

Dec. 28, 1954

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2,697,943

SHUTOFF MECHANISM FOR AIR SEPARATORS

Filed Nov. 26, 1948

2 Sheets-Sheet 1

Fig. 3

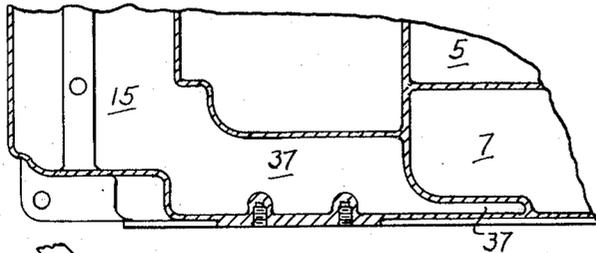


Fig. 1

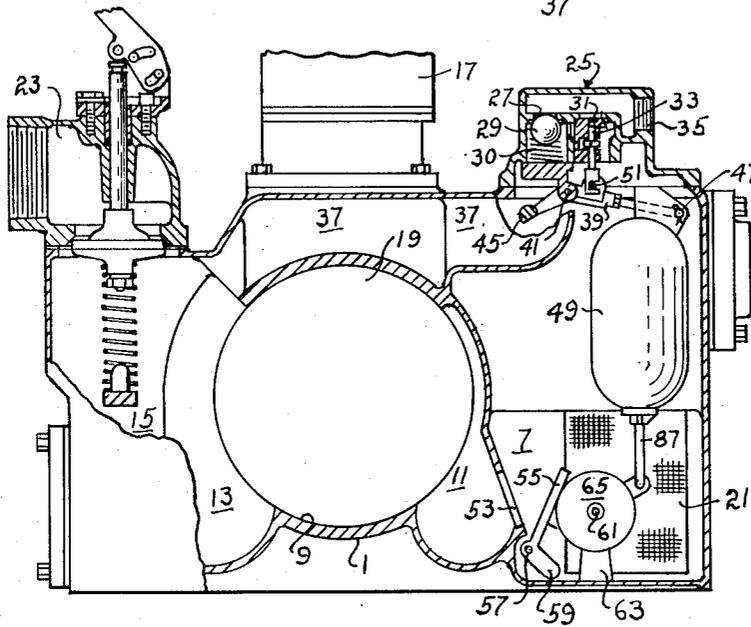
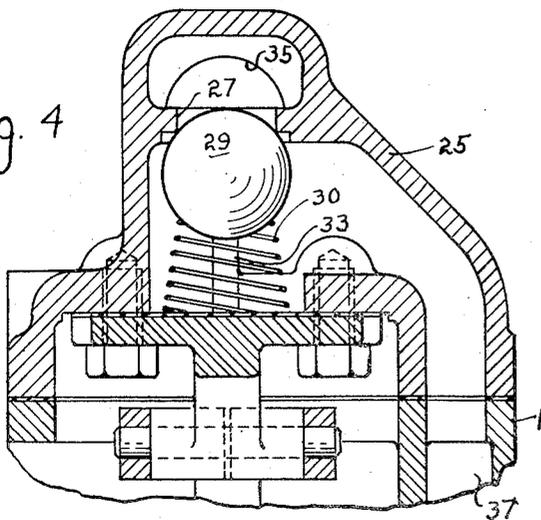


