Nov. 21, 1933. J. V. GIESLER 1,936,328

PUMP

Filed April 10, 1929 4 Sheets-Sheet 1

Fig. 4.

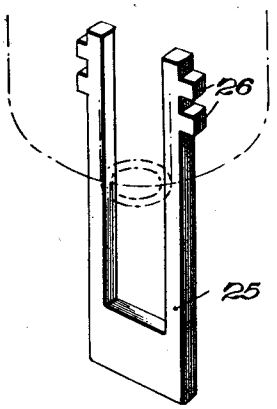
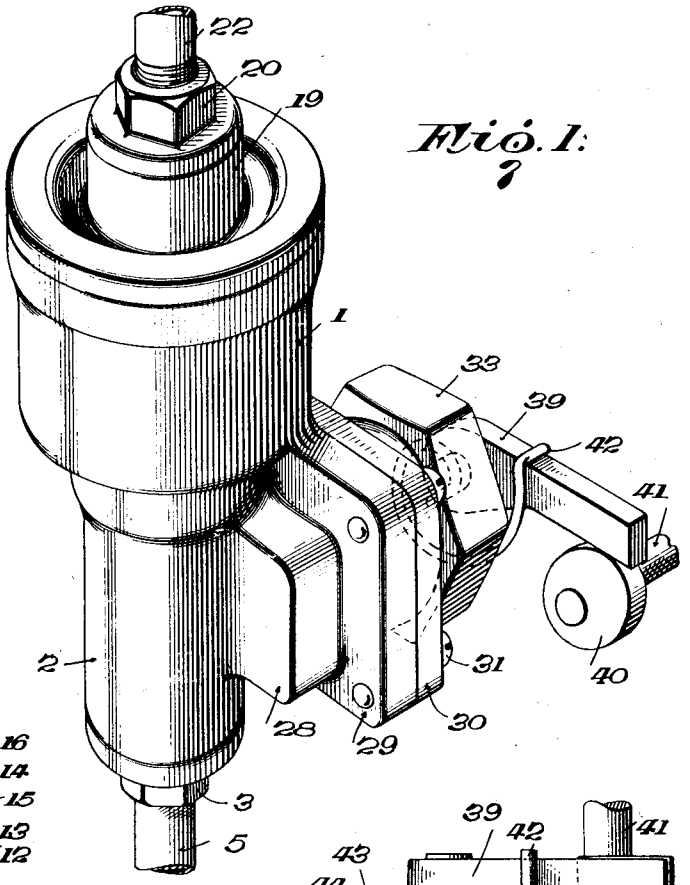


Fig. 1.



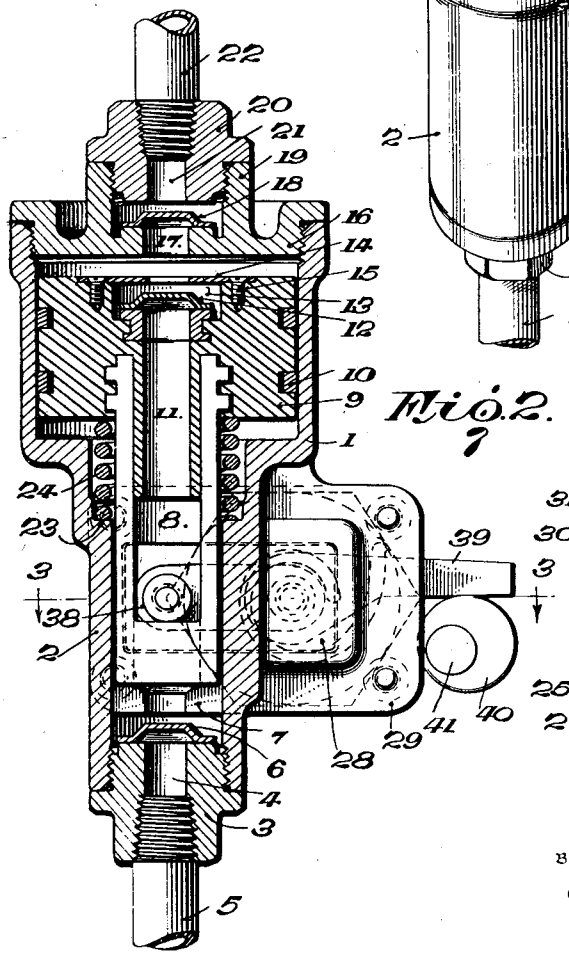


Fig. 2.

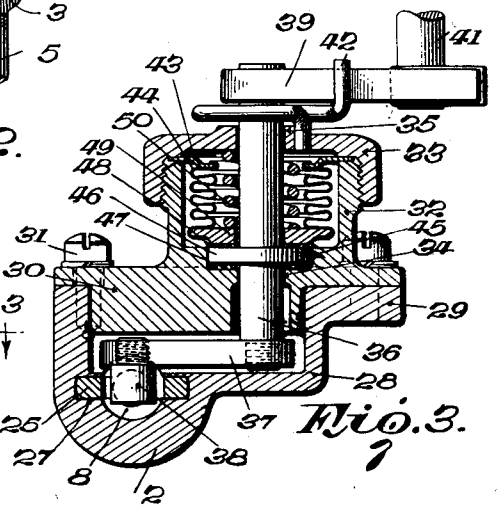


Fig. 3.

