

May 10, 1949.

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2,469,818

DIAPHRAGM PUMP

Filed Oct. 28, 1946

2 Sheets-Sheet 1

Fig. 2.

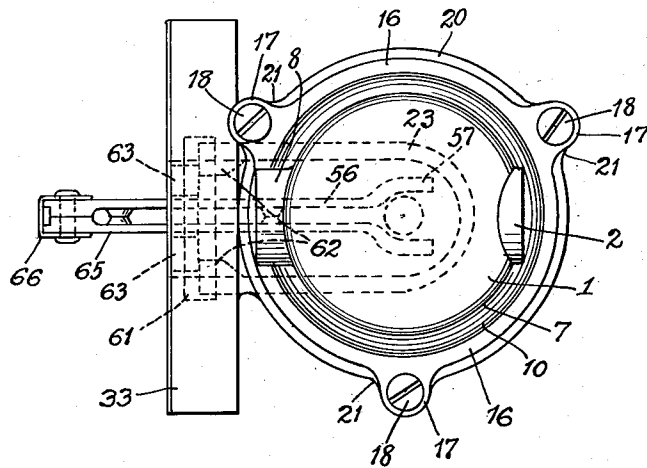
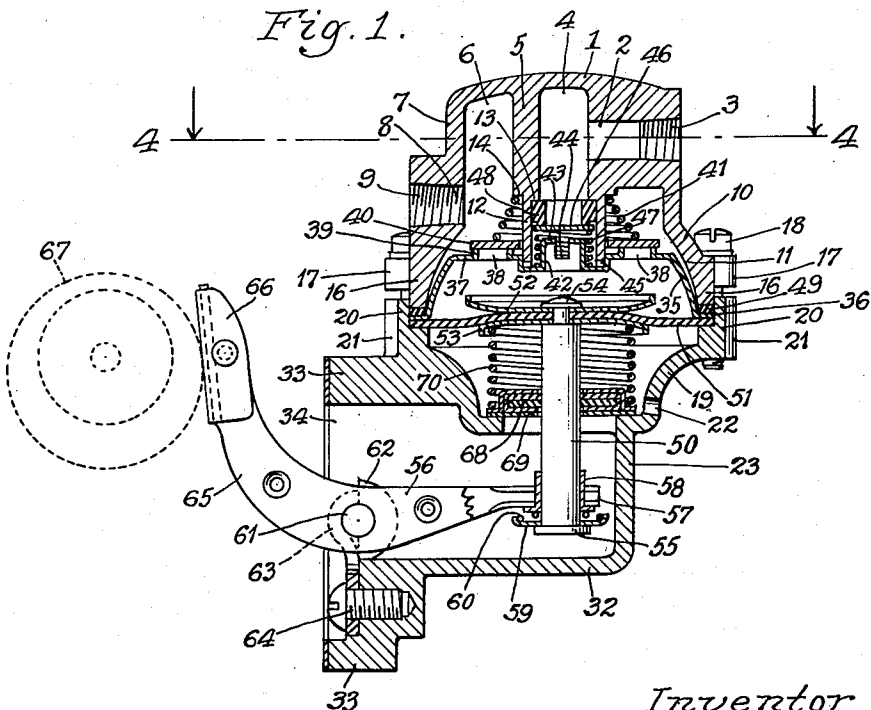


Fig. 1.



