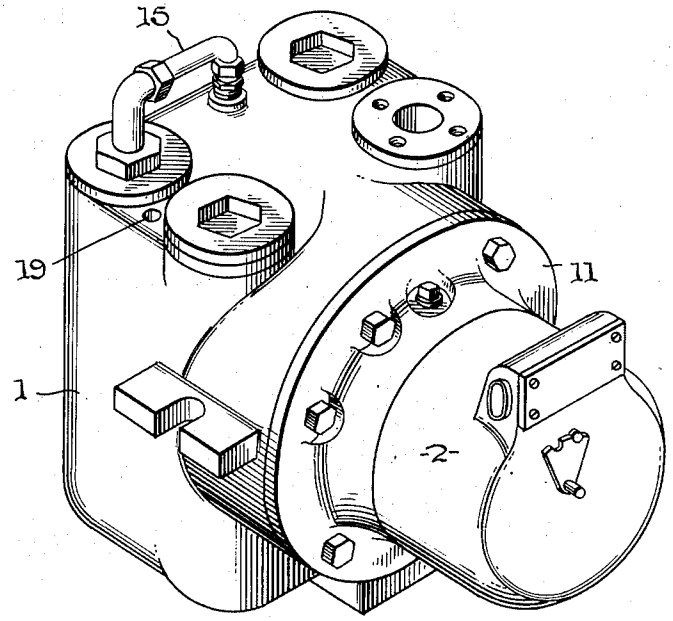
May 12, 1953 B. WAGNER 2,638,111

FLOAT VALVE

Original Filed Oct. 11, 1949 3 Sheets-Sheet 1

FIG. 1.



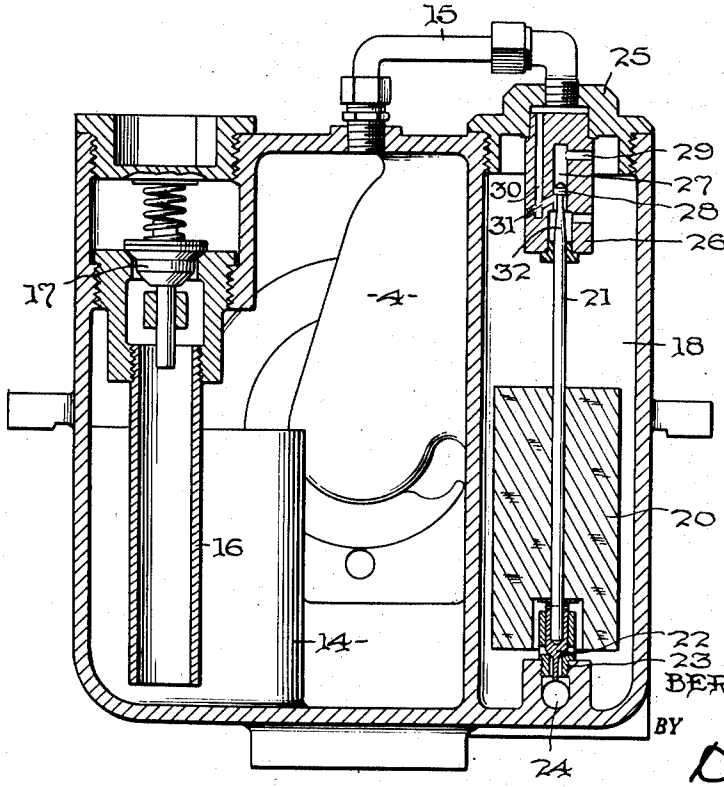


FIG. 2.

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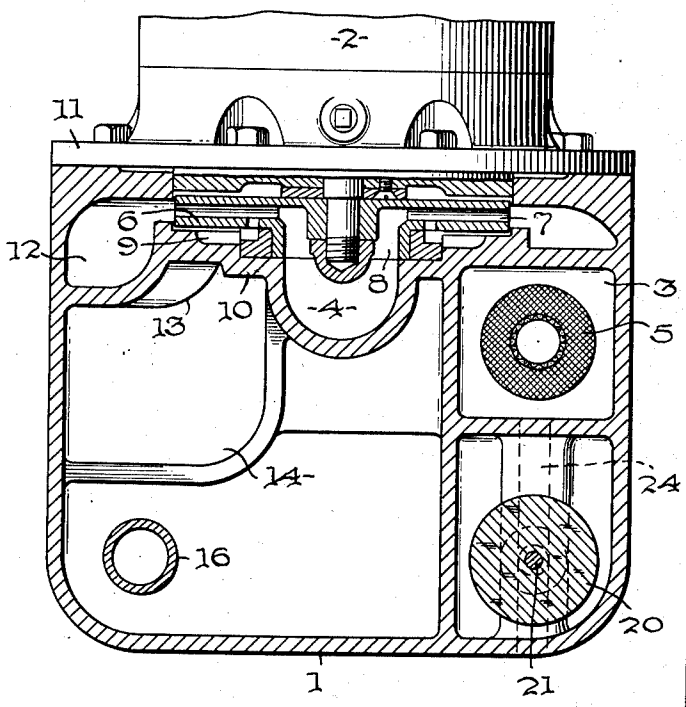
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FLOAT VALVE