Inventor

Jean V. Giesler.

By

Cameron, Kerkam and Sutton.

Attorneys.

Nov. 21, 1933. J. V. GIESLER 1,936,328

PUMP

Filed April 10, 1929 4 Sheets-Sheet 2

Fig. 7.

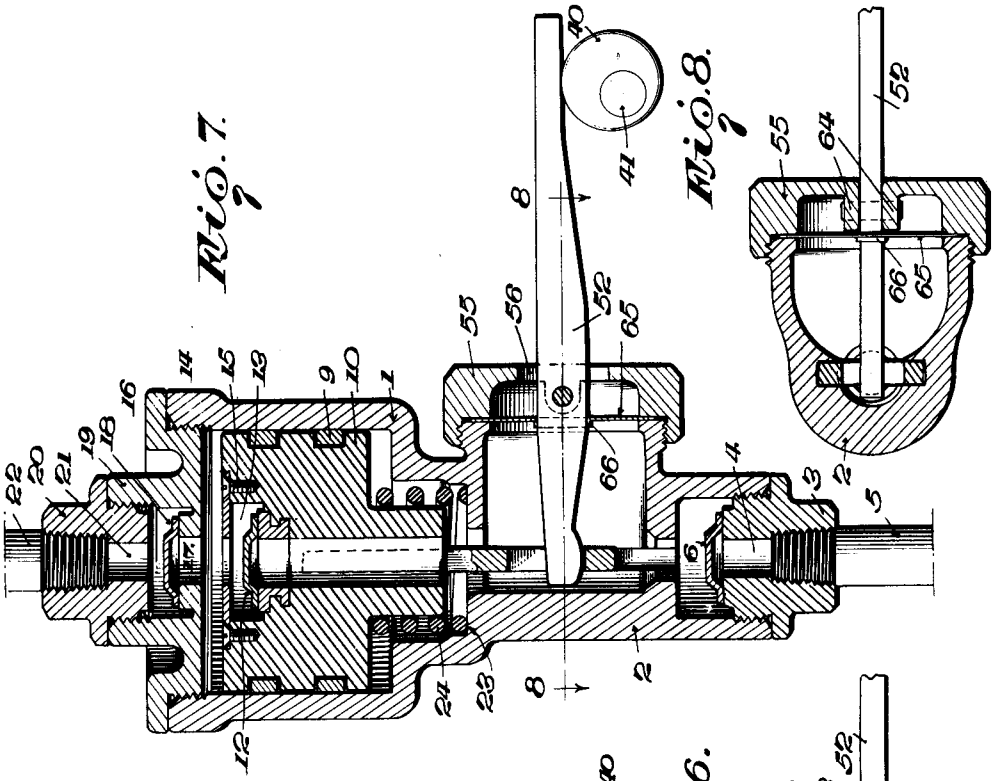


Fig. 8.

Fig. 5.

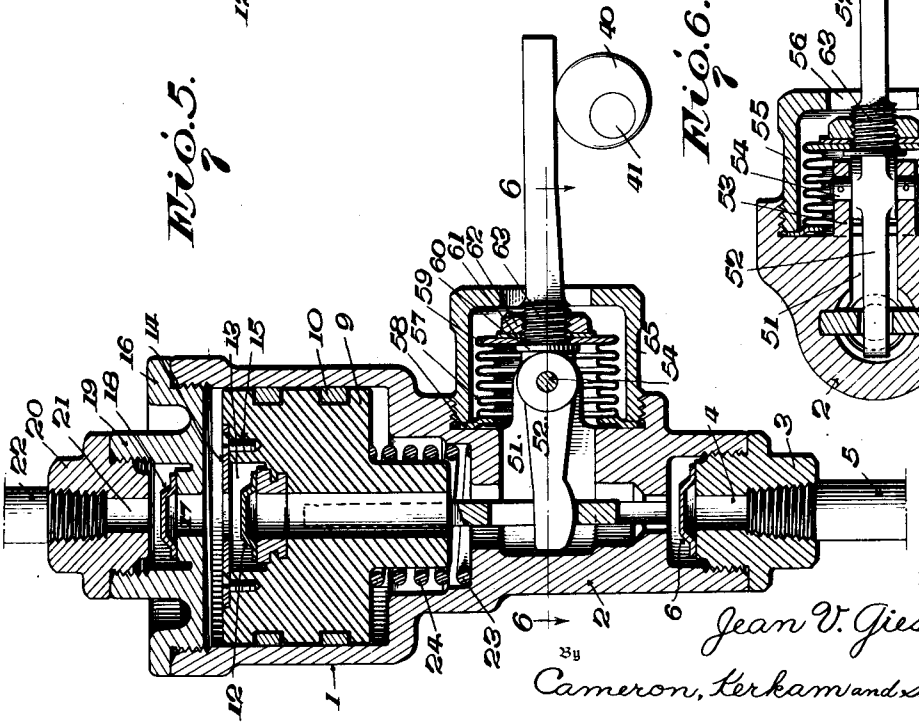


Fig. 6.