Fig. 4



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2 Sheets-Sheet 2

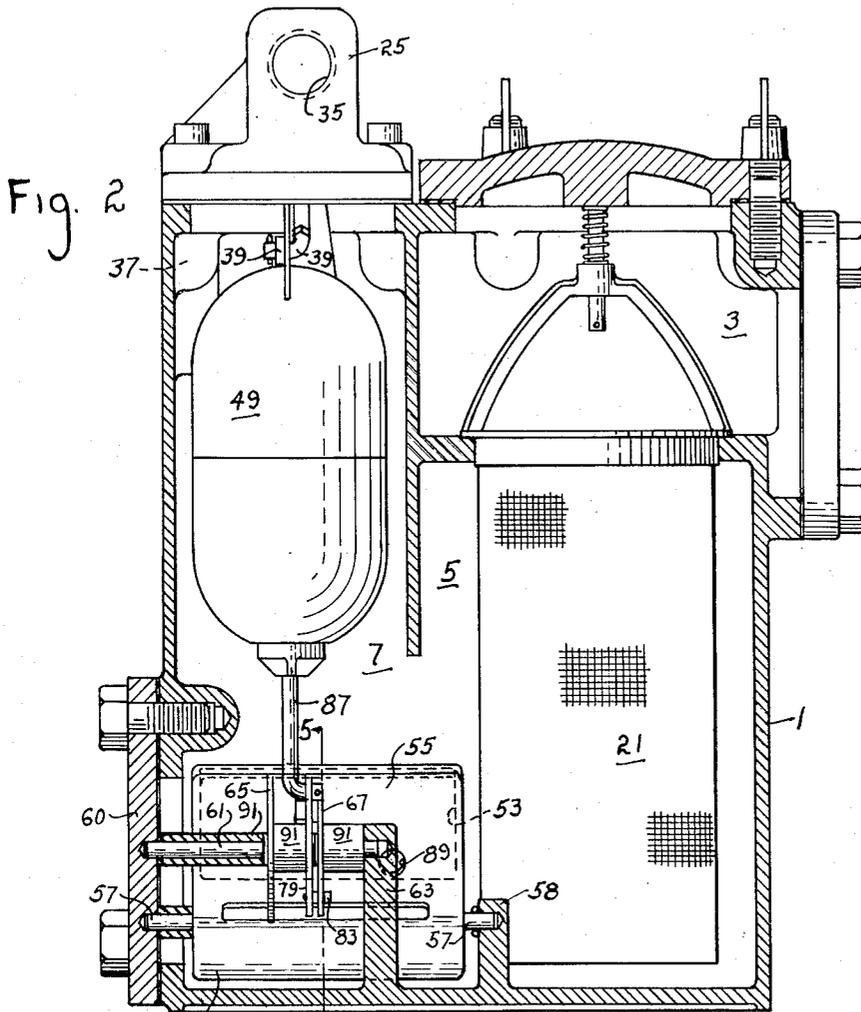


Fig. 2

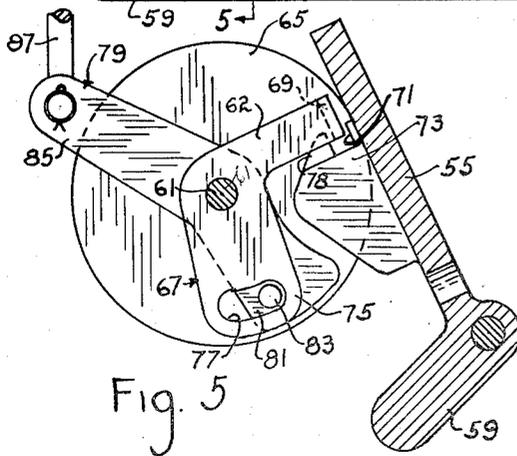


Fig. 5

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1

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SHUTOFF MECHANISM FOR AIR SEPARATORS

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17 Claims. (Cl. 73—200)

This invention relates to a shut-off mechanism for an air separator. More specifically, it relates to a device for preventing the passage of gas or foam to a meter so as to maintain the accuracy thereof.

An object of the invention is to provide means to prevent the passage of gas or foam to the meter.

Another object of the invention is to provide means for stopping the metering operation when gas or gas-shot liquid enters the separator.

Yet another object is to provide a fluid stream operated valve for shutting off the flow to the meter.

A further object of the invention is to provide a shut-off valve which is held closed until the system is shut down.

Still another object of the invention is to provide a valve which is held latched out of closing position.

Yet another object of the invention is to provide a float released latching means for the valve.

These and other objects will become apparent from a study of this specification and the drawings which are attached hereto and made a part hereof and in which:

Figure 1 is a front elevation partially in section showing the separator, meter and valve mechanism.

Figure 2 is a sectional view of the air separator and strainer chamber.

Figure 3 is a sectional view of the body showing the gas passage for breaking the siphonic vacuum on the meter.

Figure 4 is a detailed view of the structure of Figure 3.

Figure 5 is an elevation with parts in section, showing the shut-off valve and its latching means.

Referring to Figures 1, 2 and 3, numeral 1 represents a casing or body casting in which are formed the inlet chamber 3, screen chamber 5, separator chamber 7, meter chamber 9 having inlet 11 and outlet 13, faucet chamber 15, and a register 17 which is driven by the meter 19.

A strainer 21 is mounted between chambers 3 and 5 and a faucet valve 23 is mounted to control the discharge from chamber 15.