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FIG. 3.



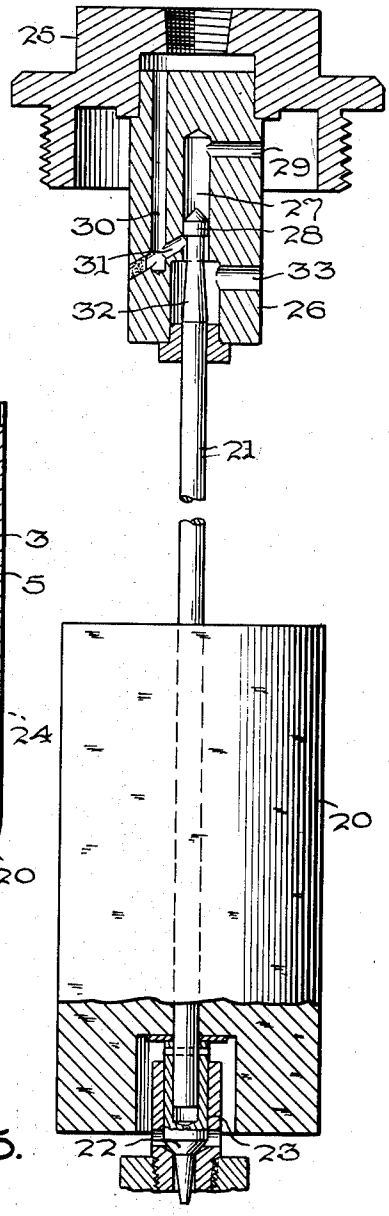


FIG. 5.

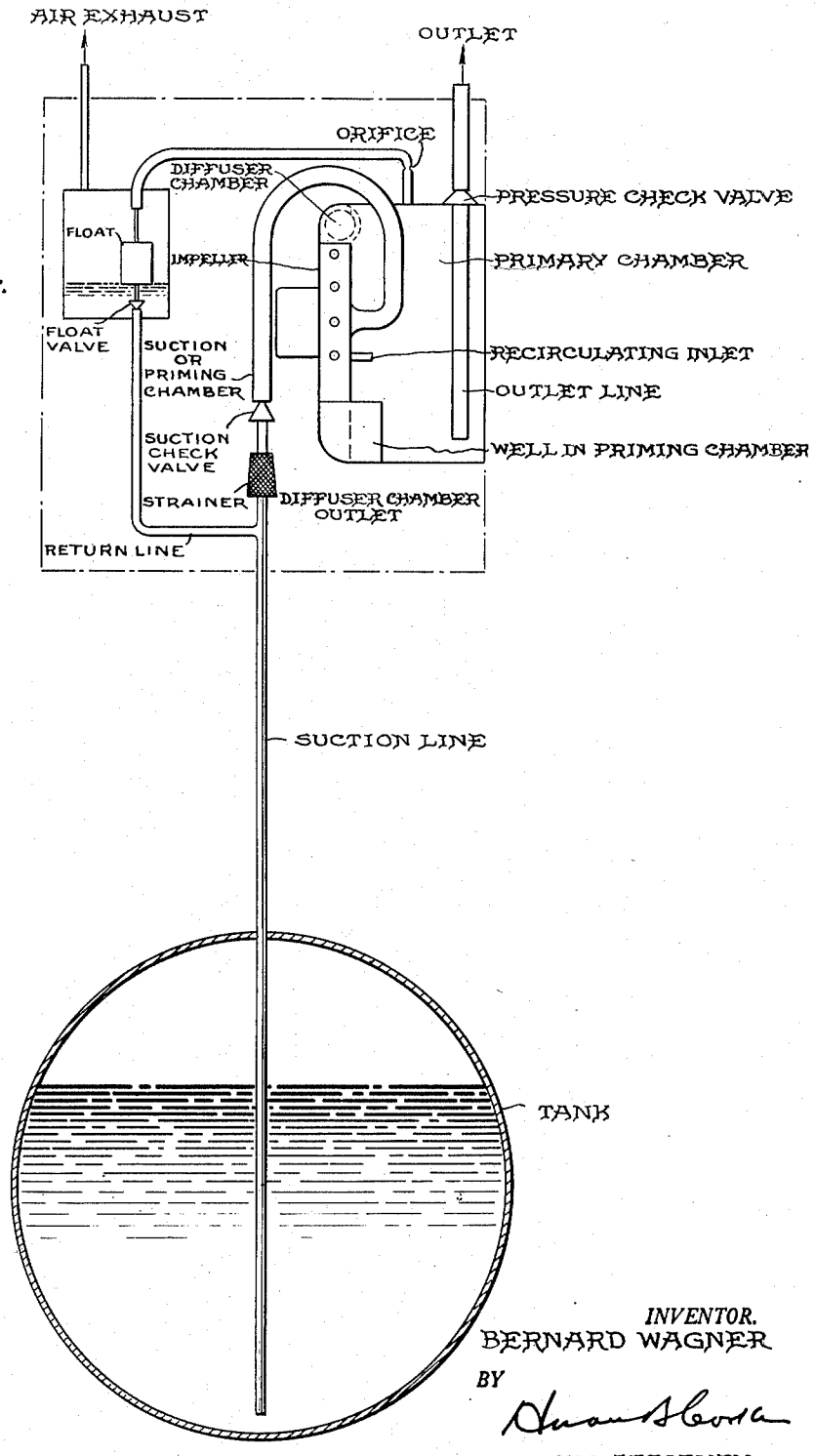
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FIG. 4.