Inventor

Jean V. Giesler.

By

Cameron, Kerkam and Sutton

Attorneys.

Nov. 21, 1933. J. V. GIESLER 1,936,328

PUMP

Filed April 10, 1929 4 Sheets-Sheet 3

Fig. 11.

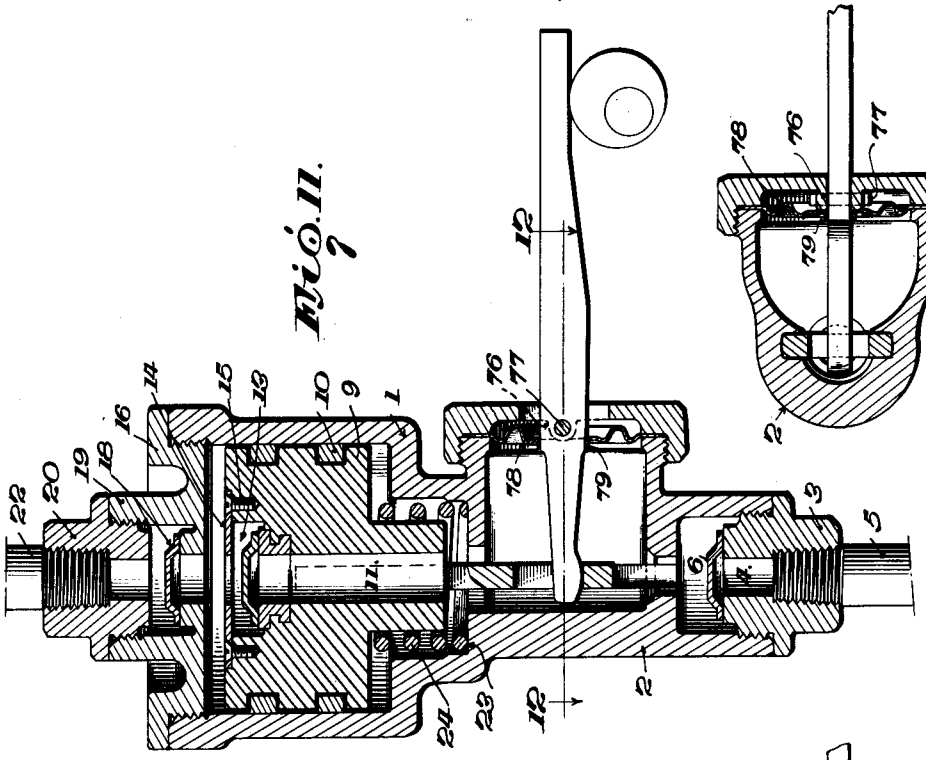


Fig. 12.

Fig. 9.

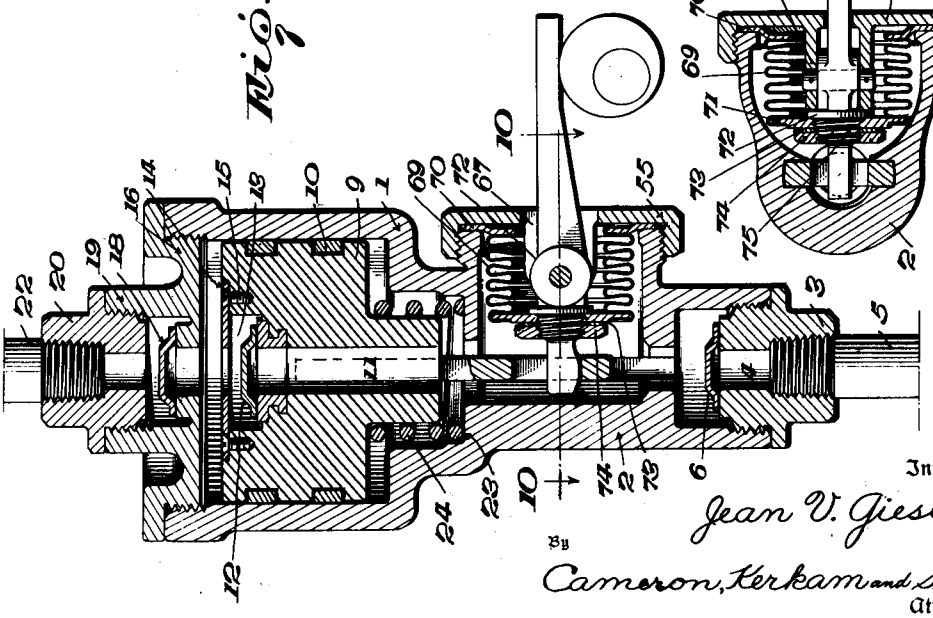
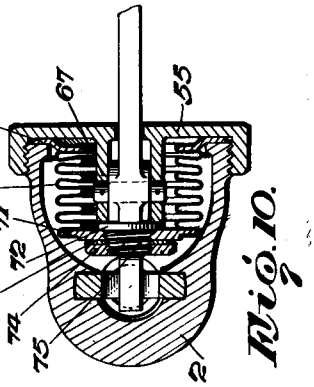


Fig. 10.



