

Jan. 12, 1943.

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2,308,041

FUEL PUMP

Original Filed July 3, 1939

2 Sheets-Sheet 1

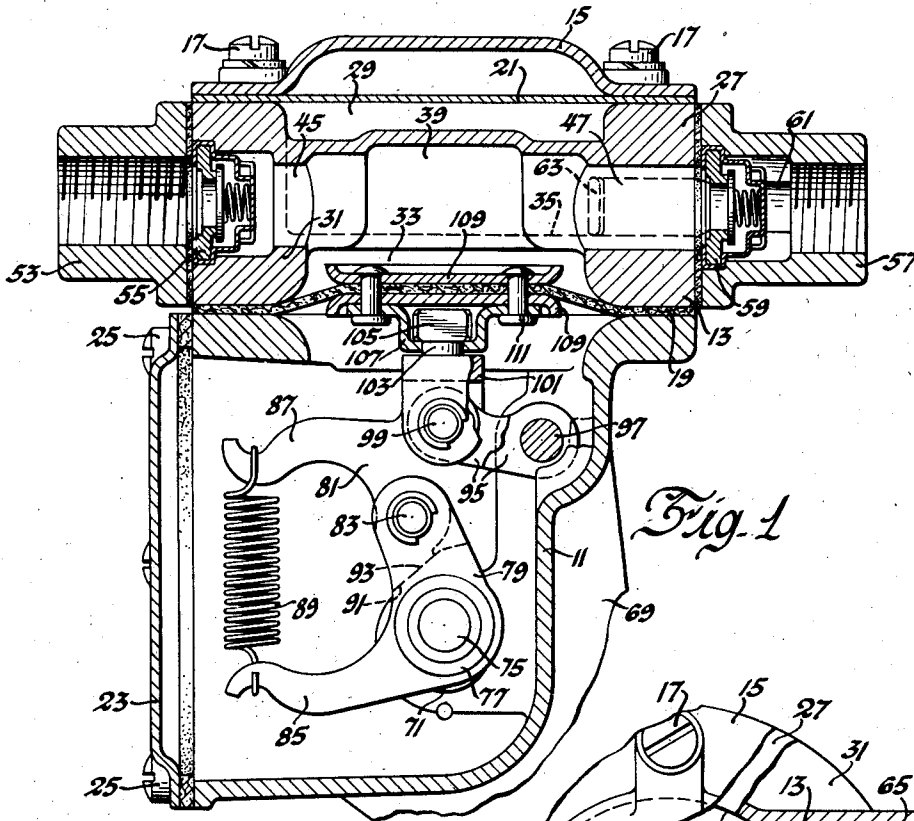


Fig. 1

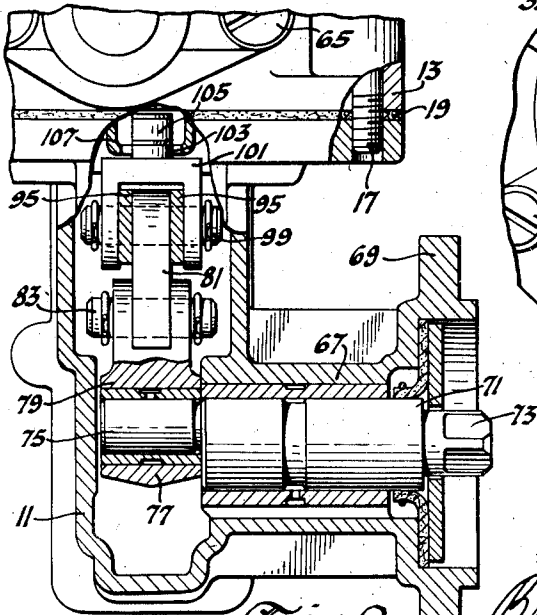


Fig. 2

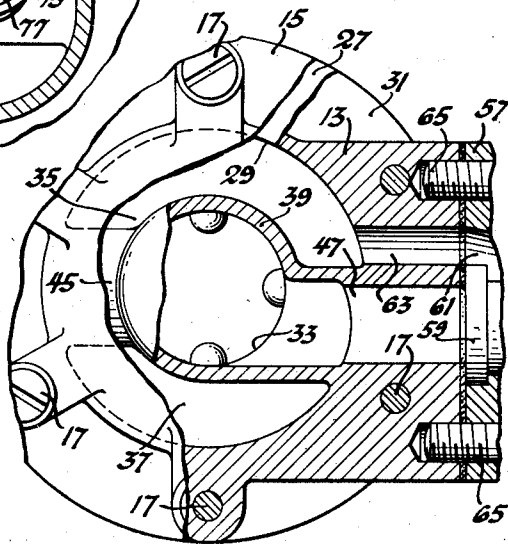


Fig. 3

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2 Sheets-Sheet 2

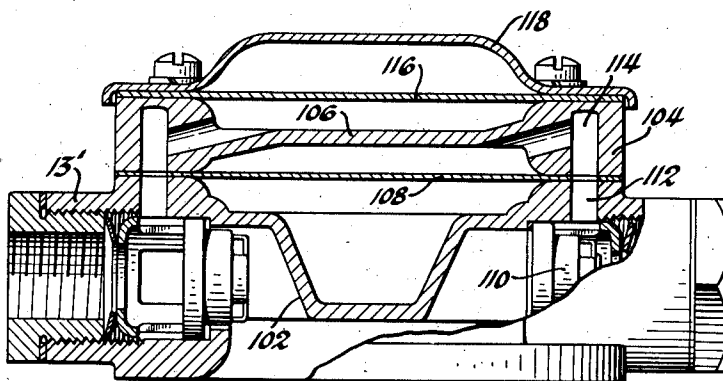


Fig. 4

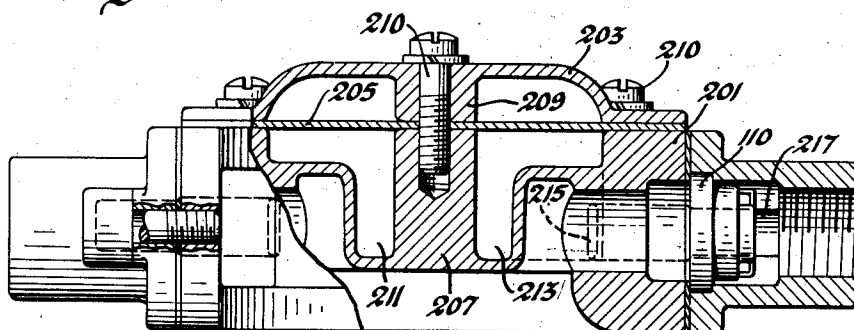


Fig. 5

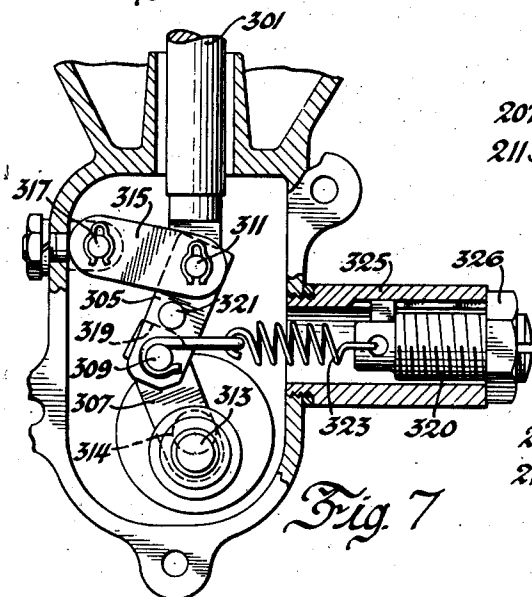


