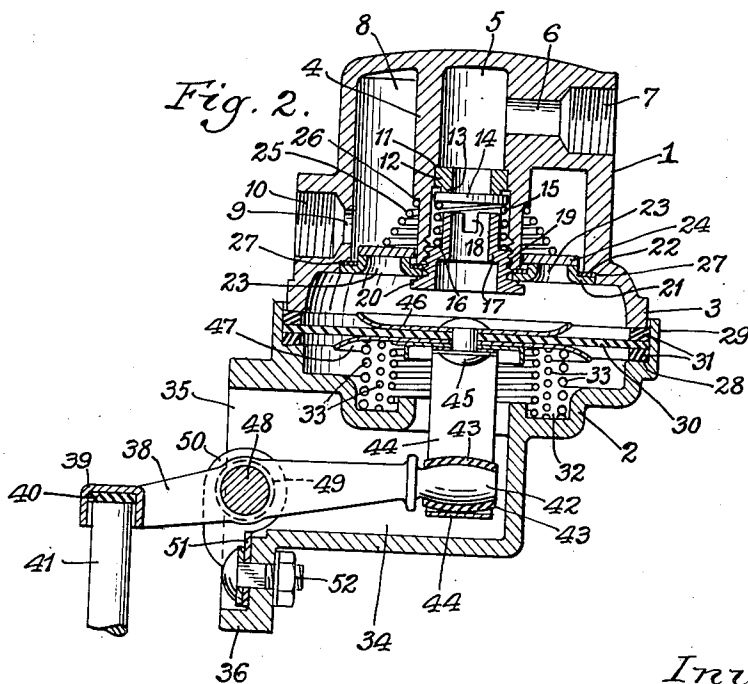
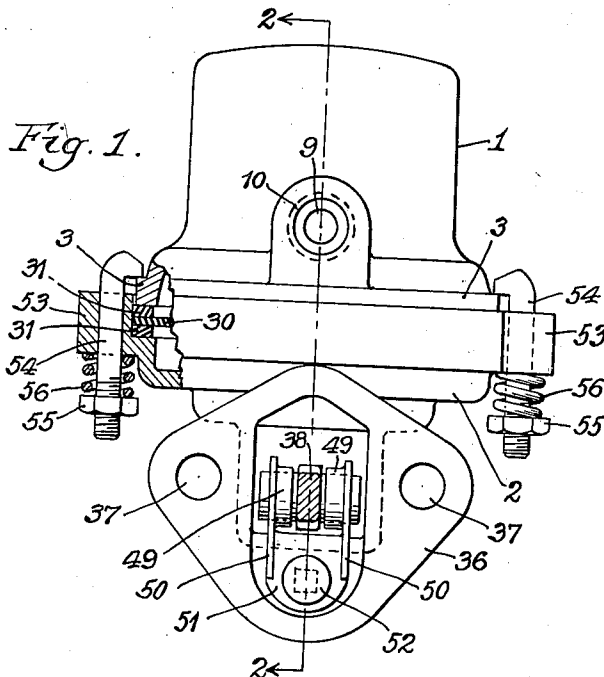


March 14, 1950

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PUMP

2,500,310

Filed Sept. 21, 1946



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UNITED STATES PATENT OFFICE

2,500,310

PUMP

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Application September 21, 1946, Serial No. 698,473

10 Claims. (Cl. 103—228)

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This invention relates to a pump and particu-
larly to a diaphragm pump. Although this pump
may be used for any purpose, it is in the form
illustrated herewith particularly adapted for fur-
nishing fuel to an internal combustion engine.

An object of the invention is to provide a com-
pact and highly efficient pump having a high
capacity for a small size.

Another object is to provide a suitable valve
arrangement.

Another object is to provide valve seats and
an effective means for assembling and retaining
them in place.

Other objects will appear from time to time
throughout the specification and claims.

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

Figure 1 is an elevation of the pump with parts
broken away and parts in section;

Figure 2 is a section taken generally at line
2—2 of Figure 1 and illustrating generally the
internal construction of the pump.