Inventor

Jean V. Giesler.

By

Cameron, Kerkam and Sutton

Attorneys.

Nov. 21, 1933. J. V. GIESLER 1,936,328

PUMP

Filed April 10, 1929 4 Sheets-Sheet 4

Fig. 15.

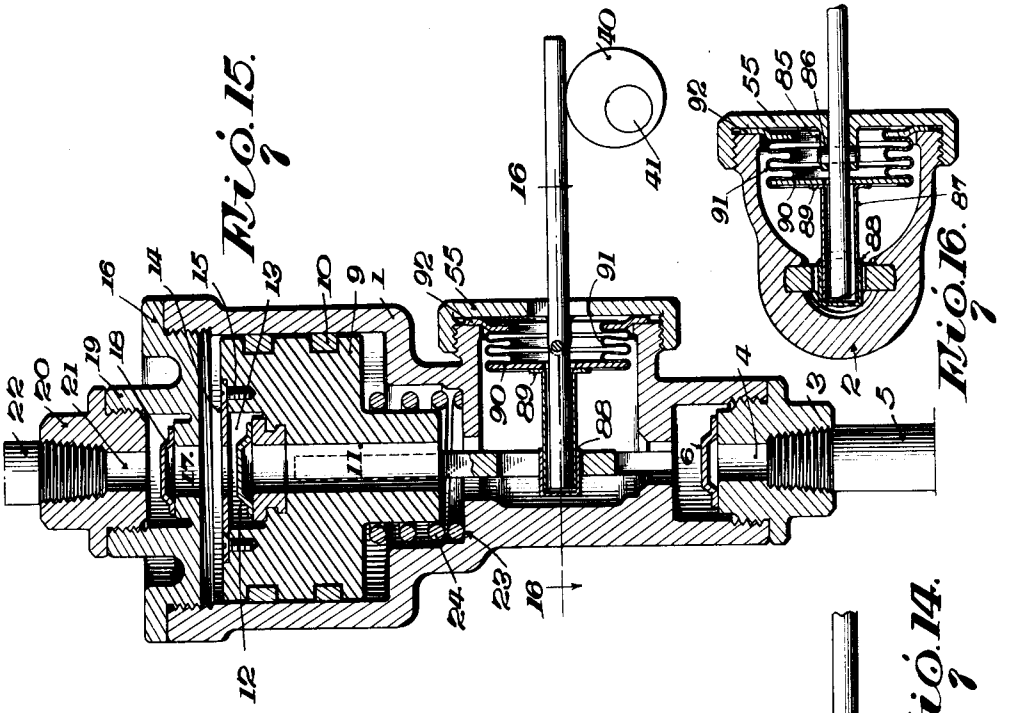


Fig. 16.

Fig. 13.

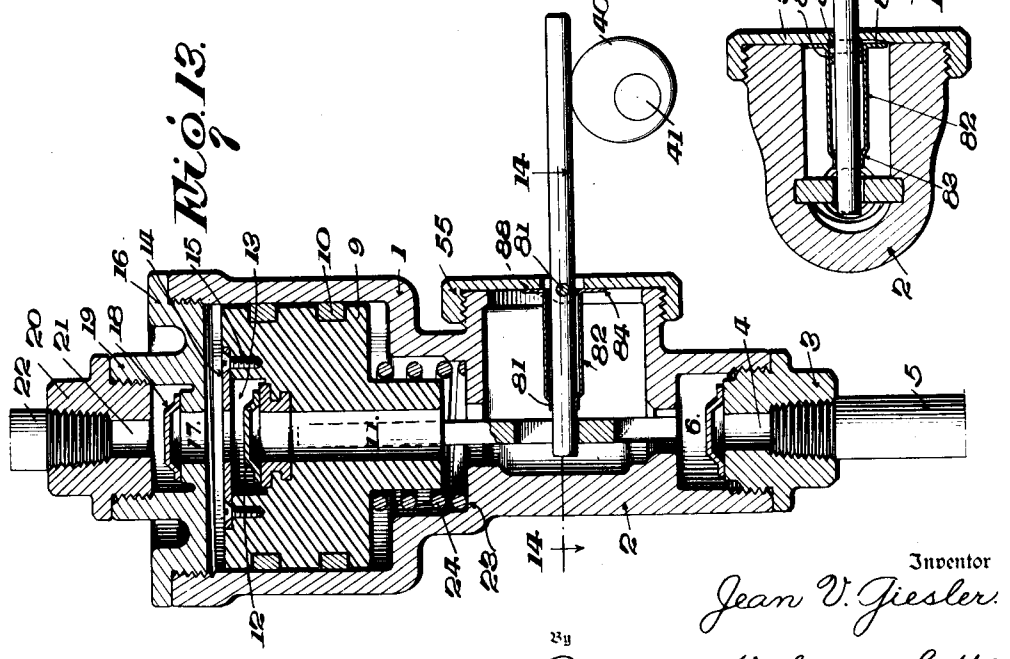


Fig. 14.

