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LIQUID CARBONATOR

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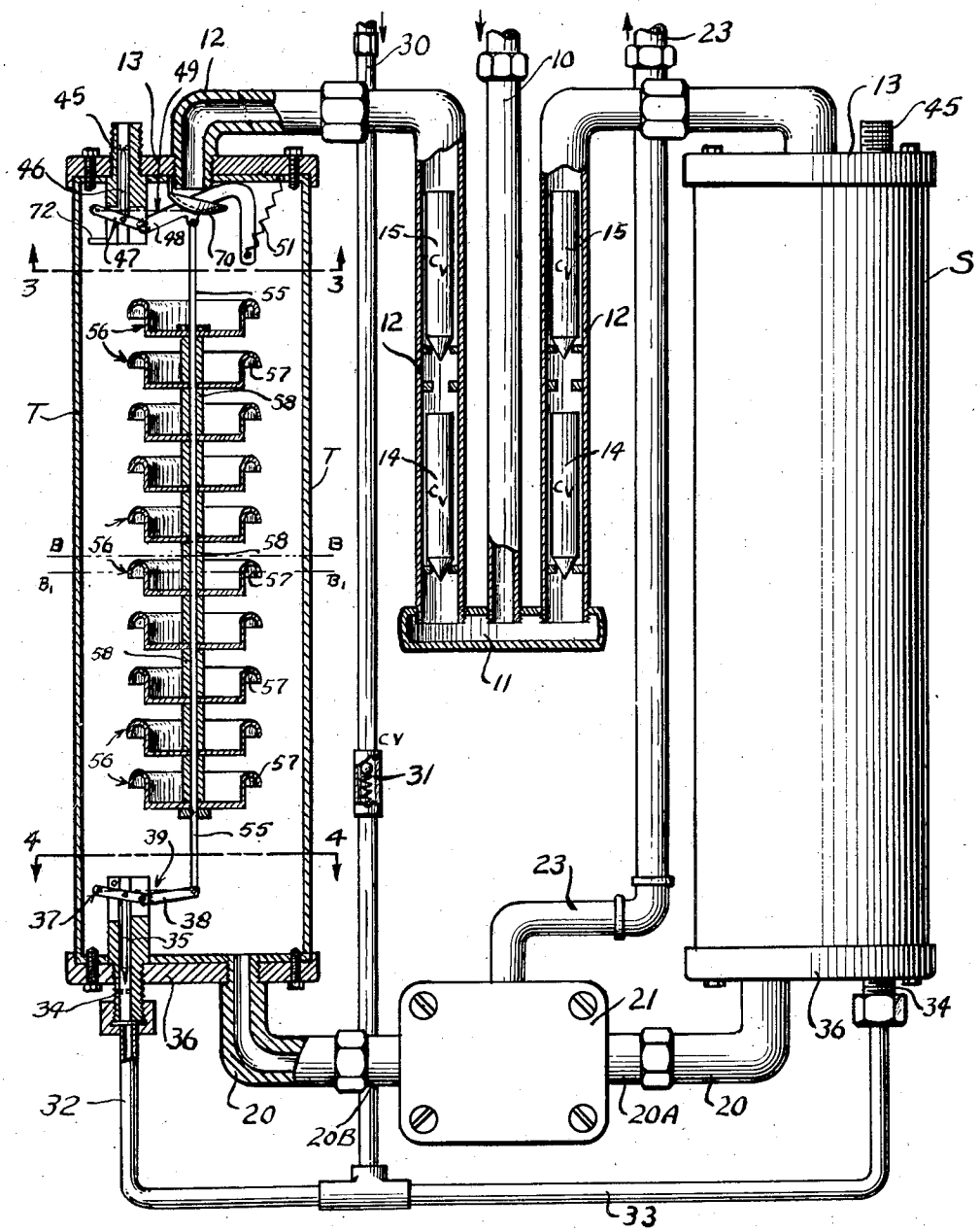

FIG. 1

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LIQUID CARBONATOR

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5 Claims. (Cl. 261—19)

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This invention relates to a carbonating device.

It is an object of the present invention to provide a carbonating device which has a new and improved control for the gas inlet and vent valves. This control comprises a column or vertical stack of spaced cups. A spring is connected to the stack or cups to help raise and hold the cups in the raised position when the water level in the carbonating tank rises to a given level. The high level water buoys the cups and spring means will raise the cups to the elevated position. When the water level in the tank falls to a given level the weight of the cups filled with liquid overcomes the pull of the spring means and the stack of cups falls to its lower position and through the connections with the valves opens the vent valve and closes the gas inlet valve. This lowers the pressure in the tank below the pressure in the water line and a check valve in the water line opens and water flows into the tank. When the water level in the tank reaches a given height it causes the cups to rise as above explained and the vent valve closes and the gas valve is automatically opened to again charge the water contained in the tank.

