Oct. 9, 1934. E. A. ROCKWELL 1,976,520

STAMPED FUEL PUMP

Filed Dec. 14, 1931 2 Sheets-Sheet 1

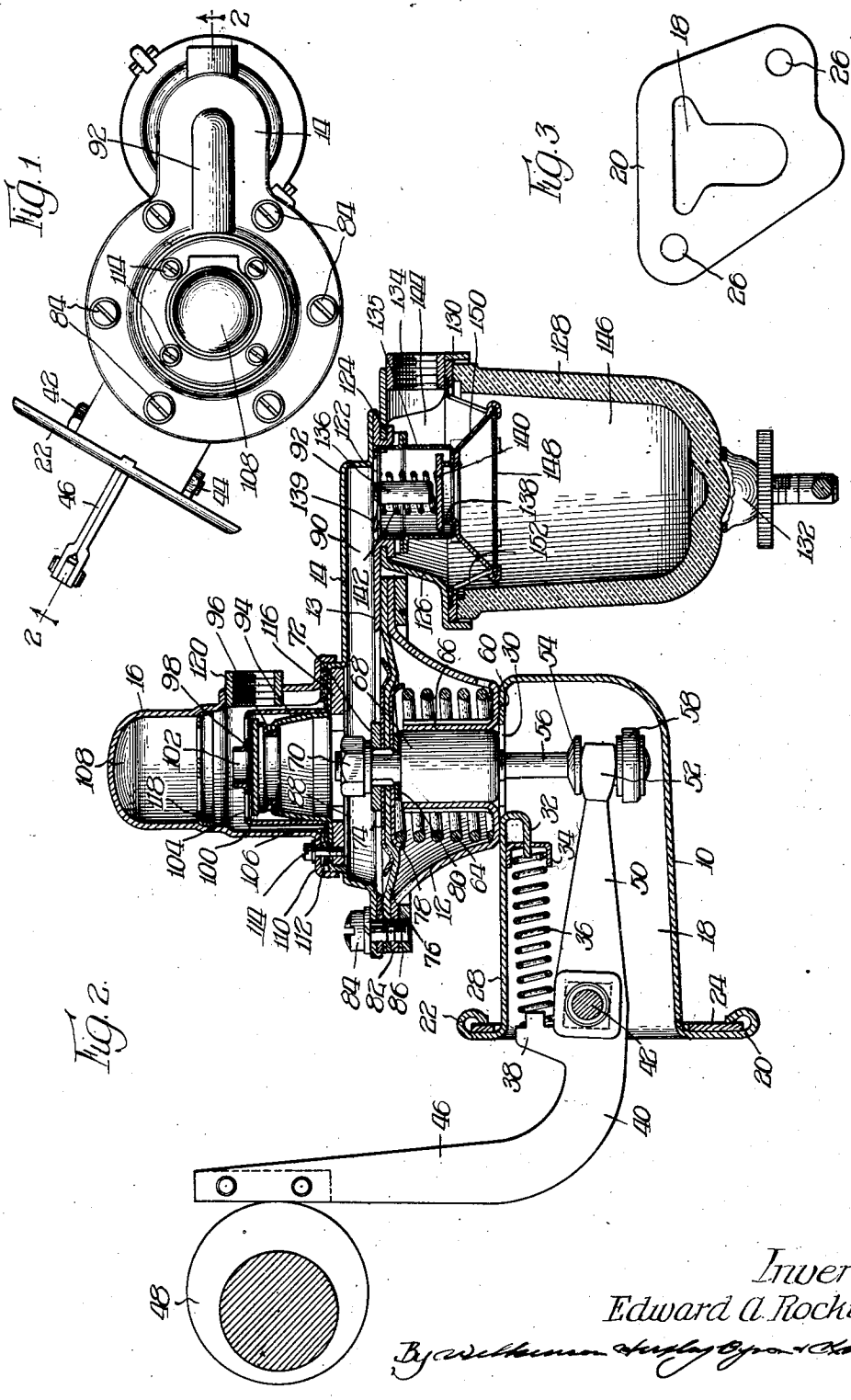


Fig. 1.

Fig. 3.

Fig. 2.

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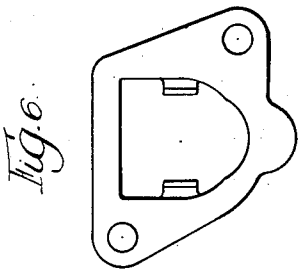


Fig. 6.