Inventor

Jean V. Giesler.

By

Cameron, Kerkam and Sutton

Attorneys

Patented Nov. 21, 1933 1,936,328

UNITED STATES PATENT OFFICE

1,936,328

PUMP

Jean V. Giesler, Knoxville, Tenn., assignor to The Fulton Sylphon Company, Knoxville, Tenn., a corporation of Delaware

Application April 10, 1929. Serial No. 354,075

12 Claims. (Cl. 103—178)

This invention relates to pumps, and more particularly to fuel feeding pumps adapted for use in the fuel systems of internal combustion engines such as automobile engines.

One of the objects of the invention is to provide a novel pump which is of simple design, economical to manufacture, and efficient and reliable in operation.

Another object is to provide a pump with novel means for effectively preventing leakage from the system.

A further object is to provide a novel pump of the reciprocating piston or plunger type wherein reciprocation of a plunger, piston or other parts through the casing of the pump is avoided, and the use of packed sliding fits is eliminated.

Other objects will appear more fully hereinafter as the description of the invention proceeds.

Several embodiments of the invention have been illustrated in the accompanying drawings, but it is is to be expressly understood that said drawings are for purposes of illustration only and are not to be construed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings,

Fig. 1 is a perspective view of one embodiment of the invention;

Fig. 2 is an elevation in section of the embodiment of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 2;

Fig. 4 is a perspective view showing part of the elements of Figs. 2 and 3;

Fig. 5 is a sectional elevation of another embodiment of the invention;

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

Fig. 7 is a sectional elevation of a further embodiment of the invention;

Fig. 8 is a section on the line 8—8 of Fig. 7;

Fig. 9 is a sectional elevation of a still further embodiment;

Fig. 10 is a section on the line 10—10 of Fig. 9;

Fig. 11 is a sectional elevation of another embodiment;

Fig. 12 is a section on the line 12—12 of Fig. 11;

Fig. 13 is a sectional elevation of a further embodiment;

Fig. 14 is a section on the line 14—14 of Fig. 13;

Fig. 15 shows another embodiment in sectional elevation; and

Fig. 16 is a section on the line 16—16 of Fig. 15.

Referring now to Figs. 1 to 4, wherein like reference numerals indicate like parts throughout the several views, a pump casing is provided which preferably comprises a cylindrical portion or pump cylinder 1, preferably but not necessarily of metal, and a substantially cylindrical portion of reduced diameter 2. The end of the cylindrical portion 2 is interiorly threaded to receive a plug 3 provided with an opening 4 extending therethrough which is threaded for connection to a pipe 5 leading to any suitable source of supply (not shown). A suction valve 6 of any suitable type cooperates with the opening 4 through the plug 3, lifting to admit fuel to the pump casing on suction and closing on pressure within said casing. Preferably the interior of the cylindrical portion 2 is restricted to form a shoulder 7 immediately above the valve 6, which shoulder limits the movement of the valve disc. A fuel passage 8 extends through the cylindrical portion 2 of the casing whereby the fuel is admitted to the pump cylinder 1.

A pump piston or plunger 9, of any suitable type, and of any suitable material, such as bakelite or other composition or in some instances metal, is slidable in the cylinder 1, and is preferably provided with suitable piston rings 10. Said piston is provided with a central passage 11, in open communication with the passage 8 at all times, and a valve disc 12 positioned in a recess 13 in the head of the piston 9 cooperates with the passage 11 to open and close the same, the motion of said valve disc being limited by a perforated plate 14 suitably secured to the piston 9 as by means of screws 15. As the piston 9 moves downwardly, as seen in the drawings, the valve disc 12 lifts and liquid passes through the passage 11 to the top of the piston 9.

The cylinder 1 is interiorly threaded to receive a cap or head 16, the latter being provided with a central opening 17 with which cooperates a valve disc 18. A tubular extension 19 formed on the head 16 surrounds the opening 17 and valve 18 and is threaded to receive a plug 20, the latter being provided with a passage 21 which is threaded to receive the end of a discharge pipe 22. As the piston moves upwardly, the valve disc 12 is held closed by the pressure of the liquid in the pump cylinder, the valve 18 opens to discharge the liquid from said cylinder, and the valve 6 opens to admit liquid to the casing below the piston. On the succeeding down stroke of the piston, as indicated above, valves 6 and 18 are closed and valve 12 opened to permit liquid to pass from below the piston to above the same.

Means are preferably provided whereby the piston 9 is positively moved downwardly on the

suction stroke and is moved upwardly by a resilient force on the discharge stroke so that the pressure on the discharge side of the pump will not exceed a predetermined amount. In the form shown, the interior of the cylindrical portion 2 of the pump casing is recessed to provide a shoulder 23 and a coil spring 24 is seated on said shoulder and bears against the lower face of the piston 9. The piston 9 is likewise preferably provided with a yoke 25 (Fig. 4), shown as provided with a plurality of lugs 26 imbedded in the piston, said yoke being slidable in the cylindrical portion 2 of the pump casing, preferably in grooves 27 which prevent relative rotation between the piston and the pump casing.