This control member takes the place of the usual hollow ball type of float valve and has advantages thereover in not being liable to leakage which renders the float ineffectual. The cups are advantageous in a carbonating tank by serving as baffles to arrest and disperse the flow of gas in the water and to provide a greater surface exposure of the water to the carbonating gas in those cups that are located above the water level in the tank.

In the drawing:

The figure is an elevation partly in section illustrating the various elements of the carbonator.

Referring to the drawings two tanks S and T are shown each identical in construction. The water inlet pipe 10 leads to a maniold 11 connected to upwardly extending pipes 12, which are connected into a head 13 on each of the tanks. Check valves 14 and 15 are arranged in the pipes 12 to prevent backflow.

At the bottom of each tank is a water outlet 20 which leads into a housing 21. An outlet pipe 23 for carbonated water leads from the housing 21.

A gas connection pipe 30 having a check valve 31 branches into two pipes 32 and 33 each leading to a valve housing 34. A needle valve 35 is positioned in housing 34 to control flow of gas into tank T. Valve housing 34 is mounted in a

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base plate 36. Valve 35 is operated by a snap over center device consisting of levers 37 and 38 each pivoted on valve housing 34 on the same pin and operated by spring 39. Spring 39 is shown above the centerline on Fig. 1 and the valve 35 in open position.

At the top of each tank located in the head 13 is a vent valve housing 45 in which is located a needle valve 46 to be operated by a similar snap action arrangement consisting of levers 47 and 48 each pivoted at the same point on valve housing 45 and operated by spring 49. Spring 49 is shown simply by a dotted line on Fig. 1. Lever 48 is an angle lever arranged when in its upper position, to abut head 13. This lever is held in its upper position by a tension spring 51 when the load of the filled cups does not overcome its pull.

The lever 38 of valve 34 and the lever 48 of valve 45 are each connected to a common shaft 55 on which is mounted a plurality of dish-shaped members or cups 56 each of which has an overhanging of reverse lip 57. These dish-shaped members 56 are spaced by spacers 58 on the shaft 55.

The snap action devices controlling needles 35 and 46 are so arranged as regards their stroke that upon downward movement of shaft 55 valve 35 will shift to a closed position prior to the time that valve 46 is shifted to open position. Also valve 35 is arranged to remain closed until valve 45 is closed on the upward stroke of shaft 55. This is accomplished by arranging the stroke of levers 37 and 38 to a shorter distance than the stroke of levers 47 and 48 on the downward stroke; on the upward stroke, levers 47 and 48 reach the deadcenter position ahead of levers 37 and 38.

The housing 21 contains an alternator valve which need not be here described as it is no part of the present invention. Suffice it to say there is located in this housing a valve which upon the drop of the pressure in one of the tanks S or T due to the opening of the vent valve will automatically close the discharge from one of the pipes 20*a* and 20*b* and automatically open the other pipe and thus connect the charged tank with an outlet pipe 23. Such an alternator valve so operating is shown, described and claimed in my prior Patent 2,431,936.

In the operation of the device, when it is properly connected to a water supply and gas supply, the water is turned on first and the cylinders S and T are allowed to fill to approximately line 3—3 of Fig. 1. Then the gas is turned on. Mean-

while the water in the cylinders has exerted sufficient force on the float elements that spring 51 will pull lever 48 up and close valve 46 and open valve 35. Gas enters at the bottom of the cylinders and rises through the water to carbonate the same. A cup 70 is shown directly beneath the water inlet. This serves to break up the water as it enters the cylinder thus causes carbonation with gas already in the cylinder.

The degree of carbonation in a carbonator depends on these factors, namely: temperature, agitation, pressure and absorption. Of these the latter is most important and requires time. A low temperature is obtained by feeding a cold water supply into the carbonator and by keeping the entire apparatus under refrigeration. Agitation is obtained by the opening of a snap action inlet valve thus instantly releasing the full force of the CO_2 gas pressure, usually about 125 pounds per square inch, into the bottom of a chamber of water with a narrow space at the top which has a low pressure. This is due to venting down to the water supply pressure which is usually 40 to 50 pounds per square inch. In the present installation since the CO_2 inlet is located at the bottom of the tank it will provide violent agitation which is assisted by a series of inverted lip cups 56. These cups serve as traps for gas and also serve to deflect the flow of gas in its upward travel causing complete mixing throughout.