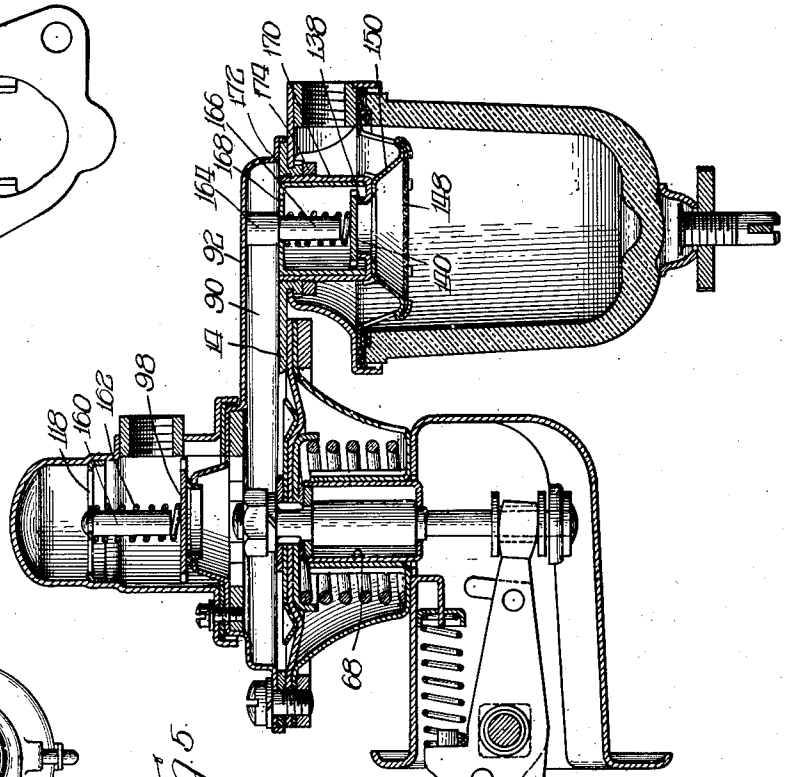


Fig. 5.

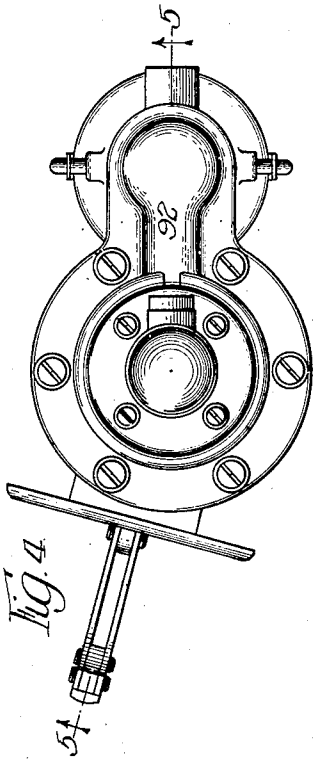


Fig. 4.

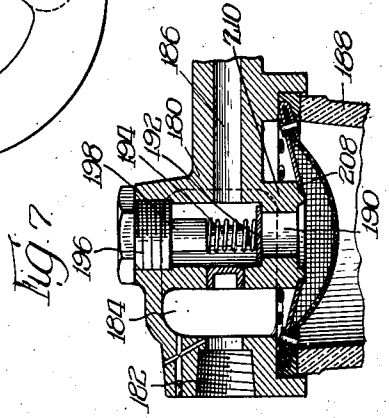


Fig. 7.

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1,976,520

STAMPED FUEL PUMP

Edward A. Rockwell, Chicago, Ill.

Application December 14, 1931, Serial No. 580,820

10 Claims. (Cl. 103—150)

This invention relates to improvements in fuel pump constructions of a type adapted for feeding fuel from a supply tank to the carbureter of an engine and designed for mounting on an engine casing to derive actuation from an engine-driven cam.

It is an object of the present invention to disclose a fuel pump of a design which is cheaper and more economical to construct and manufactured principally from stamped parts.

It is further an object of the present invention to form a fuel pump casing of metal stampings in order to obtain a compact arrangement of the pump parts and retain flow passages of sufficient cross sectional area to take care of the maximum fuel capacity and further enable the use of relatively large area check valves.

It is further an object of the present improvements to provide an improved arrangement for supporting the filter screen in the fuel receiving chamber.

