

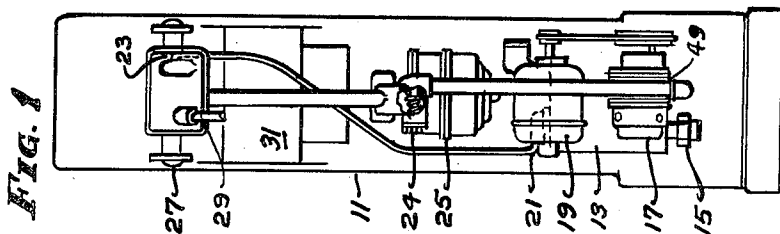
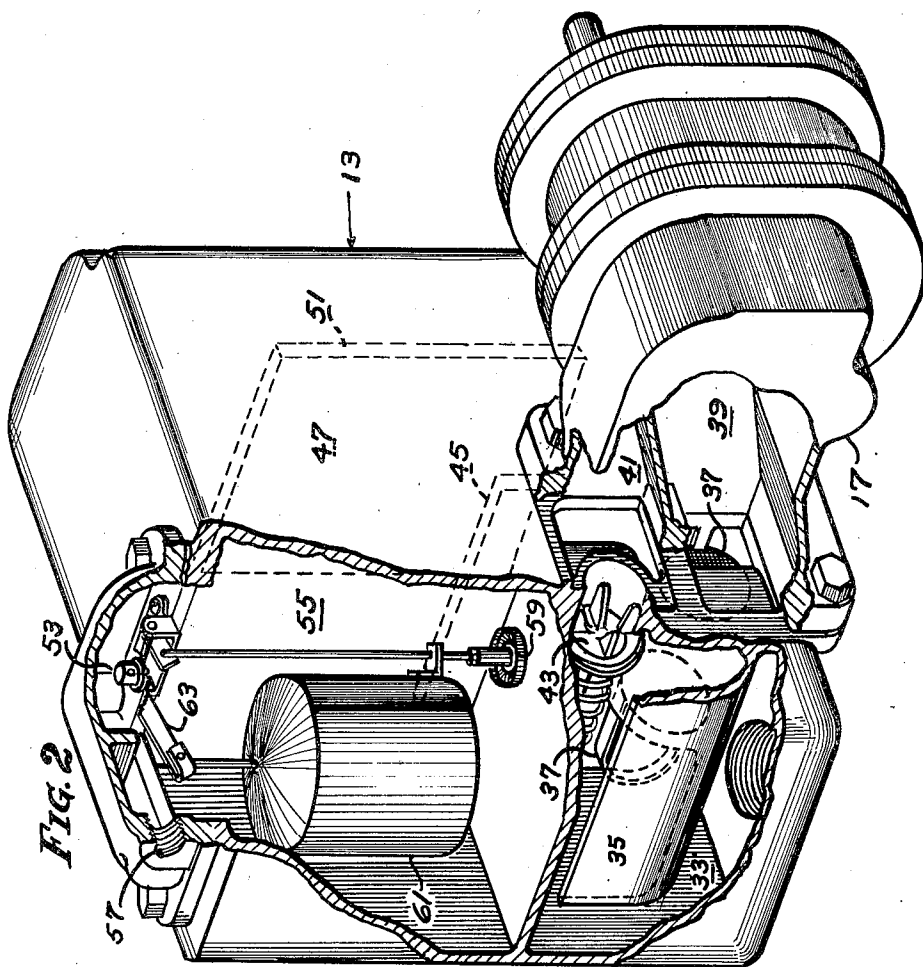
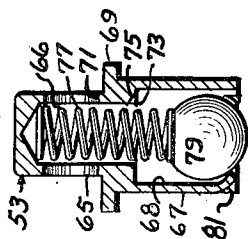
June 16, 1942.

C. P. GRIFFITH

2,286,536

GAS VENT VALVE FOR GAS AND LIQUID SEPARATORS

Filed June 10, 1938



Clement P. Griffith
INVENTOR.

BY Edmund W. C. Kammer

ATTORNEY.

UNITED STATES PATENT OFFICE

2,286,536

GAS VENT VALVE FOR GAS AND LIQUID SEPARATORS

Clement P. Griffith, Fort Wayne, Ind., assignor to
S. F. Bowser & Company, Incorporated, Fort
Wayne, Ind., a corporation of Indiana

Application June 10, 1938, Serial No. 212,998

1 Claim. (Cl. 251—120)

This invention relates to air separating means, more specifically to a device for separating the air and gases which are entrained in gasoline which is being pumped from an underground storage tank to a receptacle such as the gasoline tank of an automobile.

