Oct. 18, 1949. C. A. ERICKSON 2,485,439

PUMP

Filed Nov. 24, 1944

Fig. 1.

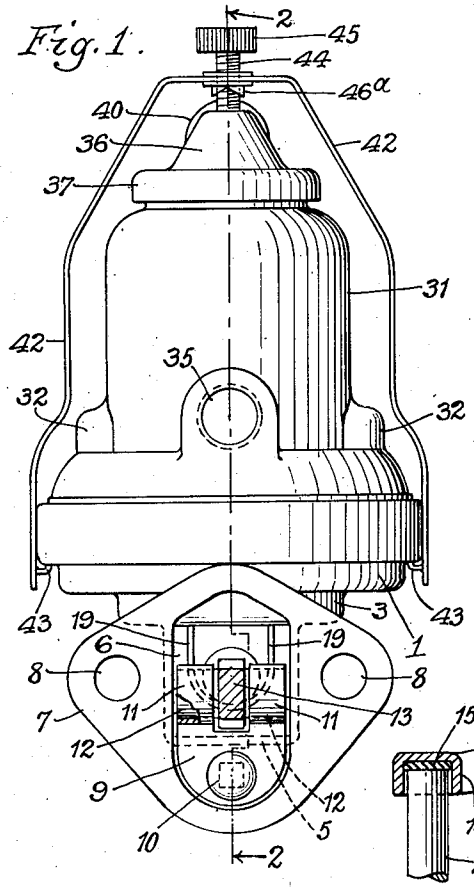


Fig. 2.

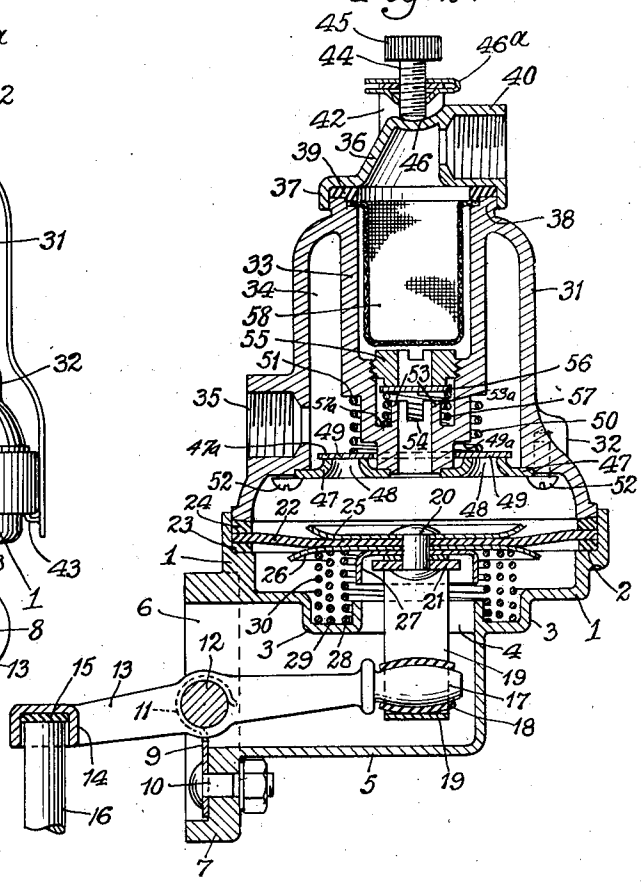
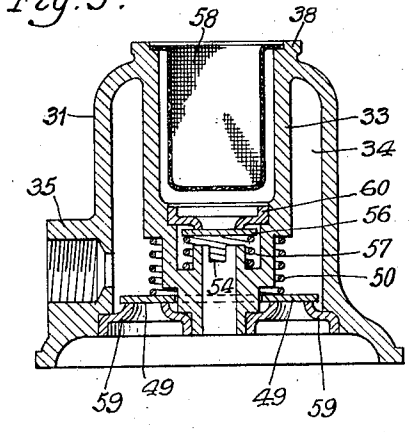


Fig. 3.



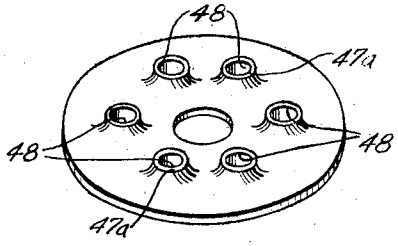


Fig. 4.