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

In the particular form here shown, the pump
comprises two main housing or structural mem-
bers. Thus there is an upper housing section 1
and a lower housing section 2. The housing sec-
tion 1 is provided with a flange 3 for engagement
with attaching means which will be described
below.

The housing section 1 has an external wall as
shown which is generally round or rounded and
an internal and preferably integral wall 4. This
is also round or rounded in cross section and pro-
vides an internal vapor dome 5. An inlet connec-
tion 6 communicates with the space 5 and may
be internally threaded, as at 7, to receive a con-
nection or conduit. 8 is a generally annular space
defined by the outer wall of the housing 1 and the
inner wall 4. An outlet connection 9 which may
be internally threaded, as at 10, leads from the
space 8.

If desired, a filter of any suitable sort may be
positioned within the space 5, but the invention
is not limited to the inclusion of such a filter.

The member 4 on its inner surface is provided
with a shoulder 11, against which a valve seat 12
is positioned. This valve seat may be of any
suitable material. Generally the pump housing
members will be of metal and the valve seat 12
may also be of metal, or it may be of fiber or
synthetic material or any desired material. The
valve seat 12 is preferably provided on one face

with a raised portion 13 upon which a valve disc
14 may be seated. The disc is normally held in
seated position by a spring 15 which is biased to
hold the valve disc seated. The valve disc itself
may be of any material—rubber, synthetic mate-
rial, fiber material or metal.

The spring 15 is seated at one end upon a
shoulder 16 which is formed in a valve retaining
member 17. This member is provided in its upper
surface with one or more notches or depressions
18. The valve 14 may be seated against the upper
end of the member 17 when suction within the
housing moves the valve from contact with the
member 13. The member 17 may be enlarged and
exteriorly threaded, as at 19, to engage corre-
sponding threads formed in the member 4. The
member 17 is also provided with a laterally ex-
tending flange 20, as shown in Figure 2. The
valve structure thus far described comprises the
inlet valve and inlet valve assembly. The mem-
ber 17 thus serves as a retainer for the spring 15
and as a limiting means for movement of the
valve inwardly and also as a seat for that valve
when it is open. The member 17 serves a further
purpose which will be described below.

The outlet valve structure comprises an an-
nular member 21 which is positioned about the
lower portion of the space 8 and is seated in a
shoulder 22 formed in the housing member 1 and
is also seated against the member 4. One or more
outlet passages 23 may be formed in the member
21 and a valve ring 24 is positioned to close these
openings when in one position. A spring 25 is
biased to hold the valve ring 24 yieldingly closed.
At one end the spring is seated against the valve
ring 24 and at its other end it is seated against
a shoulder 26 formed in the member 4. If de-
sired, gaskets 27, 27 may be positioned upon the
valve seat member 21.

The flange 20 or some other part of the mem-
ber 17 is of such size and shape that it overlaps
a portion of the outlet valve seat member 21 and
holds it in place. Thus the member 17 serves not
merely the purposes above enumerated but also
serves the purpose of seating and holding the
member 21 in place. This simplifies the assembly
operation and assures proper and accurate as-
sembly of the parts, both of the inlet and of the
outlet valve assemblies.

The lower housing section 2 is shaped to pro-
vide a shoulder 28 defined by an upwardly extend-
ing flange 29 within which the portion 3 of the
housing section 1 may fit. A diaphragm 30 is
engaged between the shoulder 28 and the lower
portion of the member 3. Gaskets or packing

material 31, 31 may be positioned on either side of the diaphragm.

The housing member 2 may be provided with an annular depression 32 within which one or more springs 33 are seated. These springs may all be of one size or may be of different sizes, and they may be formed of wire or material of different thicknesses. The housing section 2 is shaped to provide a chamber 34 and has an open end 35 about which may be positioned a flange 36 perforated, as at 37, to receive bolts or other attaching members.

An operating lever 38 projects into the chamber 34. At one end the member 38 has a cup-like part 39 which may carry within it a cushioning member 40. A push rod 41, reciprocated from any source, fits into the cup 39 and against the cushioning member 40. This push rod is reciprocated to cause movement of the lever. At its opposite end the lever is provided with a rounded portion 42 about which a cushion member 43 may be positioned. The portion 42, 43 of the lever 38 is received in a loop 44 which may be of rigid material.