Any suitable means may be provided for positively moving the piston and yoke downwardly in the pump casing on the suction stroke of the pump, but such means preferably comprise a pivoted arm or lever having one end engaging in the yoke 25 and the other end extending externally of the pump casing. In the form shown, the cylindrical portion 2 of the pump casing is provided with an enlarged portion 28 extending to one side thereof and with a flange 29 to which is suitably secured a plate 30, as by means of screws 31. The plate 30 is provided with a tubular extension 32 which is threaded to receive a cap 33, and the plate 30 and the cap 33 are provided with alined openings 34 and 35, respectively, through which extends a short rockshaft 36 constituting the pivot of the operating lever. The inner end of the shaft 36 carries an arm 37 which arm is provided at its extremity with a pin 38 engaging in the yoke 25. The other end of the shaft 36 carries an arm 39 which may be operated in any suitable manner to rock the shaft 36 in its bearings. In the form shown, a cam 40 mounted on a cam shaft 41 lifts the arm 39 to depress the arm 37 and positively move the piston 9 downwardly on the suction stroke of the pump, a coil spring 42 maintaining the arm 39 in engagement with the cam 40.

Means are provided for preventing leakage around the operating lever where it passes through the pump casing, such means preferably including a flexible wall maintained in tight sealing engagement with the operating lever and with a suitable part of the casing. In the form shown shown in Figs. 1 to 4, a flange or head 43, to which is attached one end of a flexible corrugated wall 44, is clamped between the tubular extension 32 and the cap 33. The other end of said flexible corrugated wall is maintained in sealing engagement with the rockshaft 36 in any suitable manner, but preferably by means of rubbing friction surfaces. To this end, the rockshaft 36 is provided with a collar 46 turning in a recess 45 formed in the bottom of the cup constituted by the tubular extension 32, and a friction washer 47 of any suitable material is interposed between the bottom of the recess 45 and the collar 46. A similar washer 48 is preferably placed adjacent the other face of the collar 46 and is interposed between said collar and a head 49 to which the other end of the flexible corrugated wall 44 is attached. The head 49, collar 46, and washers 47 and 48 constitute friction surfaces which are held in tight engagement by any suitable means such as a coil spring 50 interposed between the head 49 and the cap 33.

Another embodiment of the invention is shown in Figs. 5 and 6. In these figures, the arrangement of the pump casing, fluid passages and controlling valves therefor, and the piston 9, yoke 25, and spring 24, are substantially the same as described above in connection with Figs. 1 to 4, inclusive. In this embodiment, however, the rockshaft 36 is omitted and the operating lever comprises a straight rigid arm pivoted intermediate its ends. In this embodiment, therefore, the laterally extending portion 28 of the casing shown in Figs. 1 to 4 may be omitted, and a lateral opening 51 formed in the casing for the passage of the operating lever 52, the latter being suitably pivoted in brackets 53, preferably formed on the pump casing, as by means of a pivot pin 54. The pump casing is threaded around the opening 51 to receive a threaded member 55 having an opening 56 through which the lever 52 passes, and leakage from the pump casing through the opening 51 is prevented by means of a flexible corrugated wall operatively secured in sealing engagement with the lever 52 and with the pump casing. As shown, a flexible corrugated wall 57 is attached at one end to a head 58 clamped between the member 55 and the casing and at the other end to a head 59 surrounding the operating lever and seated against a collar 60 thereon by means of a washer 61 and a nut 62 engaging threads 63 formed on the operating lever 52. As the operating lever 52 is rocked about its pivot by means of the cam 40, the flexible wall 57 will be angularly displaced but will always seal the pump casing tightly and prevent leakage through the opening around the operating lever.

In Figs. 7 and 8, the operating lever 52 is pivoted in brackets 64 formed on the cap nut 55 adjacent the opening 56 therein through which said lever extends. In this embodiment, the flexible corrugated wall is replaced by a diaphragm 65 of any suitable material such as metal, fabric, or other alloy or composition, said diaphragm being clamped at its periphery between the casing and the cap nut 55. The operating lever 52 extends through said diaphragm, which is provided with a flange 66 closely surrounding said lever and secured thereto in any suitable manner as by soldering or brazing, to form a tight seal. The diaphragm is preferably secured to the lever closely adjacent the pivot of the latter, so that there is sufficient flexibility in the diaphragm for the angular displacement of the lever about its pivot.

In Figs. 9 and 10, the lever 52 is suitably pivoted between brackets 67 formed on the cap nut 55, and is surrounded by a flexible corrugated wall 69 having one of its ends attached to the head 70 which is clamped between the casing and the cap nut. The other end of said flexible wall is suitably attached to the head 71 surrounding the lever 52 and seated against a shoulder 72 thereon by means of a washer 73 and nut 74 engaging threads 75 formed on said operating lever.

In Figs. 11 and 12, the lever 52 is pivoted in any suitable manner in brackets 76 formed on the cap nut 55, as by means of a pivot pin 77, and a corrugated diaphragm 78 is clamped at its periphery between the casing and the cap nut and is provided at its center with a flange 79 surrounding and secured in any suitable manner to the lever 52 as by soldering or brazing.