Fig. 7

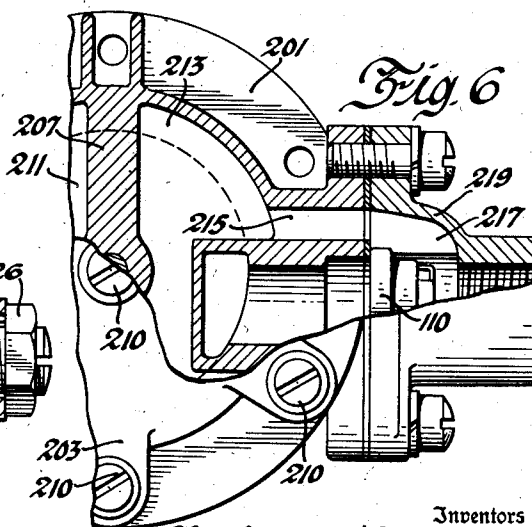


Fig. 6

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UNITED STATES PATENT OFFICE

2,308,041

FUEL PUMP

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Original application July 3, 1939, Serial No. 282,707. Divided and this application September 27, 1941, Serial No. 412,590

4 Claims. (Cl. 103—224)

This invention relates to pumps and has been designed to improve the pumps which are used to supply fuel for internal combustion engines.