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Application November 24, 1944, Serial No. 564,961

12 Claims. (Cl. 103—150)

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This invention relates to a pump and to means for providing a pump construction which is simple, sturdy and effective. It has for one object to provide a simplified valve mechanism and a means for mounting a valve with a minimum of complication and a minimum of additional parts.

Another object is to provide a valve mechanism and seating means for association with a diaphragm pump, the mechanism comprising the discharge valve in the form of a flat ring associated with a seat in the form of a flat ring.

Another object is to provide in connection with a pump a combined valve containing body and vapor dome by means of which the valve containing body which must be present includes within itself a valve or dome but need not be added as an extra member.

Another object is to provide a diaphragm pump arranged with a plurality of springs so arranged that relatively light springs can be used and can secure accurate and rapid operation.

Other objects will appear from time to time in the course of the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is an elevation of one form of the device;

Figure 2 is a longitudinal section taken at line 2—2 of Figure 1;

Figure 3 is a sectional detail through the vapor dome and valve seating means illustrating a modified form;

Figure 4 is a perspective view of the outlet valve seat member.

Like parts are indicated by like symbols throughout the specification and drawings.

As shown the invention comprises cast members and members which are stamped, spun, pressed or otherwise made. Although the invention is not limited to any particular form or method of manufacture, in general for convenience of manufacture the pump comprises two main members which may be cast but need not be. As shown these include a lower housing member 1 which is shaped to provide an annular shoulder 2. The member 1 is also provided with an annular depression 3 in which springs are positioned and will be described below. The annular depression 3 is formed about a central opening 4 through which diaphragm operating means may extend and will be described below. Preferably integral with the portions 1, 2 and 3 is a pump lever containing member 5 which may be open as at 6 and may be provided with a lateral flange 7 which is

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perforated as at 8 to receive fastening means such as screws or bolts by means of which the pump is secured to any suitable support. Secured also within the member 5 and preferably adjacent its open end 6 is a spring bearing member 9 which is held in place by means of a bolt 10. As shown the member 9 includes a pair of spring ears 11 which engage and furnish a bearing for a shaft 12 upon which a lever 13 is mounted. The lever 13 may have a seat or depression 14 formed at its outer end within which a cushioning member 15 may be positioned. A lever operating push rod 16 extends into the socket 14 and bears against the material 15. At its opposite end the lever is provided with a rounded member 17 which may have a cushioning sleeve 18 positioned upon it. The sleeve engages a stirrup 19 which is connected by means of a bolt 20 and a member 21 to a diaphragm 22. The edge of diaphragm 22 is preferably positioned over the shoulder 2 and in contact with a packing or sealing member 23. A second packing or sealing member 24 is positioned on top of the diaphragm and it is held in place together with the diaphragm and the packing member 23 by the upper housing member which will be described below.

Secured to the diaphragm 22 by the rivet 20 is a stiffening disc 25 on the top of the diaphragm and a second disc 26 on the underside of the diaphragm. A cup 27 is also secured on the underside of the diaphragm.

Positioned beneath the diaphragm is a plurality of coil springs 28, 29 and 30. These coil springs bear at one end upon the inner surface of the annular depression 3 and at the other end upon the under surface of the disc or plate 26.

Thus far the construction which is positioned in the lower housing section has been described. The construction of the upper housing section includes a housing member 31 which may be generally cylindrical in cross section but is enlarged as at 32, 32 to provide portions within which screws or other attaching means may be positioned. An integral inner wall 33 defines between itself and the portion 31 an annular chamber 34 which constitutes a vapor dome. The upper housing section may also be enlarged to provide an outlet or discharge passage connection 35 to which any suitable conduit or pipe may be connected and through which liquid is discharged from the pump. At its lower edge the upper housing section 31 is in contact with the sealing or gasket member 24 which lies on the

upper surface of the diaphragm 22 as shown in Figure 2.

A combined inlet and closure member 36 is positioned on the otherwise open upper end of the member 31. As shown the member 36 has a downwardly depending overhanging flange 37 which overlies the reduced upper end 38 of the member 31. A gasket or sealing member 39 may be positioned as shown in Figure 2 to prevent leakage. An inlet connection member 40 is formed for connection with an inlet conduit through which liquid reaches the interior of the pump.