In Figs. 13 and 14, the operating lever 52 is suitably pivoted in brackets 80 formed on the cap nut 55, as by means of a pivot pin 81, and is surrounded by a tube 82 of suitable flexible material preferably having the same cross sectional form as said lever. One end of the tube 82 is secured to said lever in any suitable manner, as by soldering or brazing, at 83, while the other end of said tube surrounds the bracket 80 and

pivot pin 81 and is provided with a flange 84 suitably secured to the cap nut 55 as by soldering or brazing.

In Figs. 15 and 16, the operating lever 52 is suitably pivoted in brackets 85 formed on the cap nut 55, as by means of a pivot pin 86, and said lever is surrounded by a flexible wall within which the lever is free to move. In the form shown, a tube 87, preferably having the same cross sectional form as the lever 52, surrounds the inner portion of said lever and the inner end of said tube is closed by a cap 88 preferably soldered or brazed thereto. The other end of the tube 87 is provided with a flange 89 which is suitably secured as by soldering or brazing to a head 90 through which the lever 52 passes freely. One end of a flexible corrugated wall 91 is secured in any suitable manner to said head 90, and the other end of said wall 91 is secured to a head 92 which is clamped between the casing and the cap nut 55.

It will be seen that in each of the embodiments of the invention shown, the use of members reciprocating through the casing is avoided and the necessity for packed sliding fits is eliminated by the use of a pivoted arm or lever having one end within the casing operatively engaging the piston and the other end without the same. In such a case, it is necessary only to prevent leakage past a member having a limited range of pivotal movement, and this may readily be accomplished by the use of diaphragms or flexible walls of metal or fabric or any suitable material which may be permanently secured in sealing engagement with the parts and yet possess sufficient flexibility to allow for the required movement of the operating lever.

Moreover, leakage past the piston during the pumping stroke is eliminated as a source of trouble by the use of two suction valves, one on the suction side of the piston and the other in the casing which encloses said piston, whereby any leakage past the piston is retained within the casing and may be employed on the next pumping stroke of the piston. The entire pump is of simple construction and requires few parts, so that it can be economically manufactured in quantities, while at the same time it is very efficient and reliable in operation and owing to the advantages afforded by the above noted features, is practically free from all objection on the ground of leakage of fluid from the casing.

While several embodiments of the invention have been described and illustrated in the drawings, it will be apparent to those skilled in the art that the invention is capable of a wide variety of mechanical expressions, while changes may be made in the form, details and proportions of the parts without departing from the spirit of the invention. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A device of the class described comprising a casing, suction and discharge valves associated with said casing, a plunger wholly within and slidable in said casing between said valves, said plunger having a passage therethrough, a valve for said passage, a lever having a one-way driving engagement with said plunger within said casing and extending through said casing, a flexible wall surrounding said lever exteriorly of its engagement with said plunger and connected to said casing to prevent leakage therefrom, means external to said casing for operating said lever to move said plunger in one direction, and resilient means within said casing for moving said plunger in the opposite direction.

2. A device of the class described comprising a casing, suction and discharge valves associated with said casing, a plunger wholly within and slidable in said casing between said valves, said plunger having a passage therethrough, a valve for said passage, a lever having a one-way driving engagement with said plunger within said casing and extending through said casing, a flexible corrugated wall surrounding said lever exteriorly of its engagement with said plunger and in sealing engagement with said lever and casing, means external to said casing for rotating said lever about its pivot to move said plunger in one direction, and resilient means within said casing tensioned by movement of said plunger in said one direction and tending to move said plunger in the opposite direction.

3. A device of the class described comprising a casing having a pump cylinder and a portion of smaller diameter communicating therewith, suction and discharge valves associated with said casing, a plunger slidable in said cylinder, said plunger having a passage therethrough, a valve for said passage, a yoke on said piston slidably engaged in said portion of smaller diameter, said plunger and yoke being wholly within said casing, a lever having a one-way driving engagement with said yoke within said portion of smaller diameter and extending through said casing, a flexible wall surrounding said lever in sealing engagement with said lever and casing, means external to said casing for rotating said lever about its pivot to move said plunger in one direction, said portion of smaller diameter having a shoulder therein, and a compression spring interposed between said shoulder and said plunger.

4. A device of the class described comprising a casing having a pump cylinder and a portion of a smaller diameter communicating therewith, a discharge valve in the wall of said cylinder, a suction valve in the wall of said portion of smaller diameter, a plunger slidable in said cylinder between said valves, said plunger having a passage therethrough, a valve for said passage adapted to pass liquid from the suction side to the discharge side of said plunger, a yoke on said piston slidably engaged in said portion of smaller diameter, said plunger and yoke being wholly within said casing, said portion of smaller diameter having a lateral opening in its wall, a lever having a one-way driving engagement with said yoke within said portion of smaller diameter and extending through said opening, a flexible wall surrounding said lever and connected to said casing to seal said opening against leakage, means external to said casing for rotating said lever about its pivot to move said plunger in one direction, and resilient means within said casing tensioned by movement of said plunger in one direction and tending to move said plunger in the opposite direction.