The loop is secured to the diaphragm by a rivet 45, or otherwise. A relatively rigid member 46 may be secured by the rivet on the upper face of the diaphragm 30 and a second relatively rigid member 47 is secured to the lower face of the diaphragm. The upper ends of the springs 33 are positioned against one face of the member 47.

A shaft 48 supports the lever 38 for rotation. Bearings 49, 49 are provided for the shaft and they may be attached to or formed integrally with ears 50 which are joined by a portion 51. The portion 51 is held in place by a nut and bolt 52.

Perforated enlargements 53 are formed on the housing section 2 to receive hooks 54 by means of which the two housing sections are removably joined together. As shown in Figure 1, the points of the hooks 54 engage the shoulder 3 on the housing section 1. The hooks are in the form of bolts and carry nuts 55. Between the nuts and the enlargements 53 are positioned springs 56, which are compressed to the desired degree by the nuts when they are tightened.

Although I have shown an operative form of my invention, it will be recognized that many changes in the form, shape and arrangement of parts can be made without departing from the spirit of the invention, and my showing is therefore to be taken as, in a sense, diagrammatic.

The use and operation of this invention are as follows:

The pump is assembled as shown and is positioned upon a support. Ordinarily if the pump is used in connection with an internal combustion engine, it will be mounted on the crankcase or some other part of the engine and the push rod 41 will be actuated by the engine, for example, by the cam shaft, or otherwise. The intake passage 6 is connected with a source of fuel and the outlet or discharge passage 9 is connected to the carburetor or other device to which the fuel is to be delivered. When the member 41 is reciprocated, the member 38 is moved up and down and alternately depresses the diaphragm 30 against the resistance of the spring or springs 33. The springs return the diaphragm when free to do so.

When the diaphragm is depressed, suction is created within the housing above the diaphragm and the valve 14 is moved from the position shown in Figure 2. It is thus moved out of contact with the member 13 and into contact with the top of the member 17. Fuel is drawn through the pas-

sage 6, the chamber 5, through the openings 18 and into the diaphragm pumping chamber. When the diaphragm movement is reversed so that pressure is created within the housing, the valve 14 is again seated.

When pressure rises sufficiently, the valve ring 24 is raised against the resistance of the spring 25 and liquid passes through the valve openings 23 and through the passage 8 and moves thence through the discharge passage 9 and the conduit which may be connected to it at the point of use. This cycle of operations continues as long as the lever 38 is moved.

In assembling pumps of the type indicated, it is important that the assembly be carried out correctly, and it is important to design a pump in which the various parts may be assembled with a minimum of effort. In the structure of the present design the valve seating arrangements are designed so that one valve seat serves the additional purpose of properly positioning and centering another valve seat and also of securing it in place.

In the assembly of the upper portion of the assembly, therefore, the housing member 1 with its associated fixed parts is completed and the assembly may then be carried out as follows: The seat member 12 is put in place and it is preferably held in place by a forced fit. The valve 14 is then put in place and the spring 15 is inserted. The spring 25 is inserted and the valve ring 24 is placed upon it. The valve seat member 21, which has the discharge openings 23 formed in it, is put in place with or without a gasket 27 and finally the member 17 is put into place. This member serves to hold all of the previously mentioned valve parts in proper assembled position. It is so proportioned that when it has been screwed home into the position shown in Figure 2, it positions all of the other members and, in particular, holds the valve seat member 21 in position. Thus no added fastening means for the valve seat member 21 is necessary, and an accurate assembly is made certain and the operation of assembly is simplified over the operation required previously where each valve seat member required separate assembly and separate securing means.

I claim:

1. In combination in a pump housing, a housing member, parts of said member defining inlet and outlet passages, an outlet valve seat member provided with a plurality of outlet openings, an outlet valve member positioned to close said openings, an inlet valve, a seat therefor, and a second inlet valve seat, inlet openings being formed in said second seat, said second inlet valve seat being adapted to be secured to said housing member and having a portion engaging a portion of said outlet valve seat member and holding the same in position.