Further and additional objects of the present invention will be more readily apparent from the description taken in connection with the attached drawings, in which

Figure 1 is a plan view of a fuel pump construction;

Figure 2 is a vertical section taken on the plane indicated 2—2 in Figure 1;

Figure 3 is a side view of a portion of the fuel pump casing;

Figure 4 is a plan view of a modified construction of fuel pump;

Figure 5 is a vertical section taken on the plane indicated 5—5 in Figure 4;

Figure 6 is a side view of a portion of the fuel pump casing, and

Figure 7 is a detail vertical section of a portion of the fuel pump illustrating further modifications.

Two designs of fuel pumps are disclosed in Figures 1 to 3 and 4 to 6, respectively. Each embodies substantially the same casing design. Previously it has been customary to manufacture the casing of a fuel pump of this character adapted for feeding fuel to a carbureter from a pair of castings secured together for clamping the pumping diaphragm. It has been suggested to make the vapor dome for the fuel pump of a metal stamping which can be removably secured on one of the pump casting parts but it is a preferred feature of the present construction to disclose a fuel pump which may be built up substantially wholly from metal stampings thereby making for a cheaper construction.

Describing first the fuel pump illustrated in Figures 1, 2 and 3, it will be noted that the fuel pump casing generally includes a base part 10, a middle part 12, a top part 14 and additionally a cap or dome 16. Each of these parts is formed from a metal stamping. The part 10 includes a cavity 18 therein which is adapted to communicate with the interior of an engine casing since the part 10 is designed to be mounted on the engine casing at its flanged side 20. The flanged side 20 may be curled over, as indicated at 22, to retain a strengthening ring 24. The outline of the flanged side 20 is shown in Figure 3 and it is provided with holes 26 to receive bolts for securing the pump to the engine casing.

The top wall 28 of the part 10 includes an opening 30 formed by a stamped-out piece 32 which is bent over, as shown in Figure 2. The stamped-out piece 32 forms a seat for the abutment member 34 engaged by the spring 36 which reacts at its other end against a projection 38 on the lever 40. Lever 40 is carried by the pivot pin 42 extending transversely of the cavity 18 and held in position by nut 44, as indicated in Figure 1. The outwardly extending arm 46 of the lever is bent upwards for thrust engagement with a rotatable engine-driven cam 48. It will be noted that the spring 36 acts as a follower spring to maintain engagement of the lever arm 46 with the cam 48. The inwardly extending arm 50 of the lever 40 includes a yoked end 52 which engages a spool 54 slidable on a stem 56 and limited in its downward movement by the abutment 58 secured to the stem 56. The arrangement is such that the actuation of the lever can only transmit a downward movement to the stem 56 and the upward movement of the stem 56 may be variable. The spring 36, as shown, extends above the lever substantially at right angles to the axis of the stem 56.

The part 12 is welded or otherwise secured to the part 10 at their meeting faces 60 surrounding the opening 30. The member 12 includes an annular recess 62 for receiving the discharge-producing spring 64. The central portion of the member 12 is upwardly flanged, as shown at 66, to form a guide bearing for the cylindrical member 68 which is secured to stem 56. The stem 56 is secured by the nut 70 to a washer 72, a formed top plate 74, a flexible diaphragm 76, a bottom plate 78 and a washer 80. All of these parts are clamped between the nut 70 against the top portion of the cylindrical part 68. The bottom plate 78 is curled over at its marginal edge to seat and position the upper end of the discharge spring 64. The marginal edge of the diaphragm 56 is clamped against

the marginal edge 82 of the stem part 12 by a plurality of screw bolts 84 which also serve to hold the stamped part 14 to the stamped part 12. A supporting plate 13 serves to strengthen the construction by being clamped between the stamped parts 12 and 14. The plate 13 has a circular opening closed by the reciprocable diaphragm. The ends of the screw bolts 84 are threaded into a ring 86 which is clamped against the bottom of the marginal edge 82 of the stamped part 12.

The stamped part 14 is hollowed out on its underside to form a pumping chamber 88 which is in communication with the lateral fuel passage 90 formed by the pressed-out portion 92. The central portion of the stamped part 14 is pressed upwardly, as at 94, and has secured thereto a stamped valve seat 96 which is flanged over for securement to the upwardly pressed-out portion 94. The valve seat 96 is engaged by the outlet check valve 98 which is positioned concentrically with respect to the axis of the diaphragm and is of substantially a large area. The check valve 98 is retained in place by a hollowed-out stamping 100 which is formed with a pressed central opening 102 over the check valve 98 and additional fuel flow openings 104 in its top wall. The pressed-out marginal lower flange 106 seats upon the top face of the stamped part 14.