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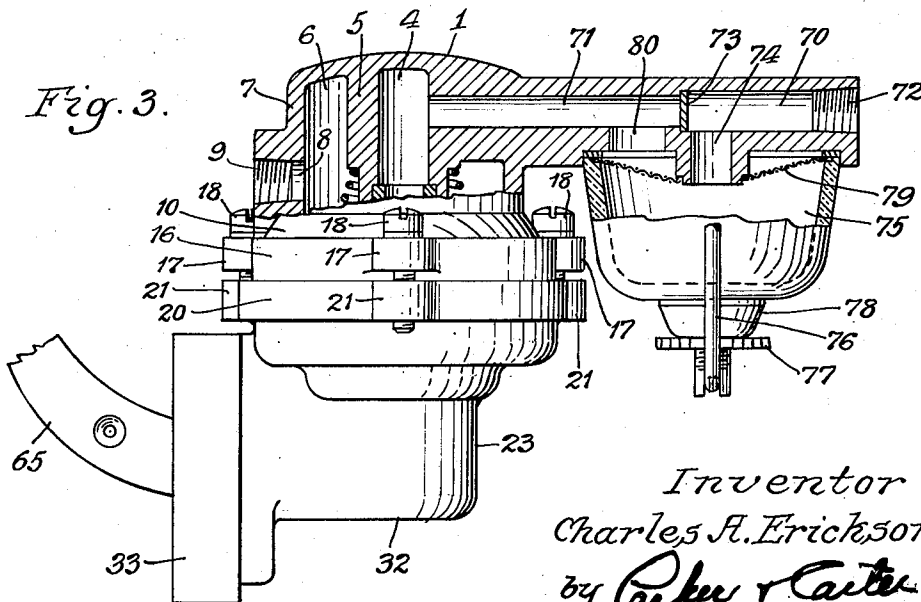
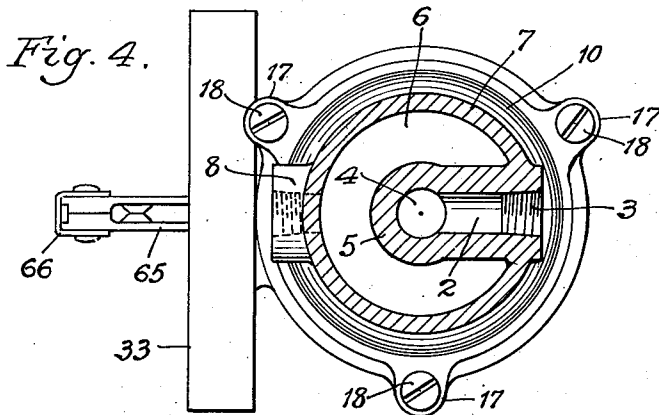
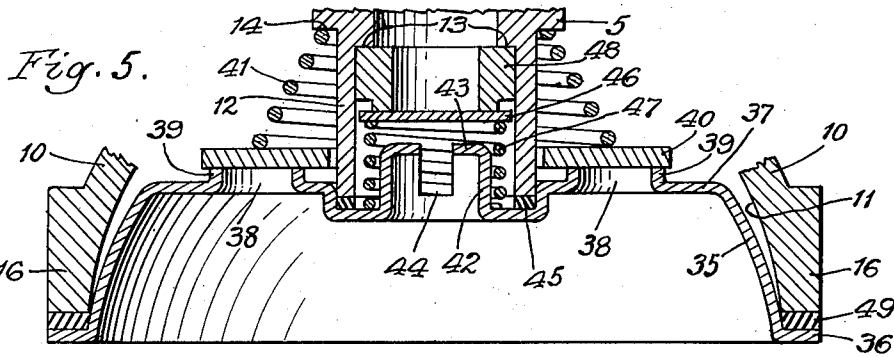
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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DIAPHRAGM PUMP

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1 Claim. (Cl. 103—150)

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This invention relates to a pump and particu-
larly to a diaphragm pump.

It has for one object to provide a pump of high
efficiency and simple construction.

Another object is to provide, in connection with
such a pump, inlet and outlet valve means and a
unitary assembly for said valve means.

Another object is to provide a valve assembly
for pumps.

Other objects will appear from time to time
throughout the course of the specification and
claim.

The invention is illustrated more or less dia-
grammatically in the accompanying drawings,
wherein:

Figure 1 is a vertical section through one form
of the pump;

Figure 2 is a plan view of the pump of Fig-
ure 1;

Figure 3 is a vertical section of a modified form
of pump;

Figure 4 is a section taken at line 4—4 of Fig-
ure 1; and

Figure 5 is a section illustrating the valve as-
sembly member on an enlarged scale.