It has been the practice in recent years to pump the gasoline and entrained gases into a separating chamber in which the velocity of the gasoline was reduced due to the fact that the cross-sectional area of the pipe leading to the separating chamber was much smaller than that of the chamber itself.

The reduction in velocity afforded time for gravity separation of the gases to take place. This action was also aided in some cases by a centrifugal action. An illustration of this type of device is found in Alfred Lanser, Reissue Patent Number 20,369.

The separated gases in which was entrained a small amount of liquid due to incomplete separation were then passed through a restricted gas discharge orifice into a float chamber so that the liquid which was carried through the orifice by the gases would be given an opportunity to settle out. The gases passed out through the vent and when sufficient liquid collected in the float chamber to lift the float, a valve connecting the float chamber with the suction line of the pump was open and the liquid passed through the pump to be recirculated.

However, in the Lanser patent, the restriction of the gas discharge orifice is effected by a float actuated valve. This represents expensive and bulky construction and it is an object of applicant's invention to replace the float actuating valve by a simpler, cheaper and more compact valve.

It is an object of applicant's invention to provide, in a gas and liquid separator, a constantly open gas discharge orifice which is variably restrictable.

It is a further object of applicant's invention to provide a gas discharge mechanism which will permit a free passage of a stream of fluid consisting mainly of gases through an opening of predetermined sizes but which will reduce the size of the opening when the stream of fluid consists mainly of liquid.

Yet another object of the invention is to provide a gas discharge valve which comprises a large orifice and a small orifice and a liquid operated valve for closing the large orifice.

A further object of the invention is to provide a variable orifice valve which is simple and which may be cheaply made.

Still another object of the invention is to provide a variable orifice valve and a constantly operating means for urging it toward open position.

These and other objects will become apparent from a consideration of the following specification taken in connection with the accompanying drawing which forms a part thereof and in which:

Figure 1 is an elevation of a dispensing apparatus showing the component parts thereof.

Figure 2 is a perspective view with parts broken away of the separator unit in which the variable orifice valve is incorporated.

Figure 3 is a sectional view showing the details of the variable orifice valve.

In Figure 1, the numeral 11 indicates generally a dispensing apparatus housing which may be of any suitable construction and in which is mounted an air separator structure 13 which is connected to an underground tank (not shown) by means of a suction line 15.

A pump 17 is attached to the separator structure and is connected to be driven by an electric motor 19 which is controlled by switch 21 connected by suitable linkage to a hose hook so as to be operated thereby, in the usual manner.

The liquid discharged from the air separator passes through a back flow preventing check valve 24 to a meter 25 and thence through suitable connections to a sight discharge 27 and to the hose 29. The meter is connected to drive a registering mechanism 31 of any suitable type.

The check valve holds the meter and all of the liquid conduit between the meter and the nozzle full of liquid. This check valve may be of any suitable construction but it preferably comprises a composition valve element acting on a metal seat and in such case, a light spring is usually provided to insure proper setting of the valve.

Further, the valve may be placed with its axis in a horizontal position so that it could not be closed by gravity and in such case, the light spring performs the additional function of moving the valve to its seating position.

Referring to Figure 2 in which the air separator structure 13 is shown in detail, it will be seen that the liquid from the underground tank enters from the suction line 15 into a chamber 33, passes over baffle 35 and through screen 37 to the suction chamber 39 of pump 17. After passing through the pump, the liquid passes through discharge chamber 41 of the pump and thence either through the by-pass valve 43 into chamber 33 or if liquid is being withdrawn from the apparatus, liquid passes over baffle 45 and into the primary separating or pressure chamber 47.

The gas free liquid passes from chamber 47 through a port 49 and to the meter as described above and the baffle 51 prevents a direct flow of liquid from baffle 45 to port 49. The separated gas and some entrained liquid pass through the valve mechanism indicated generally by numeral 53 and into the float or secondary separating

chamber 55 which is vented at 57 and which is connected to the suction chamber 33 by the valve mechanism 59. A float 61 and suitable linkage 63 control the valve mechanism.

Referring to Figure 3, it will be seen that the gas discharge valve body comprises an upper cylinder 65 having a bore 66, a lower cylinder 67 having a bore 68 which is co-axial with the first bore, and a radial flange 69 at the junction of cylinders. A passageway 71 is formed radially through the upper cylinder 65 which is closed at its upper end. The bore 68 of the lower cylinder communicates with the bore 66 of the upper cylinder and is open at its lower end. A valve seat 73 is formed at the point of communication of the two cylinder bores and this seat is grooved at 75 to form a secondary orifice which is, of course, much smaller than the main orifice.