The stamped part 16 encloses the outlet check valve and is provided with a dome-shaped chamber 108 at its upper end adapted to trap fuel vapor and air to form a cushion on the outlet side of the pump and has a pressed-out lower flange 110 adapted to seat upon a gasket 112 and upon the stamped part 14. The parts 16 and 94 are secured to the part 14 by the screw bolts 114 which are threaded into a strengthening ring 116 carried within the fuel pumping chamber. The part 16 has pressed thereinto a perforated baffle plate 118 immediately above the discharge passage from the part 94. On one side the part 16 has secured thereto an internally threaded plug 120 which forms a suitable connection for the delivery pipe line. It will be noted that the axis of the plug 120 is substantially on the same horizontal plane with check valve 98.

In the operation of the pump, fuel is delivered upwardly through part 94 on each discharge stroke of the pumping diaphragm. The fuel will contain some vapor due to the agitation of the pumping action and the heat of the engine or due to other means which may be employed. Bubbles of fuel vapor separate out from the liquid fuel after passing the check valve 98 due to the decrease in pressure on the fuel and will tend to rise through the perforations of the baffle plate 118 into the vapor dome chamber 108. The liquid fuel will pass out laterally through the connection plug 120.

The plate 13 is formed with a stamped-out opening 122. The portion which is stamped out to provide the opening 122 is curled over, as at 124, for securing thereto a stamped cap 126 which forms a top closure for the fuel trap bowl 128. The bowl 128 is secured to the marginal flanged portion 130 of the cap 126 by suitable removable securing means, partially indicated at 132. The cover 126 has secured thereto an internally threaded plug 134 similar to the plug 120 and which forms a connection for the inlet pipe line. A metal stamping 135 is secured to the opening 122 formed by the pressed-out portion 124 and includes at its bottom an upwardly curved valve seat 138 for the outlet check valve 140. A stem 136 is supported above the check valve 140 by the cross piece 139. The stem 136 is spaced from the check valve 140 to limit the opening movement thereof and also serves to position a light spring 142 which reacts between the cross pieces 139 and the check valve 140 to normally hold the inlet check valve on its seat. The fuel delivered through the inlet pipe connection flows into a pressed out chamber 144 on the bottom side of the cap 126 and flows downwardly into the chamber 146 formed by the bowl 128.

In order to form a support for a filter screen 148 there is shown a stamped piece 150 which is welded or otherwise secured to the bottom portion of the valve seat member 36 and is provided with stamped-out openings 152 which allow the fuel to flow downward into the chamber 146. The screen is supported by tongues 154 which are stamped out of the openings 152 and are curled over to support the marginal edge of the screen 148. The fuel therefore flows around the edge of the screen 148 into the sediment trap bowl and then flows upwardly through the screen and past the inlet check valve into the pumping chamber.

The construction of the fuel pump shown in Figures 4, 5 and 6 is in general very similar to the first form described and similar reference characters have been employed as far as possible. It will be noted however that the outlet check valve retaining member 100 has been replaced by a depending stem 160 secured centrally to the baffle plate 118. The stem 160 serves to limit the opening movement of the check valve 98 and further serves to retain in position a spring 162 which serves to hold the check valve 98 on its seat under light pressure.

The construction of the cage for the inlet chamber and the support for the filter screen 148 is slightly modified. In Figure 5 a stem 164 having a reduced lower portion 166 is positioned and retained by the member 168 which engages the enlarged portion of the stem 164 to press it against the underside of the hollowed-out portion 92 forming the flow passage 90. The member 168 is suitably open at its upper side to permit free flow of fuel around the stem 164. The member 168 is seated in a cup-shaped member 170 corresponding to the member 135 in Figure 2. The member 170 is screw-threaded into the bottom wall of the plate 13, as at 172, and is suitably locked in position by nut 174. The member 170 has an upwardly curved bottom edge 138, the same as in Figure 2, to form a seat for the inlet check valve 140. The screen supporting member 150 which is secured to the bottom of the member 170 is formed the same as in Figure 2. The cylindrically enlarged portion 68 which serves to guide the movement of the stem 56 may be formed as indicated in Figure 5 by a pressed-metal cylinder attached to the stem 56.

