Jan. 6, 1942. L. J. GARDAY 2,269,097

TRANSFER PUMP

Filed May 2, 1938 2 Sheets-Sheet 1

Fig. 1

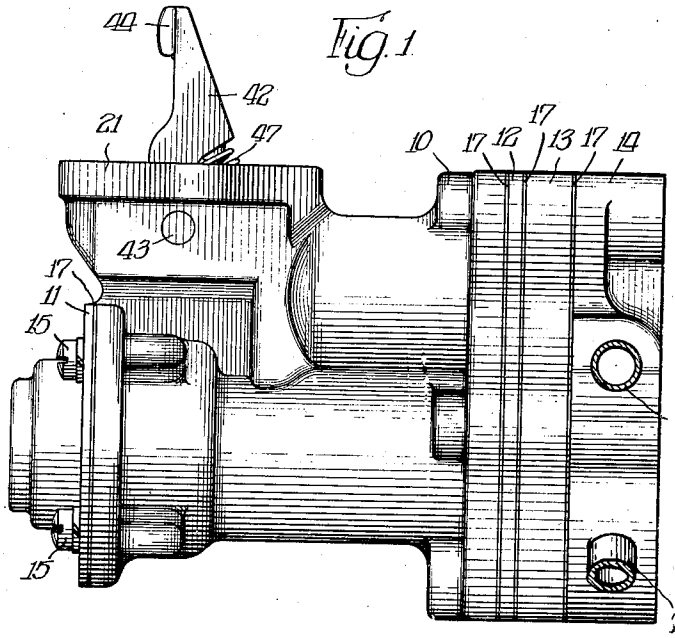

Fig. 2

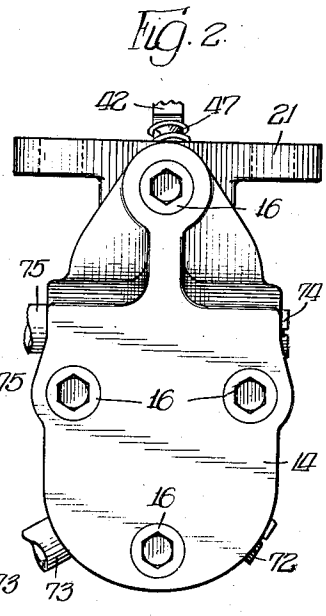

Fig. 4

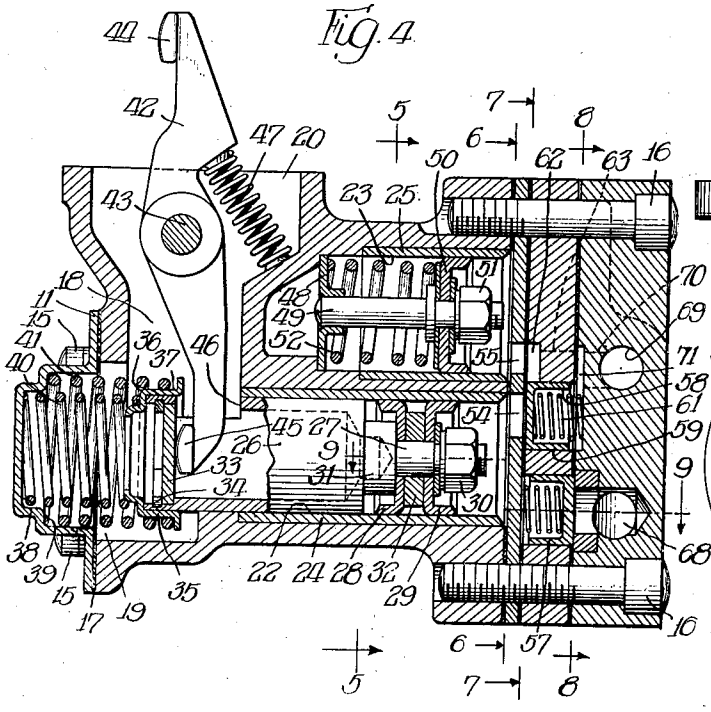

Fig. 3

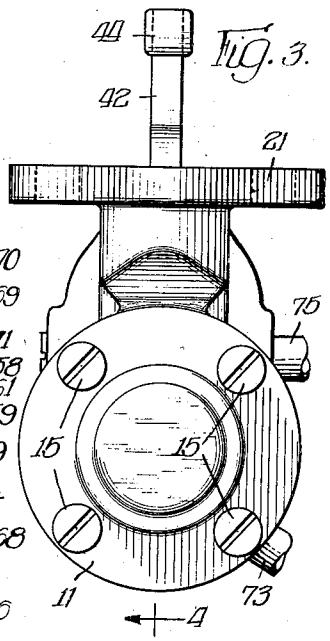

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Fig. 5.