A vent cap 25 is mounted on 1 above chamber 7 and contains a port 27 controlled by a downwardly opening spring-pressed ball valve 29, a port 31 which is controlled by an upwardly closing needle valve 33 and a port 35 which opens to atmosphere. The valve spring is numbered 30.

Valve 29 connects a channel 37 in the body with the vent port 35. The channel communicates with chamber 15.

A lever 39 is pivoted at 41 on a support 43 attached to cap 25. The lever is weighted at one end 45 and attached at 47 to float 49 at the other. The valve 33 is connected at a point 51 intermediate 45 and 47.

Chambers 7 and 11 communicate through a port 53, a control valve 55 is pivoted on rod 57 mounted on projection 58 and cap 60 on body 1 for movement to and from closing position with respect to the port. A weight 59 tends to open the valve and is heavy enough to do so under static conditions.

A shaft 61 is pivoted in cap 60 and in a standard 63 rising from the bottom of 1. A disc 65 is mounted on the shaft and serves as a stop for the valve 55. A latch

2

lever 67 is mounted for rotation on the shaft 61 and one arm 62 thereof has an ear 69 which enters a notch 71 in a lug 73 projecting from the rear side of the valve. The other arm 75 of the lever has an arcuate slot 77. The lug 73 is bevelled at 78.

A bell crank 79 is also pivoted on rod 61 and one arm 81 thereof carries a pin 83 which enters slot 77 and the other arm 85 is connected by line 87 to float 49.

A pressure balancing port 89 is formed in the valve 55 in the region of port 53. Suitable spacers 91 are provided to position the parts on shaft 61.

Operation

Assuming that the device is full of liquid to the normal level in chamber 7, valves 33 and 29 will be closed and valve 55 will be latched open.

When the faucet valve 23 is opened, liquid will flow in through chamber 3, screen 21, chambers 5 and 7, port 53, chamber 11 and rotate the meter mechanism 19 which drives register 17.

Measured liquid will pass out through chambers 13 and 15, valve 23 to the discharge conduit, usually a hose.

When the required amount of liquid is dispensed, the faucet valve is closed to stop the flow.

Should gas become entrained in the liquid entering chamber 7 to the extent that the float is not supported by the mixture at the usual level or should gas enter the chamber to cause the liquid level to drop, the float will drop. In so doing lever 79 is rotated counter-clockwise (Figure 5) and pin 83 transmits this motion to lever 67. The ear 69 is lifted from notch 71 and the current of liquid flowing through port 53 claps the valve 55 down over the port.

Any substantial siphonic vacuum in chamber 15 is satisfied by air which enters it through vent 35, port 27 (past valve 29) and channel 37. A small amount of fluid will pass through port 89.

If we assume that the defect causing the air condition (such as an empty truck tank compartment) has been remedied by connecting a new supply of liquid to the meter, and that the gas has been vented from chamber 7 so as to lift float 49, the operator can again start operating by closing the faucet valve 23. This causes the pressures on opposite sides of valve 55 to be balanced through port 89 so that weight 59 will open the valve. The bevel 78 will cam the latching lever 67 up so that it may drop into notch 71. This independent action of lever 67 is permitted by lost motion pin and slot 83, 77.

Should the float be held below the predetermined level, however, due to an insufficient supply of liquid in chamber 7, the latch 67 would be held out of latching position by pin 83 and subsequent opening of the faucet would result in closure of the valve.

The valve 33 operates in the usual manner to permit gas to be vented from chamber 7 in order to establish an operating level of liquid therein.

When the apparatus is used for metering gasoline, for example, the float is so constructed that it will float in gasoline but will sink in foam or highly gas-shot gasoline. It will thus prevent any foam or gas-shot liquid from passing to the meter to cause incorrect registration.

It is obvious that various changes may be made in the form, structure and arrangement of parts without departing from the spirit of the invention. Accordingly, applicant does not desire to be limited to the specific embodiment disclosed herein primarily for purposes of illustration; but instead he desires protection falling fairly within the scope of the appended claims.

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

1. In a liquid and gas separator having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted in the path of flow through said outlet for movement to and from closing position over said outlet, said valve being inside said chamber so as to be closed by the flow therefrom, latch means on said valve, a latch

3

movable to and from closure preventing engagement with said means, a float, a lever operable by said float and having a lost motion connection with said latch.

2. In a liquid and gas separator having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closing position over said outlet, latch means on said valve, a latch movable to and from closure preventing engagement with said means when the valve is open, a float, a lever operable by said float and a pin and slot connection between said lever and latch means.

