastening means 109 and clamp between them the diaphragm 111. Pump stems 113 and discs 115 and 117 correspond in a general way to parts 13, 15, and 17 in Fig. 1. In this modification in place of nut 19 the end of stem 113 is headed as at 119 to hold the parts assembled.

The upper part 105 is recessed forming a pump chamber between the diaphragm 111 and the wall 121 which in this form is shown as a part separable from the die cast member 105. This part 121 may be secured by fastening means 120. Above the wall 121 the body 105 is formed into another chamber 123 which is segmental in shape and closed by a radial wall 125 extending from a hollow boss 127, the axis of which is somewhat offset from the axis of the body 105. The radial wall extends to the periphery as shown. From boss 127 is a second radial extension constituting a conduit 129. This conduit extends through but does not close the chamber 123. An opening 131 in the wall of body 105 communicates with chamber 123. A screen 133 engages a shoulder on the top of body 105. A packing ring 135 is located above the peripheral region of the screen. A cover 137 is supported above ring 135 and overlies its edge.

The hollow boss 127 is closed at its upper end and at one side of its axis and in the axis of the body 105 is a screw-threaded opening 128. A fastening bolt 139 engages the cap 137 and is threaded into opening 128 sufficiently to hold the periphery of the cap firmly against the ring 135 as shown by Fig. 4.

The radial wall 125 has a passage 130 extending axially from the region above the screen to the pump chamber. Within this passage is a plug 149 serving as a seat for a valve 147 held upwardly by a spring 143 supported by an abutment 145 carried by the wall 121. The fluid from opening 131 enters chamber 123, is freed from foreign matter by the screen, flows through the passage 130 and passes to the pump chamber through the valve 147. This flow of fluid is produced by the suction stroke of the pump. Foreign matter which collects in chamber 123 beneath screen 133 may be removed by a plug 134.

Within the hollow chamber of boss 127 is an outlet disc valve 153 normally held to a seat 151, provided on wall 121, by a spring 155 engaging a suitably mounted abutment 156. From the region above this valve 153 is an opening communicating with the outlet passage 129. The space within the boss above the valve 153 serves as an air dome to maintain the regularity of the fluid discharge. From outlet passage 129 a suitable conduit (not shown) conveys the fuel to the carburetor of the engine.

The cam 157, which is on the engine cam shaft 159, operates to rock a lever 161 pivoted at 163 to the pump member 107 and works against a spring 165 which serves to maintain constant contact with the cam to prevent noise. Also pivoted on pivot 163 is a link 167. The end of link 167 has its end 171 bent from the plane thereof and assembled with the pump stem 113 by being passed through a slot 173 therefor as shown by Fig. 7. By this arrangement the diaphragm assembly may be positioned to engage the end 171 and then rotated to the locked position shown by Fig. 7 prior to the assembly of the top portion 105. The lever 161 has a shoulder 175 to engage a part 177 of link 167 whereby under the action of the cam the lever and link may swing as a unit and pull the stem 113 and make a suction pump stroke. The discharge is made by a spring 179 supported by the casing member 107 and engaging the diaphragm plate 115.

The operation of the pump will be understood without further explanation. An important feature is the upper body part which is recessed to form with the diaphragm a pump chamber; which carries the valves; which is formed to provide a receiving, filtering and sediment collecting chamber; and which is provided with a self-contained air dome.

We claim:

1. In a pump, a casing member provided with a recess, a movable pumping member cooperating with said recess to form a variable volume pumping chamber, said casing member also recessed to form a receiving chamber, said casing wall having an opening to said receiving chamber, a filter dividing said chamber into first and second parts, an axially extending boss in the first part of said receiving chamber, a radial wall extending from said boss to the peripheral wall of said casing, said boss and wall breaking the circular continuity of said first part of said receiving chamber, inlet and outlet valves in said casing member and communicating with said pumping chamber, said outlet valve being in said boss, said boss above said outlet valve constituting an air dome, said radial wall having an axial passage communicating with the second part of the receiving chamber and with the pumping chamber by way of said inlet valve, said casing having radial conduit means extending to the wall thereof from a part of the boss above the valve.

2. The invention defined by claim 1, said axial boss having its axis coincident with the axis of said casing member.

3. The invention defined by claim 1, said axial boss having its axis displaced from the axis of said casing member and closed at its end remote from the pumping chamber, a cap for the casing member forming the closure for the second part of the receiving chamber.

4. The invention defined by claim 1, said axial boss having its axis displaced from the axis of said casing member and closed at its end remote from said pumping chamber, a cap for the casing member forming a closure for the second part of the receiving chamber, and fastening means holding the cap on said casing, said fastening

means located in the axis of said casing and secured in the closed end of said boss.