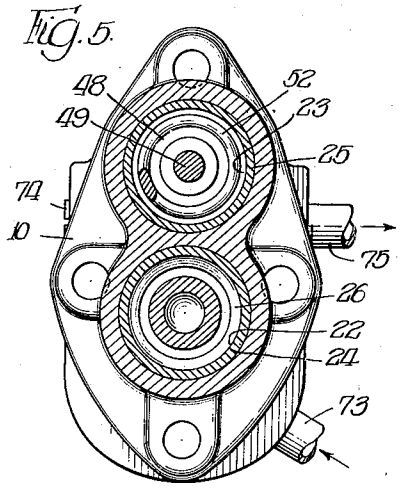


Fig. 6.

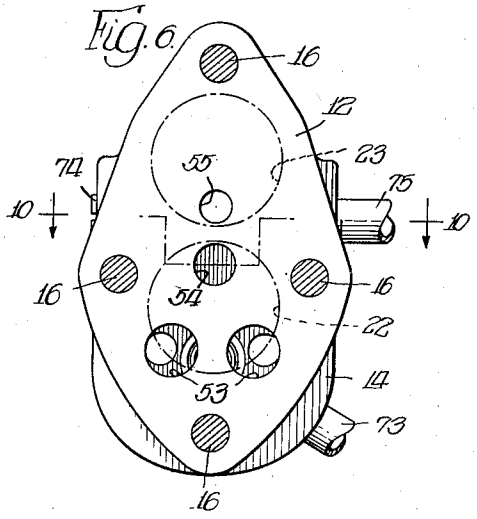


Fig. 7.

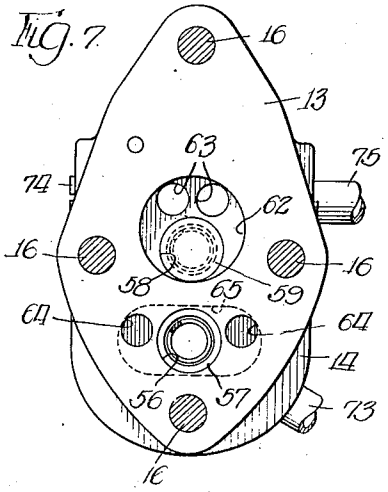


Fig. 8.

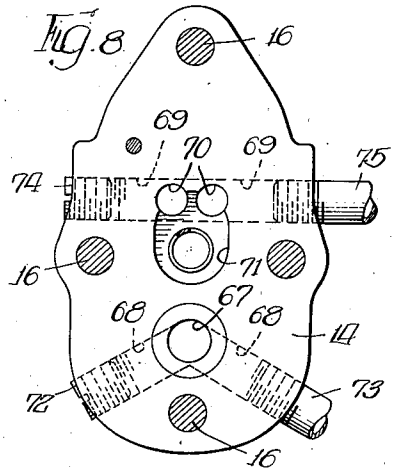


Fig. 9.

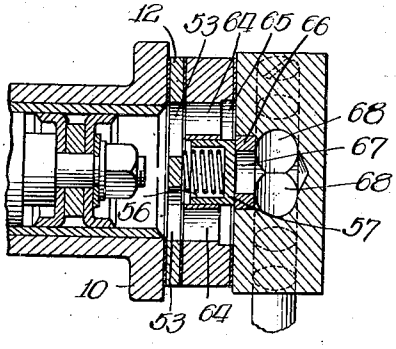
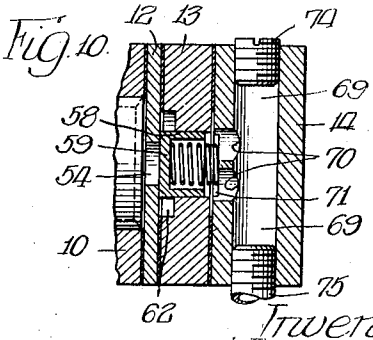


Fig. 10.