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UNITED STATES PATENT OFFICE

2,638,111

FLOAT VALVE

Bernard Wagner, Crafton, Pa., assignor to Gulf Oil Corporation, Pittsburgh, Pa., a corporation of Pennsylvania

Original application October 11, 1949, Serial No. 120,797. Divided and this application May 26, 1952, Serial No. 290,016

3 Claims. (Cl. 137—192)

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This invention relates to improvements in float valves, and more in particular to a valve for use in a gasoline dispensing system, which valve controls flow of gasoline from the air separating chamber of a pump unit, being assisted in opening by the jetting action of fluid entering the chamber and simultaneously operating to cut off flow into the chamber while the same is draining.

Such dispensing systems are designed to remove entrained air from the gasoline which is being pumped, so that accurate liquid measure will be indicated by the meter. Thus, as the gasoline is discharged from the pump impeller it passes to a separating chamber where its turbulence subsides in some degree and air rises to the top while the gasoline, freed of air, is withdrawn from a low point and passes through the meter to the dispensing hose. The separated air contains an amount of gasoline and, since the aforesaid chamber is substantially full of liquid between operations of the pump, at each dispensing operation the sudden surge of liquid discharged from the impeller tends to force some of it along with the overlying blanket of air into a second separating chamber in which the liquid gradually collects while the air is continuously vented therefrom to the atmosphere. Since this second separating chamber is in communication with the atmosphere it is important that the level of gasoline collecting in it be maintained below the vent in order to avoid flooding and the consequent creation of a dangerous condition. A float valve is accordingly provided which periodically, upon rise in liquid level, opens a passage for return of the accumulation of gasoline to the inlet of the impeller where it joins the main entering stream.

It is an object of my invention to provide in a device of the character described, improved air elimination from the pumped gasoline and an improved float valve arranged to be assisted in its operation by the jetting action of gasoline laden air expelled from the air eliminator structure, the arrangement being such as to prevent undesirable flooding of portions of the pump unit as well as to hasten the attainment of pumping pressure.

The present application is a division of my copending application Serial No. 120,797, to which reference is made for a detailed description of the pump unit construction in which the float valve herein claimed is particularly useful, although, as will be understood, in view of the separate status and development of float valves, it is applicable as well to other uses than in gasoline dispensing systems.

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In the drawings:

Figure 1 is an isometric view of a pump unit incorporating the present invention, showing the location of the vent for the air separating, float-controlled chamber.

Figure 2 is a section in elevation taken along line 2—2 of Figure 3.

Figure 3 is a horizontal sectional view through the pump unit at the height of the impeller axis.