5. In a pump, a casing member, a movable element, said member and element forming a pumping chamber, said member also formed to constitute a reservoir, a wall extending radially within said reservoir and terminating in a boss at a part of the wall removed from the casing periphery, an inlet valve controlling communication between said reservoir and pumping chamber, an outlet valve controlling fluid flow from the pumping chamber, said valves being located in said radial wall, the outlet valve being in said boss, means forming an air dome above said outlet valve to produce discharge at a uniform rate of flow, and a cap for said casing member forming a closure for said reservoir.

6. In a pump, a casing member provided with a recess, a movable member cooperating with said recess to form a variable volume pumping chamber, said casing member also recessed to form a reservoir, a radial wall in said reservoir, a cover for said reservoir, inlet and outlet valves in said wall, said inlet valve opening to permit flow from the reservoir to the pumping chamber and the outlet valve opening to permit flow from the pumping chamber, the outlet valve being substantially in the center of the reservoir, discharge conduit means extending from a position above said outlet valve, an air dome element above said outlet valve, said dome element secured to said wall and engaging and holding said cover in position.

7. In a pump, a hollow casing member, a partition, mechanism forming a pump below said partition, a central boss in said casing member above the partition, inlet and outlet valves for said pump, the inlet valve forming a communication between the space above the partition and the pump, one of said valves being in said boss, a cover for said casing member, an air dome element engaging said cover and threaded into said central boss, said air dome communicating with the space above said last-named valve.

8. The invention defined by claim 7 together with a second casing member secured to and below said hollow casing member, a pump diaphragm between said casing members, means in said second casing member to operate said diaphragm, and means to secure said casing members together and peripherally clamp said diaphragm.

9. In a pump, cooperating casing members and a diaphragm clamped between said members, pump operating means in one of said casing members, a partition with a central boss in the other casing member, the partition and diaphragm constituting a variable volume pumping chamber, inlet and outlet valves for said pumping chamber, the outlet valve being in said central boss, a cover for said other casing member, a screen peripherally clamped between said other casing member and cover, an air dome member including an air dome to produce continuous flow threaded into said boss over said outlet valve and operable to hold said cover and screen in position.

10. In a pump, cooperating casing members and a diaphragm clamped between said members, pump operating means in one of said casing members, a partition in the other casing member, the partition and diaphragm forming a variable volume pumping chamber, a radial wall above the partition forming a segmental reservoir, inlet and outlet valves in said wall, one valve being in the center of the casing, a cover for said reservoir, a screen clamped between the casing member and cover, an air dome element to produce a continuous flow secured to the wall above said outlet valve and serving to hold said cover and screen in position.

11. The invention defined by claim 10, said other casing member having a delivery passage from a position above said outlet valve, the radial wall having a passage from the region above the screen to the pumping chamber below the partition, the inlet valve being in said passage, said other casing member having a fluid admitting opening to the region below the screen.

12. In a pump, a casing member, a movable pump member, means to move said movable pump member, said member recessed at one end to form a pumping chamber for said movable pump member, said casing having a transverse wall closing said recess, a radial wall in said casing member above said transverse wall and forming an arcuate receiving chamber, said casing having an opening communicating with said receiving chamber, said radial wall having a hollow, tubular boss at the end of the wall removed from the periphery of the casing, said radial wall also having a passage parallel with the tube of said boss, inlet and outlet valves in said passage and tubular boss respectively, filtering means in said receiving chamber forming therein an upper region for clean fluid, said parallel passage arranged to provide communication from said upper region to said pumping chamber, and conduit means for the discharge of fuel from said boss above said outlet valve, said hollow boss having an upper end closure to form an air dome above the outlet valve.

13. In a pump, a casing member, a movable pump member, means to move said movable pump member, said member recessed at one end to form a pumping chamber for said movable pump member, said casing having a transverse wall closing said recess, a radial wall in said casing member above said transverse wall and forming an arcuate receiving chamber, said casing having an opening communicating with said receiving chamber, said radial wall having a hollow tubular boss at the end of the wall removed from the periphery of the casing, said radial wall also having a passage parallel with the tube of said boss, inlet and outlet valves in said passage and tubular boss respectively, filtering means in said receiving chamber forming therein an upper region for clean fluid, said parallel passage arranged to provide communication from said upper region to said pumping chamber, and conduit means for the discharge of fuel from said boss above said outlet valve, said hollow boss being integrally closed at its upper end to form an air dome above the outlet valve.

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