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

In the particular form shown the pump com-
prises a housing which is preferably made in two
pieces or sections. As shown, there is an upper
housing member 1 provided with an inlet passage
2 which may be threaded as at 3 to receive a con-
duit. The inlet passage 2 communicates with a
central inlet passage 4 which is formed within an
annular member 5. An annular chamber 6 is
formed within the housing about the member 5
and comprises a pressure dome. An outer wall
7 encloses the annular pressure dome chamber 6.
An outlet passage 8 is formed in the wall 7 and
may be threaded as at 9. The housing wall 7 is
preferably enlarged or flared outwardly as at 10
and may be provided with an inner curved face
or surface 11. The annular wall 5 is preferably
provided with a reduced downward extension 12
which, at its upper end, terminates in an internal
shoulder 13 and on its outer surface terminates in
an external shoulder 14. A flange 16 is formed as
a part of the housing member and may carry one
or more ears 17 to receive fastening members,
such as screws, 18 for joining the upper housing
section to a lower housing section. The lower
housing member is designated generally by the
numeral 19 and may include a flange 20 with ears
21 in which the screws 18 are received. The
flange 20 and the flange 16 are so dimensioned
that the flange 16 may fit within the flange 20.
The housing member 19 may be perforated as at
22 to permit the escape of liquid should any enter
the housing. A downward extension 23 from the
housing 19 provides a space for operating means

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which will be described below. The member 32
extends laterally as at 33 and is open as at 34 to
permit the entrance of and positioning of operat-
ing means. The portion 33 may be of any desired
shape to furnish means whereby the pump may be
attached to a suitable mounting or support.

A valve supporting and positioning member 35,
as shown in Figures 1 and 5, may be shaped to
correspond somewhat to the curvature 11 of the
member 10, and it terminates in a flange 36
shaped to extend beneath the flange 16 of the
upper housing member and shaped also to fit
within the flange 20 of the lower housing mem-
ber. The member 35 is provided with a generally
flattened portion 37 perforated as at 38. About
each of the perforations 38 is a raised portion 39
comprising a valve seat. A valve ring 40 is po-
sitioned about the member 12 above the openings
38, within the lower portion of the annular space
6 and is adapted to be seated against the valve
seats 39 to close them. A spring 41 bears at one
end against the shoulder 14 and at the other end
against the valve 40 and is biased to seat the
valve.

The member 35 is also provided with a generally
central upward extension 42 which terminates
at its upper end in a valve seat 43 and which is
cut away in one or more places as at 44. A pack-
ing or sealing member 45 may be positioned about
the upward extension 42. A valve 46 is positioned
within the space defined by the member 12 and
above the extension 42. A spring 47 is positioned
to be seated against a seating member 48. This
member is fixed within the member 12 and
against the shoulder 13. The spring 47 bears at
one end against the valve 46 and is biased to hold
the valve in the raised or closed position.

A packing member 49 may be positioned above
the flange 36 and below the flange 16.

A diaphragm rod 50 is positioned to move with-
in the housing 19 and to extend into the space
defined by the housing portion 32. Fixed to it is
a diaphragm 51 which is gripped at its edge by
the flange 36 and the flange 20 when the two
housing sections are joined together. Stiffening
discs 52 and 53 are secured respectively above and
below the diaphragm 51 and are fastened to the
member 50 by a rivet, screw or other attach-
ing member 54.

At its lower end, the member 50 may be headed
as at 55 to engage a rocker arm or operating lever
56, which is bifurcated as at 57 to fit about it.
If desired, a generally tubular member 58 may be
positioned about the rod 50 and is embraced by
the bifurcations 57. If desired, a laterally ex-
tended member 59 may be positioned about the
rod 50 adjacent the head 55, and cushioning
means 60 may be positioned on the member 59
to act as a cushioning and silencing means.

The rocker arm or lever is provided with a sup-

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port 61 which is held in a bearing 62 by a retaining member 63. This member is, itself, removably held in place in the lower housing section by a screw 64 or otherwise. The rocker arm may be of any desired shape; as shown in Figure 1, it is upwardly shaped as at 65 and carries a cam contacting member 66 which is adapted to contact a cam 67 or any other desired operating means.

If desired, a sealing means may be provided about the rod 50. This means includes packing or cushioning members 68 which fit tightly in contact with the member 50 and are held in place by enclosing parts 69. In the particular form shown in Figure 1, the parts 69 serve also as a seat for the lower end of the operating spring 70. The upper end of this spring is in contact with the stiffener 53 beneath the diaphragm 51. The spring 70 is biased to hold the diaphragm in the raised position.