5. A device of the class described comprising a casing, suction and discharge valves associated with said casing, a plunger wholly within and slidable in said casing, a rockshaft having a pair of arms, one of said arms being inside of said casing and one of said arms being outside of said casing, and having a one-way driving engagement with said plunger within a chamber of said casing that contains the fluid being pumped therethrough, a flexible wall cooperating with said rockshaft and said casing to prevent leakage

therefrom, means external to said casing and flexible wall for rotating said lever in one direction, and resilient means within said casing for moving said plunger in one direction.

6. A device of the class described comprising a casing, suction and discharge valves associated with said casing, a plunger wholly within and slidable in said casing, a rock shaft extending from the inside to the outside of said casing, an arm on said shaft projecting into a chamber in said casing through which passes the fluid being pumped and having a one-way driving engagement with said plunger, an arm on said shaft external to said casing, means operatively engaging said external arm to move said plunger in one direction, resilient means within said casing to move said plunger in the opposite direction, a flexible wall surrounding said shaft and sealed to said casing, and means including cooperating friction surfaces for maintaining a fluid-tight joint between said wall and shaft.

7. A device of the class described comprising a casing, suction and discharge valves associated with said casing, a plunger slidable in said casing, a slotted yoke on said plunger, said plunger dividing the interior of said casing into receiving and pumping chambers, a valve-controlled passage through said plunger, a rock shaft extending from the inside to the outside of said casing, an arm on said shaft within said casing having a one-way driving engagement with one end of the slot in said yoke, an arm on said shaft external to said casing, means operatively engaging said external arm to move said plunger in one direction, resilient means within said casing to move said plunger in the opposite direction, and a flexible wall surrounding said shaft and sealed to said shaft and casing.

8. A device of the class described comprising a casing having a pump cylinder and a portion of smaller diameter communicating therewith, suction and discharge valves associated with said casing, a plunger slidable in said cylinder, said plunger having a passage therethrough, a valve for said passage, a shoulder in said portion of smaller diameter, a coil spring interposed between said shoulder and said piston, a yoke on said piston slidably engaged in said portion of smaller diameter, a rock shaft extending through said casing, an arm on said shaft within said casing having a one-way driving engagement with said yoke, an arm on said shaft external to said casing, means operatively engaging said external arm to move said plunger in one direction against the tension of said spring, and a flexible wall surrounding said shaft and sealed to said casing.

9. A device of the class described comprising a casing having a lateral opening therein, suction and discharge valves associated with said casing, a plunger slidable in said casing between said valves, said plunger having a passage therethrough, a valve for said passage, a lever having a one-way driving engagement with said plunger within said casing and extending through said opening, means mounted on said casing or pivoting said lever, a flexible diaphragm surrounding said lever in said opening and sealed to said lever and casing respectively, means external to said casing for operating said lever to move said plunger in one direction, and resilient means within said casing for moving said plunger in the opposite direction.

10. A device of the class described comprising a casing, suction and discharge valves associated with said casing, a plunger slidable in said casing between said valves, said plunger having a passage therethrough, a valve for said passage, a lever having a one-way driving engagement with said plunger and extending through said casing, a flexible tube surrounding said lever and sealed at its ends to said lever and casing respectively, means external to said casing for operating said lever to move said plunger in one direction, and resilient means within said casing for moving said plunger in the opposite direction.

11. A mechanically driven fuel pump for delivering fuel at a constant pressure independent of the speed of the driving means comprising a pump casing having a chamber therein, independent inflow and outflow connections to said casing for flow of the fuel through said chamber, a reciprocable pump plunger movable in said chamber and dividing said chamber into an expansible and reducible pumping chamber and an anterior fuel receiving chamber, valve means preventing return flow into said pumping chamber from said outflow connection, means permitting flow of the fuel in one direction from said fuel receiving chamber past said reciprocable pump plunger and into said pumping chamber, a flexible diaphragm secured in sealing relation to said pump casing and forming a wall of said fuel receiving chamber, an operating member extending through said diaphragm and secured in sealing relation thereto, a lost motion connection between said operating member and said pump plunger within said fuel receiving chamber, resilient means within said fuel receiving chamber normally effective to prevent lost motion between said operating member and said pump plunger and serving to limit the effective discharge pressure by permitting a variable discharge stroke of said pump plunger and driving means adapted to engage said operating member on the exterior of said fuel receiving chamber.

12. A mechanically driven fuel pump comprising a pump casing having a chamber therein, a reciprocable pumping member dividing said chamber into a pumping chamber and a fuel receiving chamber, a valve controlled outflow passage from the pumping chamber, an inflow passage to said fuel receiving chamber, a flexible diaphragm secured in sealing relation to said casing and forming a wall of said fuel receiving chamber, an operating member secured in sealing relation to said diaphragm and extending therethrough, a lost motion connection within said fuel receiving chamber between said operating member and said pumping member, a resilient compression spring cooperating with said pumping member and serving to limit the effective discharge stroke of said pumping member, means for positively moving said operating member in one direction and resilient means operative to return said operating member in the opposite direction.

JEAN V. GIESLER.