Pressure and absorption are related in that the amount of absorption is dependent upon the pressure applied. The pressure is maintained by the supply of CO_2 gas. Time is provided for absorption of gas by alternating from one tank to another.

When both tanks are completely filled with carbonated water each valve 46 is closed and each gas valve 35 is open. Each of the cups 56 will remain filled with water and the weight of this water on shaft 55 will tend to cause a downward movement of lever 48 against the spring 51. It will also tend to cause a downward movement of lever 38 and when the water level has reached the point indicated at approximately line B valve 35 will snap closed. Upon further withdrawing of water to a point indicated at line B_1 valve 45 will be snapped open. This will decrease pressure in the tank and permit tap water to enter once more to bring the water level up. In the meantime when the pressure in the tank T has dropped a predetermined amount the pressure in pipe 20A will shift the alternator valve (not shown) thus closing pipe 20B and opening the other tank S to the carbonated water outlet. When water again fills the left-hand tank T, the spring 51 will pull the accumulators or cups 56 upward, first closing valve 46 and then opening valve 35, to permit carbonation.

The cycles thus continue with one tank being used and then the other. Since both tanks are connected to the same source of gas supply, the pressure will remain the same until one tank is vented through valve 45. Upon venting of one tank, the alternator valve (not shown) will shift and connect the carbonated water outlet to the other tank. Spring 51 may be controlled to regulate the lower water level in each tank. Spring 51 actually exerts an upward force on shaft 55 at all times. When the water level drops, the weight of the water in cups 56 will overcome this spring.

The overhanging lips 57 serve to trap gas and further the carbonation by interrupting the flow of gas upward through the water. After the cycles have started carbonation will be furthered by water being sprayed into the gaseous atmosphere of the tank by splash plate 70 previously described.

What I claim is:

1. In a carbonating device, a tank, a vent valve and gas inlet valve each shiftable to open and closed positions, a liquid level responsive member operably connected with each of said valves to cause shifting of the same, said member comprising a series of dish-shaped members mounted in vertical relation and inverted lips extending outwardly and downwardly from each of said members, the said members arranged to carry liquid and tending thereby to sink, and a spring tending to hold the dish-shaped members up but allowing the same to lower as the level of the liquid becomes lower and thereby exposes more of said dish-shaped members and increases the gravity pull of the members upon the spring.

2. In a carbonating device of the type including a cylinder, a vent valve and a gas inlet valve each shiftable to open and closed positions, a valve actuating means comprising a plurality of dish-shaped and water retaining members vertically spaced on a shiftable common support, each having inverted lips extending outwardly and downwardly to serve as a gas trap, and spring means urging said member to an up position of sufficient strength to hold such member up when partially surrounded by water.

3. In a carbonating apparatus having a tank with a vent port and valve therefor and a gas inlet port and valve therefor, and means operated by the liquid level for controlling said valves, the said means comprising a plurality of upright cups and a rod for supporting said cups in spaced relation and having connections with said valves to open and close the valves, and a spring of strength calculated to support the rod and cups in elevated position when the liquid in the tank is above a given level and to thereby hold the vent valve closed and the gas valve open and designed to permit the rod and cups to drop by reason of their gravity pull overcoming the pull of the spring when filled with liquid and when the level of the liquid in the tank falls below a given level thereby to close the gas valve and open the vent valve.

4. In a carbonating apparatus having a tank with a vent port and valve therefor and a gas inlet port and valve therefor, and means operated by the liquid level for controlling said valves, the said means comprising a plurality of upright cups having turned over and turned down gas-trapping flanges and a rod for supporting said cups in spaced relation and having connections with said valves to open and close the valves, and a spring of strength calculated to support the rod and cups in elevated position when the liquid in the tank is above a given level and to thereby hold the vent valve closed and the gas valve open and designed to permit the rod and cups to drop by reason of their gravity pull overcoming the pull of the spring when filled with liquid and when the level of the liquid in the tank falls below a given level thereby to close the gas valve and open the vent valve.

5. In a carbonating apparatus having a tank with a vent port and valve therefor and a gas inlet port and valve therefor, and means operated by the liquid level for controlling said valves, the said means comprising a plurality of upright cups and a rod for supporting said cups in

spaced relation and having snap-over-center spring connections with said valves to snap open and close the valves, and a spring of strength calculated to support the rod and cups in elevated position when the liquid in the tank is above a given level and to thereby hold the vent valve closed and the gas valve open and designed to permit the rod and cups to drop by reason of their gravity pull overcoming the pull of the spring when filled with liquid and when the level of the liquid in the tank falls below a given level thereby to close the gas valve and open the vent valve.

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