2. In combination in a pump housing, a housing member, parts of said member defining inlet and outlet passages, an annular outlet valve seat member provided with a plurality of outlet openings, an annular outlet valve member positioned to close said openings, an inlet valve, a seat therefor, and a second inlet valve seat, inlet openings being formed in said second seat, said second inlet valve seat being adapted to be secured to said housing member and having a portion engaging a portion of said outlet valve seat member and holding the same in position.

3. In combination in a pump housing, a housing member, parts of said member defining inlet

and outlet passages, an outlet valve seat member provided with a plurality of outlet openings, an outlet valve member positioned to close said openings, and a spring biased to move said valve to the closed position, an inlet valve, a seat therefor, and a second inlet valve seat, inlet openings being formed in said second seat, and a spring biased to hold said inlet valve on said first inlet valve seat, said second inlet valve seat being adapted to be secured to said housing member and having a portion engaging a portion of said outlet valve seat member and holding the same in position.

4. In combination in a pump housing, a housing member, parts of said member defining inlet and outlet passages, an annular outlet valve seat member provided with a plurality of outlet openings, an annular outlet valve member positioned to close said openings, and a spring biased to move said valve to the closed position, an inlet valve, a seat therefor, and a second inlet valve seat, inlet openings being formed in said second seat, and a spring biased to hold said inlet valve on said first inlet valve seat, said second inlet valve seat being adapted to be secured to said housing member and having a portion engaging a portion of said outlet valve seat member and holding the same in position.

5. In combination in a pump housing, a housing member, parts of said member defining inlet and outlet passages, and an enclosed vapor dome, an outlet valve seat member provided with a plurality of outlet openings, an outlet valve member positioned to close said openings, an inlet valve, a seat therefor, and a second inlet valve seat, inlet openings being formed in said second seat, said second inlet valve seat being adapted to be secured to said housing member and having a portion engaging a portion of said outlet valve seat member and holding the same in position.

6. In combination in a pump housing, a housing member, parts of said member defining inlet and outlet passages, and an enclosed vapor dome, an annular outlet valve seat member provided with a plurality of outlet openings, an annular outlet valve member positioned to close said openings, and a spring biased to move said valve to the closed position, an inlet valve, a seat therefor, and a second inlet valve seat, inlet openings being formed in said second seat, and a spring biased to hold said inlet valve on said first inlet valve seat, said second inlet valve seat being adapted to be secured to said housing member and having a portion engaging a portion of said outlet valve seat member and holding the same in position.

7. In combination in a pump, a housing member defining an inlet and an outlet passage, an inlet valve, a seat therefor, an outlet valve and an annular seat therefor, said inlet valve seat being adapted to project through the central opening of said annular seat and be secured to said housing member, said inlet valve seat in-

cluding means adapted to engage said annular seat to position and to retain said annular seat in predetermined position.

8. In combination in a pump, a housing member defining a central inlet passage and an annular outlet passage surrounding said inlet passage, an annular outlet valve seat member having a central opening and a plurality of outlet openings, an outlet valve adapted to seat on said seat member to close said outlet openings, an inlet valve seat adjacent said inlet passage, an inlet valve adapted to seat on said inlet valve seat to close said inlet passage, a valve retaining member projecting through said central opening of said annular outlet valve seat member and adapted to engage said outlet valve seat member to position and support the latter, and means for securing said valve retaining member to said housing member.

9. In combination in a pump, a housing, said housing defining an inlet and an outlet passage, a plurality of valves positioned in said housing, a seat member for each of said valves, one of said valve seat members having a central aperture, another of said valve seat members extending through said central aperture and having an interlocking engagement with said housing, said other of said valve seat members including means adapted to engage said one of said valve seat members adjacent said central aperture to position and retain said one of said valve seat members in proper position.

10. In combination in a pump, a housing, said housing defining an inlet and an outlet passage, a plurality of valves positioned in said housing, a seat member for each of said valves, one of said valve seat members having a central aperture, another of said valve seat members extending through said central aperture and having an interlocking engagement with said housing, said other of said valve seat members including means adapted to engage said one of said valve seat members adjacent said central aperture to position and retain said one of said valve seat members in proper position, said valves being positioned one to be seated on each of said valve seat members.

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