As further illustrating an arrangement for supporting the filter screen in the inlet trap chamber, I have shown in Figure 7 a part 180 of a pump casing formed, in this embodiment, of a casting. The threaded connection 182 is the inlet connection in communication with a chambered portion 184 on the bottom side of the head 180. The lateral fuel flow passage 186 leads to the pumping chamber. A sediment trap bowl 188 is secured to the underside of the head 180 in any desired manner. The head 180 has a vertical flow passage 190 concentric with the bowl 188 and including therein an inlet check valve 192 retained on its seat by the spring 194 which is positioned by the removable threaded stud 196 having a depending stem 198. A circular plate 200 is secured

at its marginal edge 202 by clamping of the bowl 188 to the head 180. The plate 200 has secured thereto by open rivets 204 a filter screen 206 which serves to filter the fuel passing upwards towards the outlet flow passage 190. The plate 200 seats at 208 on the depending cylindrical extension 210 of the head 180. It will be apparent that in this construction the fuel passing into the trap chamber must flow through the openings in the rivets 204 in order to reach the bottom part of the bowl 188 from which it must flow through the screen 206 to reach the check valve. This construction may be employed in place of the form of support of screen shown in the other constructions.

I claim:

1. In a fuel pump of the type adapted for mounting on an engine casing to derive actuation from the engine for feeding fuel from a supply tank to the carbureter of the engine, a stamped pump casing comprising a first stamped casing part having a chambered cavity therein open at one end for communication with an engine casing and outwardly flanged at said open end for securement to the engine casing, an actuating lever pivotally supported by said stamped casing part, said stamped casing part including an inwardly bent tongue stamped out of its upper wall, a spring seat member carried by said stamped-out tongue, a follower spring reacting between said lever and said spring seat member, a second stamped casing part secured to the top wall of said stamped casing part adjacent the first stamped-out opening therein, said second stamped casing part including an annular spring cavity, an upwardly directed guide bearing portion and a marginal diaphragm supporting flange, a pumping diaphragm clamped at its marginal edge to the marginal edge of said second stamped casing part, a reciprocable stem secured to the central part of said diaphragm guided for movement by the guide bearing portion of said second stamped casing part and extending into the cavity of said first casing part for operative connection with said lever, a compression spring received in the annular spring cavity of said second casing part and reacting against said pumping diaphragm and a third stamped casing part forming a pumping chamber secured to said second stamped casing part.

2. In a fuel pump of the type adapted for mounting on an engine casing to derive actuation from the engine for feeding fuel from a supply tank to the carbureter of the engine, a first stamped casing part having an outwardly flanged marginal edge adapted for attachment to an engine casing and forming a chambered lever receiving cavity, a second stamped casing part adapted for securement at its lower side to the upper side of said first stamped casing part and forming an annular spring receiving cavity, a reciprocable pumping diaphragm secured at its marginal edge to the upper side of said second stamped casing part, a third stamped casing part flanged at its lower side for attachment to the marginal edge of the pumping diaphragm and chambered on its underside to form a pumping chamber, said third stamped casing part having a lateral extension, a fuel receiving inlet chamber having its axis offset from the axis of said diaphragm and supported by said third stamped casing part, said fuel receiving inlet chamber having an inlet connection from a source of fuel supply, an inlet check valve concentric with the axis of said fuel receiving chamber, an outlet check valve adapted to seat upon a valve seat fixed to said third stamped casing part and concentric with respect to the axis of the diaphragm and a fourth stamped casing part secured to said third stamped casing part enclosing said outlet check valve, said fourth stamped casing part having an outlet connection for delivery of fuel from said pump.

3. In a fuel pump, a stamped supporting plate having a circular opening therein, a reciprocable pumping diaphragm spanning said opening and having its marginal edge bearing against one side of said supporting plate, a stamped cover plate having a chambered pumping cavity on its underside and clamped against said supporting plate, a stamped spring supporting member having an annular spring-receiving cavity and a marginal upper edge adapted for clamping against the lower side of the marginal edge of said diaphragm, a bolt-receiving ring on the underside of the marginal edge of said stamped spring-supporting member, a series of bolts for clamping the stamped cover plate and stamped spring supporting member to said diaphragm, a compression spring reacting between said diaphragm and the bottom portion of said stamped spring supporting member and a depending diaphragm operating stem extending through said stamped spring supporting member concentric with the axis of said diaphragm.