One convenient means for securing the several housing members together comprises a bail 42 which is provided with membrs 43 which are engaged beneath the lower edge of the housing member 31 as shown in Figure 1. At its upper end the bail has threaded in it a locking screw 44 which is provided with a knurled or roughened knob 45 for manipulation. The connection member 36 may be provided with a depression 46 in which the lower end of the adjusting screw 44 is received. By means of the bail and screw construction the whole housing consisting in the main of three members, the lower housing member 1, the upper housing member 31 and the closure member 36 are readily and securely held together but may be easily separated by merely removing the bail. A locking means 46*a* may be used.

One important advantage of the invention resides in the simplicity of its construction, the vapor dome being formed integrally with a housing section and positioned within it so that it need not as is customary be made and assembled as a separate member which is ordinarily positioned outside of the pump housing and therefore requires additional space for the installation of the pump.

Another advantage resides in the simplicity of the valve construction. The outlet valve comprises an annular seat 47 which is provided with a plurality of perforations or openings 48. The seat 47 is formed to define a plurality of coplanar annular raised seat portions 47*a* individual to and each surrounding one of the openings 48. The discharge valve comprises an annular disc or flat ring 49 which is normally held in engagement with the seat portions 47*a* by a spring 50. The spring bears at one end upon the upper surface of the valve ring 49 and at its other end bears against a shoulder 51 formed in the housing member 33. Movement of the valve ring 49 in an opening direction, or in a direction away from the seat 47 is limited by a shoulder 49*a* integrally formed on the outer portion of the inner wall 33. The valve seat member 47 is held in place by one or more screws 52.

The inlet valve assembly includes a series of raised members 53 which as shown in Figure 2, are separated by depressions 54. An inlet valve seat member 55 may be removably threaded in place in the wall section 33. An inlet valve 56 is normally held closed against the seat by a spring 57 which acts against an annular shoulder 57*a* on the inner portion of the housing wall 33. Suction may unseat the valve and move it against the upper end of the members 53 which provide shoulder means 53*a* to limit downward movement of the valve 56 but permit liquid to enter through the openings or notches 54. A screen or other filtering member 58 may be thus positioned on the upstream side of the valve 56 and within the chamber formed by the wall 33.

In Figure 3 a modified form of construction is shown. The outlet or discharge valve seat member comprises a ring 59 which is permanently fixed in position. The discharge valve construction is otherwise the same as that described above. Similarly the inlet valve seat is formed of a ring-like member 60 which is permanently pressed, welded, riveted or otherwise secured in place and the inlet valve details are the same as above described.

It will be realized that whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

This application is a continuation in part of my co-pending application Serial No. 540,217, filed June 14, 1944, now Patent No. 2,462,372, dated February 22, 1949.

The use and operation of my invention are as follows:

The device as shown is assembled and is positioned in a liquid line so that a liquid conduit is connected to the connection portion 40 and an outlet conduit for liquid is connected to the member 35. The push rod 16 is reciprocated. Obviously the device is desirable for a fuel pump for internal combustion engines and will ordinarily be associated with such an engine and driven thereby. The liquid handled will be fuel and will be drawn from a tank and moved to or against a carburetor. The pump lever 13 is moved up and down and alternately pulls down the diaphragm 22 compressing the springs 28, 29 and 30 and creating suction within the diaphragm chamber. This suction additionally holds the discharge valve 49 on its seat and moves the inlet valve 56 from its seat to contact with the member 53. Liquid enters passing through the screen 58 through the openings 54 and into the diaphragm chamber. When the movement of the lever 13 is reversed the springs force the diaphragm upwardly creating pressure within the diaphragm chamber. This pressure seats the inlet valve 56 against its seat 55 and opens the valve 49 against the spring 50 and allows the liquid to be discharged from the diaphragm chamber and to move outwardly through the outlet connection 35 to a point of use. The annular space 34 defined between the walls 31 and 33 serves as a pressure dome to equalize the flow of the liquid.

I claim:

1. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage said vapor dome being in communication with said outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, and an outlet valve comprising a ring positioned over said last-mentioned valve seats, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring.