Figure 4 is a schematic representation showing the principal elements incorporated in the pump unit.

Figure 5 is a section, partly in elevation, showing the detail of the float valve and mechanism associated therewith which also appears in Figure 2.

Referring to the drawings, the pump unit housing is indicated generally at 1, and the motor and motor bell housing which is bolted thereto is indicated generally at 2. A suction inlet in the base of the pump housing leads into portions 3 and 4 of a suction conduit delivering liquid to the impeller eye and formed by partitions within the housing, the liquid being drawn through a strainer 5 within portion 3 of the suction conduit to prevent any foreign matter from entering any further portion of the pump system.

The impeller 6 is a disc-like cylindrical member having a plurality of radial passages 7 connecting the inlet eye 8 with its outer periphery. The impeller is situated within an impeller chamber 9 formed between a partition 10 within the housing 1 and the end plate 11 of the bell housing for motor 2.

An impeller discharge chamber 12 is provided within housing 1 and extends about the outer periphery of impeller 6 and communicates therewith. This impeller chamber may take any convenient form such as that of a doughnut, but is preferably of the volute type. The purpose of this chamber is to gradually perform a transition from radial flow of liquid in the impeller to tangential flow as well as to initiate the separation of any air which may be entrapped within the liquid being pumped. An outlet 13 is provided in the impeller discharge chamber extending downwardly and discharging in the same direction into primary air separation chamber 14. Baffle means may be provided in conjunction with outlet 13 and extending within impeller discharge chamber 12 to facilitate direction of the liquid in the impeller discharge chamber toward the outlet 13.

The purpose of the primary air separation chamber, as the name implies, is to separate the air and difficultly condensable vapor from the liquid which has been freshly pumped and discharged thereinto. This may be due to aeration or cavitation caused by the centrifugal pump or simply due to the presence of air or vapor on the inlet side of the pump. The level of liquid in chamber 14 will remain near the top of the chamber at all times unless there is a leak in the system, whereby during repriming and normal operations the air and/or vapor separating from the liquid as it reaches the top of chamber 14 is forced into a restricted conduit 15.

A pump outlet conduit 16 extends downwardly into chamber 14 to receive air-free liquid from a point near the bottom of such chamber and to convey it through a meter to a dispensing hose, neither of which are shown. This outlet conduit contains a check valve 17.

The air which is permitted to bleed from primary air separation chamber 14 through the restricted conduit 15 will invariably contain volatile vapors and may also contain entrained liquid. To recover the liquid passing through conduit 15 and to facilitate further air separation, a secondary air separation chamber 18 is provided within the pump unit. This air separation chamber is provided with an air vent 19 in the top thereof, shown in Figure 1, a float 20 of any suitable buoyant material such as cork, and a float operated valve to control the liquid level therein. Float 20 is disposed upon a vertical rod 21 connecting at the base thereof with the needle portion 22 of a needle valve having a seat 23 situated in the base of chamber 18 and disposed about needle 22 in the form of a collar, as shown in detail in Figure 5. This needle valve is in communication with a conduit 24 extending therefrom in the base of housing 1 to the suction inlet conduit of the pump unit. Thus, as the float 20 rises within the secondary air separation chamber in response to the liquid level therein, the needle valve is opened and liquid recirculates to the suction inlet. The portion of chamber 18 above the liquid level therein is under atmospheric pressure due to air vent 19 provided in the top thereof communicating with the atmosphere, as shown in Figure 1. For this reason and for the reason that the conduit 24 is under suction, the needle valve may tend to stick to its seat, although the liquid level within chamber 18 has risen to a point which should cause the float 20 to open the valve. To insure that this condition will not occur, the pressure of fluid coming from conduit 15 is employed to assist opening of the valve, as shown in Figures 2 and 5. For this purpose, the top of chamber 18 is provided with a removable closure 25 to which conduit 15 is connected. A cylinder 26 having a central bore 27 therein depends from removable closure 25, and rod 21, upon which float 20 is mounted, extends upwardly within bore 27 to form a small piston 28 operating within bore 27. The top of bore 27 is provided with a lateral passage 29 extending therefrom to the chamber 18 to permit elevation of piston 28 within bore 27 when a pressure is developed therebeneath. To develop this pressure, another passage 30 is provided within cylinder 26, extending from a point in communication with conduit 15 and directing at 31 a jet against the lower face of piston 28. Rod 21 is tapered at 32 immediately beneath piston 28 and passage 33 communicating with this portion of rod 21

is provided to permit fluid from conduit 15 and passages 30 and 31 to pass into chamber 18 except when piston 28 is fully elevated. When piston 28 is fully elevated, the tapered portion of rod 21 enters bore 27 to prevent passage of fluid from primary air separation chamber 14 through passages 30, 31 and 33 into secondary air separation chamber 18. Thus, when secondary chamber 18 accumulates sufficient liquid, flow of further liquid thereto is prevented until most of the liquid has been exhausted through valve 22.