A light coil spring 77 is inserted in the upper cylinder bore and this spring is compressed by inserting a ball valve 79 in the lower cylinder bore. The valve is held in the cylinder preferably by cutting the lower cylinder axially to form a plurality of fingers 81 and by bending these fingers inwardly in a swedging operation to restrict the diameter of the bore and thus prevent escape of the valve.

In practice the bore 66 is made of .25 inch diameter, the bore 68 is made .375 inch diameter and the ball valve is .3125 inch diameter. The restricted orifices comprise two notches which are .0314 inch wide and .0314 inch deep and disposed at 45° to the bores.

The spring used when it is compressed from .5 to .375 inch will support about 6½ ounces.

Operation

In initiating a dispensing operation, the operator will raise the hose hook which in turn will move the switch 21 to the on or closed position to start the pump 17. Liquid will be drawn up through the suction line 15, chamber 33, pump chamber 39 and will be discharged through the by-pass valve back into chamber 33.

In the event that there is considerable gas in chamber 47 some of the liquid will enter this chamber and force the gas out through the bore 68 past ball valve 79 which is held away from its seat 73 by spring 77 into bore 66 and out through the radial passageway 71 and into the float chamber 55 whence it may escape through the vent 57. As gas is driven from the chamber, the liquid will rise therein and eventually reach the level of the cylinder 67 and some of it will pass to the float chamber by the same path traversed by the gas.

The relative sizes of the bore 68 and ball 79 are such that the force exerted on the ball by gas passing through the passage formed between the ball 79 and bore 68 under normal operating pressures is not sufficient to overcome spring 77 and consequently the ball remains away from its seat 73.

However, when liquid attempts to follow the path of the gas outlined above, to the float chamber, since it has a much greater mass and viscosity than the gas, the liquid will exert sufficient force upon the ball valve to overcome spring 77 and consequently the ball engages seat 73.

Since this seat is provided with the small

orifice 75, liquid will flow over into the float chamber at a very reduced rate because of the small size of the orifice 75. If, during the dispensing operation, any substantial amount of gas collects in chamber 47, the liquid level will be depressed and the liquid will drain out of bore 68. Since the force exerted on the valve by air passing out the small orifice under the pressure in chamber 47 will not be sufficient to retain valve 79 on its seat against the action of the spring 77, the valve will drop and open the larger orifice defined by seat 73, thus permitting a greater volume of gas to be discharged than would be discharged through the orifice 75.

As the amount of gas in the chamber becomes reduced, the liquid level rises and the valve would again be closed as described above. The above described operation is the same as that which occurs when liquid is being dispensed from the apparatus through the usual nozzle valve after the apparatus has been started except that in such case the by-pass valve is closed if there is a substantial discharge through the nozzle.

It is to be understood that the valve seat 73 is of such a size that the ordinary flow resistance which normally exists in the system between the separating chamber 55 and the nozzle will create more than sufficient back pressure in the chamber 55 to eject the gases collected therein without incorporating a special back pressure valve or regulating valve such as that disclosed in the patent to Bechtold, No. 1,868,444.

The above description of operation of the valve 79 is predicated upon the assumption that the pump 17 is in normal operation. The valve would not close with a rising liquid level in chamber 47 if this rise in level were due to such a thing as a leaky check valve 24 since in this case, the energy in the liquid passing through the orifice would not be enough to overcome the force of the spring and the weight of the valve.

While applicant has herein disclosed a specific embodiment of his invention for the purposes of illustration, it is obvious that various changes may be made in the form, construction and arrangement of parts without departing from the spirit of the invention. Accordingly, applicant desires protection not only upon the specific form of the invention herein described in detail but upon such mechanisms as fall fairly within the scope of the appended claim.

What I claim to be new and desire to protect by Letters Patent of the United States is:

In a valve mechanism, a valve body, means forming a continuously open passageway of relatively small cross-sectional area, said passageway comprising two bores of different diameters, a mutilated valve seat formed at the junction of said bores, a ball valve in the larger bore, a spring in said smaller bore acting on said valve and means comprising inwardly directed projections for holding said valve in said larger bore, said mutilation serving to form a very restricted by-pass for said valve, said valve, spring and larger bore being so proportioned that, under normal operating conditions, the forces acting on the valve to open it overcome the forces acting on the valve to close it when gas is being discharged, but are overcome by the forces acting to close the valve when liquid is being discharged.

CLEMENT P. GRIFFITH.