2. In combination in a pump assembly, a hous-

ing member defining within itself an inlet passage, a vapor dome and an outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, and an outlet valve comprising a ring positioned over said last-mentioned valve seats, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring, said outlet valve member being held removably in place by screws.

3. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage said vapor dome being in communication with said outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, and an outlet valve comprising a ring positioned over said last-mentioned valve seats, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring, said outlet valve member being permanently pressed in place.

4. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a generally flat ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, and an outlet valve comprising a flat ring positioned over said last-mentioned valve seats, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring.

5. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage said vapor dome being in communication with said outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a generally flat ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, said ring shaped to define about each of said perforations a raised seat, and an outlet valve comprising a flat ring positioned over said last-mentioned valve seats, and spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring.

6. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage said vapor dome being in communication with said outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a generally flat ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, said ring shaped to define about each of said perforations a raised seat, and an outlet valve comprising a flat ring positioned over said last-mentioned valve seats, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring, said outlet valve disk being held removably in place by screws.

7. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop and shaped to define an inlet valve seat, an inlet valve adapted to seat on said valve seat, an outlet valve member comprising a generally flat ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, said ring shaped to define about each of said perforations a raised seat, and an outlet valve comprising a flat ring positioned over said last-mentioned valve seats, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring, said outlet valve disk being permanently pressed in place.

8. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage, said vapor dome being in communication with said outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop, an outlet valve member comprising a ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, and an outlet valve comprising a ring positioned over said last-mentioned valve seats, said outlet passage being positioned immediately adjacent said outlet valve member, and a spring in contact at one end with said ring-like valve, said housing shaped to provide a seat for the opposite end of said spring, said outlet valve member being held removably in place by screws.

9. In combination in a pump assembly, a housing member defining within itself an inlet passage, a vapor dome and an outlet passage, said vapor dome being in communication with said outlet passage, said housing member shaped also to define an inlet valve stop, an inlet valve-retaining member removably threaded into said housing adjacent said stop, an outlet valve member comprising a generally flat ring having a plurality of perforations therein and a plurality of outlet valve seats individual to and surrounding said perforations, and an outlet valve comprising a flat ring positioned over said last-mentioned valve seats, said outlet passage being positioned immediately adjacent said outlet valve member, and a spring in contact at one end with said ring-

like valve, said housing shaped to provide a seat for the opposite end of said spring.

10. In a fuel pump, a housing member having inner and outer concentric cylindrical walls defining a central inlet chamber and an annular outlet chamber and pressure dome concentric therewith, an inlet valve seat element and an inlet valve extending transversely of said inner cylindrical wall and adapted to close said inlet chamber at its lower end, an annular outlet valve seat element and an annular outlet valve extending transversely of said housing member and adapted to close said outlet chamber at its lower end, said housing member having integrally formed inner and outer shoulder portions adapted to engage said inlet and outlet valves respectively to limit movement thereof in an opening direction, and spring means individual to said valves and urging them toward their associated seat elements.

11. In a fuel pump, a housing member having inner and outer concentric cylindrical walls defining a central inlet chamber and an annular outlet chamber and pressure dome concentric therewith, an inlet valve seat element and an inlet valve extending transversely of said inner cylindrical wall and adapted to close said inlet chamber at its lower end, an annular outlet valve seat element and an annular outlet valve extending transversely of said housing member and adapted to close said outlet chamber at its lower end, said housing member having integrally formed inner and outer shoulder portions adapted to engage said inlet and outlet valves respectively to limit movement thereof in an opening direction, and coil spring means individual to said valves and urging them toward their associated seat elements, said housing member having integrally

formed inner and outer annular portions individual to said spring means and adapted to seat and engage one end thereof.

12. In a fuel pump, a housing member having inner and outer concentric cylindrical walls defining a central inlet chamber and an annular outlet chamber and pressure dome concentric therewith, an inlet valve seat element and an inlet valve extending transversely of said inner cylindrical wall and adapted to close said inlet chamber at its lower end, an annular outlet valve seat element and an annular outlet valve extending transversely of said housing member and adapted to close said outlet chamber at its lower end, said outlet valve seat element having a plurality of apertures spaced arcuately thereabout and coplanar narrow annular raised seat portions individual to and surrounding said apertures, and spring means individual to said valves and urging them toward their associated seat elements.

CHARLES A. ERICKSON.

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