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Patented Jan. 6, 1942 2,269,097

UNITED STATES PATENT OFFICE

2,269,097

TRANSFER PUMP

Louis J. Garday, Waukesha, Wis., assignor, by mesne assignments, to The New York Trust Company

Application May 2, 1938, Serial No. 205,520

7 Claims. (Cl. 103—153)

This invention has to do with pumps of the type commonly used for transferring fuel from a supply tank to a carburetor or injection pump.

The principal object of the invention is to provide an improved pump of the type described which is highly efficient and dependable in operation and will deliver the fuel in a steady stream without objectionable pressure pulsation.

Another object of the invention is to provide a pump of this type which is simple in construction, inexpensive to manufacture and easy to take apart for cleaning or repair.

Other more specific objects and advantages of the invention will be evident to those skilled in the art upon a full understanding of the construction, arrangement and operation of the improved pump.

One embodiment of the invention is presented herein for the purpose of exemplification, but it will of course be appreciated that the invention is capable of being incorporated in other structurally modified forms coming equally within the scope of the appended claims.

In the accompanying drawings:

Fig. 1 is a side view of a pump constructed in accordance with the invention;

Fig. 2 is an end view of the pump;

Fig. 3 is an opposite end view of the pump;

Fig. 4 is a vertical longitudinal section through the center of the pump taken on the line 4—4 of Fig. 3;

Figs. 5, 6, 7 and 8 are vertical transverse sections through the pump, taken respectively on the lines 5—5, 6—6, 7—7 and 8—8 of Fig. 4;

Fig. 9 is a horizontal section, taken on the irregular line 9—9 of Fig. 4; and

Fig. 10 is a horizontal section, taken on the irregular line 10—10 of Fig. 6.

As will be observed in the drawings, the pump is a self-contained unit which is enclosed within a readily separable multi-part casing composed of a main body 10, an end plate 11, a valve plate 12, a valve housing 13 and a valve housing cover 14. The end plate 11 is fastened to one end of the body 10 by means of four screws 15, while the valve plate 12, valve housing 13 and valve housing cover 14 are together fastened to the other end of the body 10 by means of four relatively long screws 16. Thin sealing casings 17 are positioned between the flat meeting surfaces of all of these members.

The body 10 is provided with a chamber 18 in one end of the same, which chamber has an end opening 19 which is covered by the end plate 11 and a top opening 20 which is surrounded by an apertured attaching flange 21 used in bolting the pump assembly to the frame of an associated engine. The body 10 is further provided with a horizontal bore 22 in the lower portion of the same in connection with the lower portion of the chamber 18, and a relatively short blind bore 23 above the bore 22 separate from both the chamber 18 and the bore 22. The bores 22 and 23 are lined with cylindrical surfacing sleeves 24 and 25, and independently communicate, one above the other, with the valve plate 12.

The bore 22 in the body 10 contains a closely fitting horizontally movable plunger 26 of hollow cylindrical form which is provided at one end with a short axially projecting rod 27 on which a pair of oppositely facing cup packings 28 and 29 are secured by means of a nut 30. These packings seal against the inside of the liner 24 and are separated from the plunger 26 and from each other by spacing members 31 and 32. The plunger 26 is closed at its other end by a thrust disk 33 which fits within a groove on the inside of the plunger and is locked in position by a readily removable expansion ring 34. A collar 35 is capped over the same end of the plunger 26. This collar is provided with two concentrically arranged shoulders 36 and 37, in opposition to corresponding shoulders 38 and 39 on the inside of the end plate 11, and two coil springs 40 and 41 are compressed one within the other between these shoulders.

The chamber 18 in the body 10 contains an operating lever 42 which is pivotally mounted intermediate its ends on a cross pin 43. The upper end 44 of the lever projects up through the opening 20 for intermittent engagement with a cam (not shown) on a shaft of the engine, while the lower end 45 of the lever projects down through a hole 46 in the top of the hollow plunger 26 into engagement with the thrust disk 33 at the end of the plunger. A small coil spring 47 in the upper portion of the chamber 18 acts, with the springs 40 and 41, to cause the upper end 44 of the lever to follow the cam with which it coacts.