An object of the invention is to provide an improved operating mechanism.

Another object resides in an improved form of pulsator.

Other objects and advantages will be understood from the description which follows:

This application is a division of our application for Fuel pump, Serial No. 282,707, filed July 3, 1939 and patented on December 16, 1941, as Number 2,266,297. The earlier filed application is intended to obtain protection for the operating means. This application seeks to obtain protection for the pulsator.

In the drawings:

Figure 1 is a vertical section through one embodiment.

Figure 2 is a vertical section at right angles to that shown by Figure 1.

Figure 3 is a top plan view partly broken away and in section.

Figure 4 is a vertical section through the upper part of the modified form.

Figure 5 is a vertical section through the upper part of another modification.

Figure 6 is a horizontal section through the modification shown in Figure 5.

Figure 7 is a vertical section of a modified form of operating mechanism.

In the form of invention shown by Figures 1 to 3, numeral 11 is used to designate a housing for the operating mechanism. Numeral 13 is the body member of the pump and 15 is a cap. Bolts 17 secure these parts together. The main diaphragm marked 19 is clamped between the housing 11 and the body 13. A second diaphragm 21 constituting a part of a pulsator is clamped between body 13 and cap 15. Housing 11 is closed by a cover 23 secured by screws 25.

The body 13 at its top has a circular ledge 27 forming a space 29 beneath diaphragm 21. The body 13 has a lower circular ledge 31 forming a space 33 above the diaphragm 19. As shown by Figure 3 the body 13 beneath the space 29 is formed into two arcuate chambers 35 and 37 which are open to space 29. The two chambers 35 and 37 are separated by a transverse partition. This partition includes a circular dome 39 closed at its top and open to the space 33, an inlet passage 45 extending somewhat radially and a similar and slightly offset outlet passage 47.

A flange 53 seats against the body over the inlet passage 45 and holds in position an inlet valve

designated by numeral 55. This valve controls a passage of fuel from a source of supply to the fuel pump chamber 33. A second flange 57 is secured to the body over the outlet passage 47. It houses an outlet valve 59. Just beyond valve 59, flange 57 is formed with a passage 61 registering with a passage 63 in the body, passage 63 opening into space 35. For supplying the float bowl of the carburetor, a pipe, not shown, is to be connected to flange 57. The flanges 53 and 57 are secured by fastening means 65.

In the lower part of housing 11 is a tubular extension 67 terminating in an attaching flange 69. Rotatably mounted in the tubular extension is a shaft 71 having a projecting driving end 73. At the other end of this shaft and within the housing is an eccentric pin 75. Rotatable on pin 75 is the eye 77 of a link 79. A second link 81 is rotatably associated with link 79 by a connecting pin 83. Links 79 and 81 have arms 85 and 87 respectively and a coil spring 89 is connected to these arms. In pulling the arms together the spring brings into contact faces 91 and 93 on the links and do so before the links reach alignment. A retaining link 95 is pivoted to the housing at 97 and its other end is pivoted to link 81 by pin 99. Pin 99 is also connected to the lower forked end of a stem 101. The stem has a neck 103 and a head 105. The head and the neck are projected through a rectangular aperture of a plate 107. Thereafter the stem 101 is rotated about its axis through 90 degrees to lock the stem and plate 107 from separation. This construction will be understood by comparing Figure 1 and Figure 2. Above and below the diaphragm are reinforcing plates 109. The two plates, the diaphragm, and the plate 107 are secured together by fastening means 111.