The modified form of Figure 3 is generally the same as that described above, and only so much will be re-described as differs from the structure above described. The pump housing, the valve supporting means and the other parts are substantially the same. The inlet passage member 71 is extended and is longer than the inlet passage member 2. At its outer end it is threaded as at 72 to receive a conduit. Within the passage member 70 is a directing means 73 which directs entering fluid downwardly through the passage 74 into the bowl 75. The bowl is supported on the member 71 and is removably held in place by a bail 76, which is provided with a tightening thumb nut 77 against the holding member 78 to hold the bowl tightly in position. A screen 79 is positioned about the passage member 74 and within the bowl and screens all material moving from the bowl to the inlet passage member 71 through the opening 80.

The use and operation of this invention are as follows:

The pump of this application is primarily designed to be associated with an internal combustion engine, and it is preferably mounted adjacent the engine, for example, on the crankcase, and the rocker arm or operating lever is placed where it can be operated by a rotating member, such as the cam shaft. It is connected to a source of liquid and the outlet or discharge side is connected to a carburetor or other point of use. When the cam shaft rotates the pump diaphragm is moved up and down through the linkage shown and produces alternate suction and discharge strokes. As the diaphragm is drawn downwardly liquid is drawn through the inlet passage and the inlet valve is unseated and moved downwardly to permit the entrance of liquid.

The suction which causes the liquid to enter also holds the outlet valve seated on the several outlet valve seats. When the diaphragm is raised, pressure within the pump housing is increased, the inlet valve is seated, the outlet valve is raised from its seat and liquid is discharged from the pump.

During the pump operation the integral vapor dome is effective and its operation is made sure by the location and extent of the ring-like outlet or discharge valve. Since that valve is positioned above or on the upstream side of the outlet valve openings, it prevents the liquid from shooting up into the vapor dome. It acts as a baffling or guiding means, while permitting liquid to move outwardly through the outlet valve openings, which prevents filling of the vapor dome and thus

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makes sure that the dome will remain clear of liquid and will remain effective.

The valve assembly member which includes the portions defining the outlet valve seats, the member for limiting the inward movement of the inlet valve and means for engagement between the two housing members is a unit, and may be made by stamping, spinning or any other desired manner. Because it is a unitary member it insures accurate positioning of the various inlet and outlet valve passage and members in assembly and simplifies assembly of the total device. It is not necessary to carry out individual seating or adjustment of various valve members in the assembly of the device. Similarly, when the device is taken apart for cleaning or repair and is re-assembled, both operations are simplified and made more certain and accurate by reason of the fact that the member which positions and defines the inlet and outlet openings to and from the pumping chamber is a unitary member.

In the modified form the construction of the pump proper is the same as that disclosed in the earlier figures. The only difference is the provision of a bowl which may be transparent. For example, it may be made of glass. The bowl permits a user by inspection, without taking the device apart to check the operation of the pump and to check the condition of the liquid moving to the pump.

The features above discussed can be embodied in a pump with or without the stuffing box mechanism shown and can be embodied in a pump arranged with any desired rocker arm or operating lever. The invention is not limited, therefore, to the particular means shown for reciprocating the diaphragm. While the pump itself will ordinarily be made of metal, it may be made of any material.

I claim:

In combination in a liquid pump, a pair of housing members and means for securing them releasably together, one of said housing members shaped to fit within the other, inlet and outlet passages formed in one of said housing members, and an annular integral pressure dome formed within said housing member and positioned concentrically with a portion of said inlet passage, a unitary member including a central inlet, and a plurality of outlet valve seats positioned about said inlet, said unitary member provided with a portion adapted to be gripped and held between said housing members, a ring-like valve member positioned adjacent to and adapted to be seated upon said outlet valve seats, said outlet valve member shaped of rigid material, and a spring biased to hold it seated, said outlet valve member being guided by a portion of the housing member within which said inlet passage is formed, and an inlet valve positioned to be seated to close said inlet, and a spring biased normally to hold said inlet valve closed.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
986,122	Astrom	Mar. 7, 1911
2,016,580	Schulze et al.	Oct. 8, 1935
2,080,392	Rockwell	May 11, 1937
2,139,347	Babitch et al.	Dec. 6, 1938
2,382,797	Longan	Aug. 14, 1945