The small upper bore 23 in the body 10 contains a centrally apertured end disk 48 in which a rod 49 is slidably guided. A cup packing 50 seals against the inside of the liner 25 and is secured to the rod 49 by a nut 51. A coil spring 52 is positioned under compression between the disk 48 and the packing 50.

From the foregoing it will be understood that the plunger 26 is moved toward the left in the

bore 22 by the lever 42 against the yielding resistance of the springs 40 and 41 to effect the suction stroke of the pump, and that during each return movement of the lever the plunger is moved to the right by the springs 40 and 41 to effect the delivery stroke.

The valve plate 12 (see Fig. 6), which fits against the body 10 over the open ends of the bores 22 and 23, contains two lower holes 53 which register to a certain extent with the lower part of the open end of the bore 22, an intermediate hole 54 which registers with the upper part of the open end of the same bore, and an upper hole 55 which registers with the lower part of the open end of the bore 23.

The valve housing 13 (see Fig. 7), which fits in turn against the valve plate 12, contains a lower hole 56 in which a cup-shaped inlet valve 57 fits, and an upper hole 58 in which a cup-shaped outlet valve 59 fits. The inlet valve 57 is pressed against a seat on an opposed portion of the adjoining valve housing cover 14 by means of a small coil spring 60 which is compressed between the valve and an opposed portion of the adjoining valve plate 12 (see Fig. 9), while the outlet valve 59 is pressed against a seat on an opposed portion of the valve plate 12 by means of a small coil spring 61 which is compressed between the valve and an opposed portion of the adjoining valve housing cover 14 (see Fig. 10).

When the outlet valve 59 is seated, it closes off the intermediate hole 54 in the valve plate 12, and when it is unseated it allows fuel to flow from the bore 22 out through the hole 54 into a relatively large shallow recess 62 which is formed in that portion of the valve housing 13 in which the hole 58 for the outlet valve 59 is located. This recess 62 extends upwardly from the face of the outlet valve 59 into register with the upper hole 55 in the valve plate 12 and contains in its upper portion two small holes 63. The valve housing 13 is provided with two more small holes 64 (see Figs. 7 and 9), which are located at opposite sides of the hole 56 in which the inlet valve 57 is positioned. These holes 64, as well as the hole 56, open at the far side of the valve housing 13 into a shallow horizontally elongated recess 65. When the inlet valve 57 is pressed against its seat on the valve housing 14—which seat is a bronze ring 66 set into the face of the cover—it closes off the hole 67 in such seat and prevents any flow of fuel through the same into the bore 22. When the inlet valve 57 is unseated, however, fuel will flow through the hole 67 into the recess 65, and thence through the holes 64 in the valve housing 13 and holes 53 in the valve plate 12 into the open end of the bore 22.

The valve housing cover 14 (see Fig. 8) contains two oppositely disposed inlet ports 68 in the lower portion thereof, in communication with the hole 67 in the seat of the inlet valve 57, and two oppositely disposed outlet ports 69 in the upper portion thereof, in communication with two small holes 70. The holes 70 register with the holes 63 in the valve housing 13 and open into a shallow recess 71, which recess extends downwardly in the meeting face of the cover 14 into register with the back of the outlet valve 59. One of the inlet ports 68 is adapted to be closed by a screw plug 72 and the other connected with a conduit 73, while one of the outlet ports 69 is adapted to be closed by a screw plug 74 and the other connected with a conduit 75. These connections can be made at either side of the cover, to conform to any desired arrangement of the fuel conduits 73 and 75.

The valve plate 12, valve housing 13 and valve housing cover 14, when fitted together face to face in the manner illustrated and described, cooperate to provide a simple fluid-tight system of fuel passages. These passages are in effect (1) an inlet passage (port 68, hole 67, recess 65, holes 64 and holes 53) leading to the bore 22 of the pumping plunger 26; (2) an outlet passage (port 69, holes 70, recess 71, holes 63, recess 62 and hole 55) leading to the bore 23 of the pressure moderating piston 50; and (3) an intermediate passage (hole 54 and recess 62) connecting the bore 22 with the outlet passage. The inlet valve 57 is located in the inlet passage, while the outlet valve 59 is located in the intermediate passage.