The pump may be located in any position where driving means is available for rotating shaft 71. The eccentric pin operates through the instrumentality of links 79 and 81 and the stem 101 to reciprocate the diaphragm. Fuel is drawn into the pump chamber through valve 55 in response to the suction stroke of the pump and it is forcibly ejected through valve 59 by the discharge stroke. Uniform discharge is made possible by the pulsator, the pulsator including chambers 35, 37 and 29 together with the diaphragm 21 backed by the air cushion between the diaphragm and the cap 15. Spring 89 biases the linkage to that position where faces 91 and 93 are in contact with the result that as long as this contact is made, full strokes both of suction and discharge occur. The discharge stroke may be resisted by built up pressure at

the pump outlet due to the closure valve in the carburetor. When this outlet pressure is sufficient to overcome spring 89, the spring yields and a collapse of links 79 and 81 occurs. It will be observed that since the spring is connected only to the links and has no contact with a fixed abutment its force is applied wholly to the diaphragm and it offers no resistance to the suction stroke merely opposing resistance to the discharge stroke to the extent of the built up pressure at the pump outlet valve. The force required to operate the pump is therefore reduced to a minimum owing to the floating support of the spring.

Figure 4 shows a modification in which the body 13' has inlet and outlet ports substantially as before. The body has a depressed region 102, the space around this region being a part of the pump chamber. Above the body is a member 104 having an intermediate partition 106. A diaphragm 108 is preferably clamped between the circular margins of the body member and member 104. In advance of the outlet valve 110 the body is formed with a passage 112 communicating with a passage 114 in member 104 leading to the space between the diaphragm 108 and the partition 106, this space serving as a pulsator for the outlet valve. To provide a pulsator for the inlet valve there is a second diaphragm 116 located between the top of member 104 and a cap 118. The space between the partition 106 and the diaphragm 116 is in communication by suitable passages in the member 104 and the body member with that side of the inlet valve remote from the pump chamber. By this construction a pulsator effect is provided for both the inlet and discharge of fuel.

The modification by which a double pulsator may be provided with but a single pulsator diaphragm is shown in Figures 5 and 6. In these figures a body 201 and cap 203 clamp between them a diaphragm 205. The body and cap have transverse partitions 207 and 209 registering with each other whereby two chambers 211 and 213 are formed. The chamber 213 communicates by means of passages 215 and 217 in the body and the valve carried flange 219 with the region beyond the outlet valve. Chamber 211 is similarly associated with the space on the side of the inlet valve remote from the pump chamber. Suitable means 210 secure to them the cap and the body.

For some purposes the operating arrangement shown in Figure 7 may be used. In this form a stem 301 is connected to a diaphragm, not shown, and corresponds with the stem 101 of Figure 1. Links 305 and 307 connected together at 309 are terminally connected at 311 to the stem 301 and to an eccentric 313 on a rotary shaft 314. A guide link 315 is connected to pin 311 and to a

pin 317 carried by the housing. Link 307 has a specially formed surface 319 to engage a pin 321 in link 305 and thereby prevents alignment of the links. A spring 323 is hooked to pin 309 and to a plug 320 adjustably held within a tubular member 325 threaded into the housing. A nut 326 threaded on the plug and engaging the end of tubular member 325 provides adjustment for the spring. In this form of the invention the surface 319 of link 307 normally engages the pin 321 of link 305 under the influence of the spring 323. This relation of links 305 and 307 prevails at all times except when the outlet pressure of the pump overcomes the tension of the spring 323 at which times during the discharge movement of the eccentric the linkage collapses.

We claim:

1. A pump having a pump body formed with a pump chamber together with inlet and outlet valves, means forming a plurality of pulsator chambers, said chambers being in communication with the sides of said valves remote from the pump chamber together with a single diaphragm closing said pulsator chambers and a recessed hollow cap secured to said pump body above said diaphragm to form therewith closed air spaces one above each pulsator chamber.

2. A pump having a pump body formed with a pump chamber together with inlet and outlet valves, means forming a plurality of pulsator chambers, said chambers being in communication with the sides of said valves remote from the pump chamber, said pump body having a partition on its side remote from the pump chamber to separate said pulsator chambers, a diaphragm closing said pulsator chambers and a cap having a partition to register with said first named partition and to form with said diaphragm an air sealed cushion above each pulsator chamber.

3. In a pump, a body, one side of said body forming a pump chamber wall, the other side of said body formed with a dividing partition to make pulsator chambers, a diaphragm over said body to close said pulsator chambers, a cap secured to said body and means constituting a part of said cap to form with said diaphragm closed air cushions one over each pulsator chamber, valves for said pump, said pulsator chambers communicating with the pump inlet and outlet in regions on the sides of the valves remote from the pump chamber.

4. The invention defined by claim 3, said means comprising a partition registering with said first named partition.

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