3. In a liquid and gas separator having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closing position over said outlet, latch means on said valve, a latch movable to and from closure preventing engagement with said means when the valve is open, a float, a lever operable by said float and having a lost motion connection with said latch, and weight means for constantly urging said valve open.

4. In a liquid and gas separator having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted in the path of flow through said outlet for movement to and from closing position over said outlet, said valve being inside said chamber so as to be closed by the flow therefrom, latch means on said valve, a latch movable to and from closure preventing engagement with said means when the valve is open, a float, a lever operable by said float and having a lost motion connection with said latch, and means for constantly urging said valve open.

5. In a liquid and gas separator having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closing position over said outlet, a stop for said valve to limit the opening movement thereof, latch means on said valve, a latch movable to and from closure preventing engagement with said means when the valve is open, a float, a lever operable by said float and having a lost motion connection with said latch, and weight means for constantly urging said valve open.

6. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted in the path of flow through said outlet for movement to and from closed position with respect to said outlet, said valve being inside said chamber so as to be closed by the flow therefrom, means normally urging and holding said valve away from said position and liquid level responsive means in said chamber for disabling said holding means.

7. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closed position with respect to said outlet, means normally urging said valve away from said position, said valve being disposed in the flow of liquid so as to be urged toward closed position thereby, means for latching said valve open and liquid level responsive means in said chamber for releasing said latching means.

8. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closed position with respect to said outlet, means for latching said valve away from said position and liquid level responsive means in said chamber for releasing said latching means.

9. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closed position with respect to said outlet, means for latching said valve away from said position, and float controlled means in said chamber and responsive to a predetermined low level therein for rendering said latching means ineffective.

10. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted in the path of flow through said outlet for movement to and from closed position with respect to said outlet, said valve being inside said chamber so as to be closed by the flow therefrom, means for latching said valve away from said position, a float in the chamber, and

4

means responsive to a predetermined low position of said float for rendering said latching means ineffective.

11. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closed position with respect to said outlet, means for urging the valve from closed position, means for latching said valve away from said position, and liquid level responsive means in said chamber for releasing said latching means, said latching means comprising a latch and means on the valve automatically engageable in latching relation therewith under the action of said urging means.

12. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closed position with respect to said outlet, means for latching said valve away from said position, said latching means comprising a latch and means on the valve adapted to be engaged by said latch when it is away from closed position, and liquid level responsive means for operating said latch from said latching position.

13. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted in the path of flow through said outlet for movement to and from closed position with respect to said outlet, said valve being inside said chamber so as to be closed by the flow therefrom, means for latching said valve away from said position, said latching means comprising a latch and means on the valve adapted to be engaged by said latch when it is away from closed position, and liquid level responsive means for operating said latch from said latching position when a predetermined low liquid level is reached.

14. In a liquid and gas separator, the combination of means defining a separating chamber having a liquid outlet adjacent the bottom thereof, a flow actuated valve mounted for movement to and from closed position with respect to said outlet, means for latching said valve away from said position, said latching means comprising a latch and means on the valve adapted to be engaged by said latch when it is away from closed position, liquid level responsive means for operating said latch from said latching position, a vent, a vent valve, and means connecting said vent valve for opening and closing by said level responsive means.

15. An air separator adapted to be connected to the inlet of a meter having a discharge valve at the liquid outlet comprising, in combination, a casing provided with a liquid inlet and outlet and having an atmospheric vent communicating with the separator, a flow closed control valve for the inlet of the meter, said control valve having a pressure balancing port, and means for continually urging said control valve open.

16. An air separator adapted to be connected to the inlet of a meter having a discharge valve at the liquid outlet comprising, in combination, a casing having a liquid inlet and outlet and having an atmospheric vent communicating with the separator, a control valve for the inlet of the meter, said control valve having a pressure balancing port, means for continually urging said control valve open, and means responsive to a liquid level above a predetermined level in the separator for latching said control valve open.

17. An air separator adapted to be connected to the inlet of a meter having a discharge valve at the liquid outlet comprising, in combination, a casing having a liquid inlet and outlet and having an atmospheric vent communicating with the separator, a flow closed control valve for the inlet of the meter, said control valve having a pressure balancing port, means for continually urging said control valve open, means responsive to a liquid level above a predetermined level in the separator for latching said valve open, said last named means being responsive to a liquid level below said predetermined level for unlatching said valve.

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