The opening of valve 22 is assisted by the jet action of fluid under pressure at 31 against the face of piston 28, insuring that the valve will not stick to seat 23 when a predetermined quantity of liquid accumulates in chamber 18. When valve 22 opens, the action of piston 28 and float 20 causes piston 28 to become completely elevated within bore 27 such that the tapered portion 32 of rod 21 interrupts the flow of fluid from primary air separation chamber 14 to secondary air separation chamber 18. This provides an opportunity for most of the liquid to be exhausted from chamber 18, so that the chamber will not become flooded were liquid to enter the chamber faster than it could be removed. Such flooding, which is common in gasoline dispensing systems employing float controlled air separation chambers, could be serious if liquid were permitted to escape from vent 19. When chamber 18 becomes sufficiently exhausted of liquid, the weight of the float valve assembly will carry valve 22 back to its seat despite the pressure acting upon piston 28. In addition, piston 28 performs the further function of hastening the attainment of pumping pressure within chamber 14. Between operations, when the pump is not working, chamber 14 is under atmospheric pressure. When the pump starts again, chamber 14 must rapidly rebuild its lost pressure to sufficient magnitude for a dispensing operation. In starting, some liquid from chamber 14 initially in the form of a liquid jet is forced into chamber 18 under normal operating conditions, such that float 20 and piston 28 become elevated, thus interrupting communication between chambers 14 and 18. Since pressure relief from chamber 14 is thereby cut off, the pressure within chamber 14 is permitted to build up more rapidly than if pressure relief were afforded for chamber 14 through secondary chamber 18.

From the foregoing it will be appreciated that while the float valve and jet assist lends for better pump operation in a unit as above described, the invention is not limited in its application to gasoline dispensing systems but has utility in many environments wherein assisted operation of a float valve is desired or necessary.

What I claim as my invention is:

1. A float valve comprising a valve rod, a float mounted thereon and a valve piece at the lower end of said rod, the upper end of the rod being tapered to reduced diameter and terminating in a piston head of less diameter than the maximum diameter of the tapered portion, a cylinder in which said piston head is received, and a fluid conduit entering the bore of said cylinder beneath the piston head, to project fluid thereagainst and to assist in raising said valve piece from its seat as buoyancy of the float increases with rise of liquid level.

2. A float valve comprising, in combination with a float chamber provided with an air vent and a gas-liquid separation chamber communi-

cating with said float chamber, a float operated valve in said float chamber, a float carried by said valve and having an upwardly extending rod movable therewith, said rod being tapered adjacent its end and terminating in a piston head, a cylinder provided with a bore closely fitting said piston head and an enlarged chamber defining an annular shoulder at the entrance to the bore against which the tapered portion of said rod abuts when the float valve and rod are raised, a first conduit communicating with the bore of said cylinder below the piston head, a second conduit extending from the bore in said cylinder to the interior of said float chamber above the piston, and a third conduit extending from the enlarged chamber in said cylinder to the interior of said float chamber below the piston, whereby in closed position of the valve, fluid entering the float chamber from the first conduit flows beneath the piston head and around the rod to the third said conduit, and as liquid accumulates in the separation chamber, with increasing buoyant force exerted by the float, the jetting action of entering fluid on the under side of said piston assists in unseating the valve with simultaneous

rise of the rod to a position wherein its tapered portion plugs the cylinder bore and cuts off communication between the first conduit and the float chamber.

3. In a liquid pump having a pumping mechanism, an air separation chamber in communication therewith, a float chamber to receive air and entrained liquid from said air separation chamber, a restricted conduit connected therebetween, and a liquid drainage conduit from said float chamber, the combination therewith comprising a float in said float chamber, a float operated valve controlling said drainage conduit, a piston operatively controlled by said float, a cylinder to receive said piston, said cylinder being provided with a passage connecting with said restricted conduit and directing the discharge therefrom against a face of said piston to assist in opening said float-operated valve and a second passage communicating the aforesaid passage with said float chamber, said communication being interrupted when said piston and float are fully elevated.

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No references cited.