When the plunger 26 is moved to the left by the lever 42 against the yielding resistance of the springs 40 and 41, the inlet valve 57 will unseat and fuel will flow into the bore 22. As soon as the lever 42 oscillates in the opposite direction, the force stored up in the springs 40 and 41 will move the plunger 26 to the right, and the outlet valve 59 will unseat, discharging the previously drawn-in fuel through the outlet passage. The pressure on the expelled fuel will cause the piston 50 in the bore 23 to back up momentarily, and this movement of the piston 50 will act to level off the peak pressure on the fuel being delivered by the pump, thereby eliminating the objectionable and damaging pulsations which usually characterize the operation of ordinary transfer pumps. While the lever 42 has an unvarying angular movement, the piston 26 will have a varying reciprocal movement, the extent of its movement toward the right on each stroke depending upon the back pressure in the outlet passage of the pump.

I claim:

1. In a transfer pump, a casing characterized by a chamber and a cylindrical pumping bore in connection with the chamber, a close fitting hollow cylindrical plunger slidably mounted in the bore, spring means in compressed engagement with one end of the plunger, and an operating lever which is pivotally mounted intermediate its ends in the chamber with one end of the lever projecting through an opening in one side of the plunger into thrust engagement with the inside of the first mentioned end of the plunger.

2. In a transfer pump, a casing characterized by a chamber and a cylindrical pumping bore in connection with the chamber, a close fitting hollow cylindrical plunger slidably mounted in the bore, spring means in compressed engagement with one end of the plunger, an operating lever which is pivotally mounted intermediate its ends in the chamber with one end of the lever projecting through an opening in one side of the plunger into thrust engagement with the inside of the first mentioned end of the plunger, an axial projection on the other end of the plunger, and sealing means mounted on the projection in fluid-tight engagement with the wall of the bore.

3. In a transfer pump, a casing characterized by a chamber and a cylindrical pumping bore in connection with the chamber, a close fitting hollow cylindrical plunger slidably mounted in the bore, spring means in compressed engagement with one end of the plunger, an operating lever which is pivotally mounted intermediate its ends in the chamber with one end of the lever

projecting through an opening in one side of the plunger into thrust engagement with the inside of the first mentioned end of the plunger, an axial projection on the other end of the plunger, and sealing means mounted on the projection in fluid-tight engagement with the wall of the bore, said sealing means consisting of two oppositely facing cup-shaped packing members.

4. In a transfer pump, a casing characterized by two cylindrical bores arranged side by side in spaced parallel relation, a plate secured to the casing over the ends of both bores, a pumping plunger slidably mounted in the first bore, means for reciprocating the plunger, an inlet valve carried by the plate in communication with the first bore, an outlet valve also carried by the plate in communication with both the first bore and the second bore, a piston slidably mounted in the second bore, and means for permitting the piston to back up momentarily to level off the peak pressure during each pumping stroke.

5. In a transfer pump, a chamber, a cylindrical bore in communication with the chamber, and a second cylindrical bore at one side of the first bore in spaced parallel relation to the latter, a pumping plunger slidably mounted in the first bore, an operating lever in the chamber coupled with the plunger for reciprocating the latter, a spring loaded piston slidably mounted in the second bore, a plate secured to the casing over the ends of both bores, an inlet valve in the plate in communication with the first bore, and an outlet valve in the plate in communication with both the first bore and the second bore.

6. In a transfer pump, a chamber, a cylindrical bore in communication with the chamber, and a second cylindrical bore at one side of the first bore in spaced parallel relation to the latter, a pumping plunger slidably mounted in the first bore, an operating lever in the chamber coupled with the plunger for reciprocating the latter, a spring loaded piston slidably mounted in the second bore, a plurality of plates secured one upon the other over the ends of both bores, an inlet valve in one of the plates in communication with the first bore, an outlet valve in one of the plates in communication with both the first bore and the second bore, and inlet and outlet passages in one of the plates in communication respectively with the inlet and outlet valves.

7. In a transfer pump, a chamber, spaced cylindrical bores, one of said bores being in communication with said chamber, a pumping plunger slidably mounted in the bore having chamber communication, an operating lever in said chamber for operatively reciprocating said plunger, a spring loaded piston in the other bore, a valve plate over the ends of both bores, said bores independently communicating with said plate, an inlet valve in said plate in communication with the bore having chamber communication, and an outlet valve in said plate in communication with both of said bores.

LOUIS J. GARDAY.