4. In a fuel pump a stamped casing part forming a pumping chamber, a reciprocable diaphragm forming a movable wall of said pumping chamber, said stamped casing part having a lateral extension, a second stamped casing part secured to said lateral extension, a fuel receiving bowl clamped at its upper open end to said second stamped casing part, an inlet connection to said second stamped casing part, an inlet valve cage mounted concentric with said fuel receiving bowl, an inlet check valve within said valve cage, a filter screen supporting member secured to said valve cage and having a marginal edge clamped between said bowl and said second stamped casing part, said filter screen supporting member having stamped-out tongues leaving openings for fuel flow and a filter screen gripped by said tongues.

5. In a filter construction for fuel pumps, a cup-shaped fuel receiving bowl, a cover for the upper end of said bowl to which said bowl is removably secured, a lateral inlet connection for delivery of fuel into said bowl, a housing having a vertical outflow passage concentric with said bowl depending from said cover, a check valve in said housing controlling the delivery of fuel upwardly through said outlet passage and preventing return flow into said bowl from said outlet passage, a spider supporting member having marginal portions thereof clamped between said bowl and said cover, the spider having a central opening, the marginal portion of which is secured to the lower end of said depending housing, a filter screen supported by said spider member within said fuel bowl, said spider member having openings permitting flow of the fuel from said inlet connection downwardly into said bowl without passing said filter and said filter member serving to filter the fuel delivered from said bowl by flowing upward towards said outlet passage.

6. In a fuel pump, a substantially flat transverse supporting plate having a pair of offset circular openings therein, one of said openings being materially larger than the other of said openings, a reciprocable pumping diaphragm spanning the largest of said openings and having its

marginal edge clamped against said supporting plate, a stamped cover member secured to the upper side of said supporting plate, said stamped cover member being recessed on its underside to form a pumping chamber above said diaphragm and a lateral flow passage from the smaller of said openings towards said pumping chamber, a valve housing member secured within the smaller of the openings in said supporting plate and depending therefrom, an inlet check valve positioned in said housing member and seating downwardly thereon, a spider member pressed into the upper end of said housing member, a stem depending from said spider member, a spring surrounding said stem and reacting between said spider member and said inlet check valve to normally hold said check valve in seated position and a fuel receiving chamber carried by said supporting plate concentric with said housing and having an inlet connection for flow of the fuel downwardly into said fuel receiving chamber and upwardly past said inlet check valve.

7. In a fuel pump a substantially flat transverse supporting plate having a circular opening therein, a reciprocable pumping diaphragm spanning said opening and having its marginal edge clamped to the underside of said plate, means for actuating said diaphragm, a stamped cover member secured to the upper side of said plate, said cover member being recessed on its underside to form a pumping chamber concentric with said diaphragm, a fuel receiving bowl, a cover member for said bowl secured to said supporting plate and depending therefrom, the cover member for said bowl having an inlet connection, a fuel inflow passage placing said fuel receiving chamber in communication with said pumping chamber, a stamped vapor dome secured to said first mentioned cover member concentric with said diaphragm, said vapor dome having an outlet connection for delivery of fuel therefrom, a fuel outflow passage between said pumping chamber and said vapor dome and inlet and outlet check valves in said passages.

8. In a fuel pump, a reciprocable pumping diaphragm, a transverse supporting plate to which the marginal edge of said diaphragm is secured, a stamped cover plate enclosing said diaphragm and forming a pumping chamber and an inflow passage leading to said pumping chamber surrounded by the walls of said cover plate and said transverse supporting plate.

9. In a fuel pump, a pump casing having a pumping chamber therein, a reciprocable pumping diaphragm, a reciprocable operating stem secured to said diaphragm, said casing forming a bearing and a stamped bearing member secured to said stem slidable within the bearing of said casing.

10. In a fuel pump, a pump casing including a cover member forming a pumping chamber, a reciprocable pumping diaphragm forming a movable wall of said pumping chamber, said cover member having a lateral extension, a fuel-receiving bowl clamped at its upper end to said cover member, a flow passage leading outwardly from said bowl to said pumping chamber, an inlet check valve in said flow passage concentric with said bowl, a filter screen supporting member secured at its central portion to said cover member and having its marginal edge clamped between said bowl and said cover member, said filter screen supporting member having openings for fuel flow downwardly therethrough and a filter screen carried by said supporting member and spanning the flow passage leading to the pumping chamber.

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