

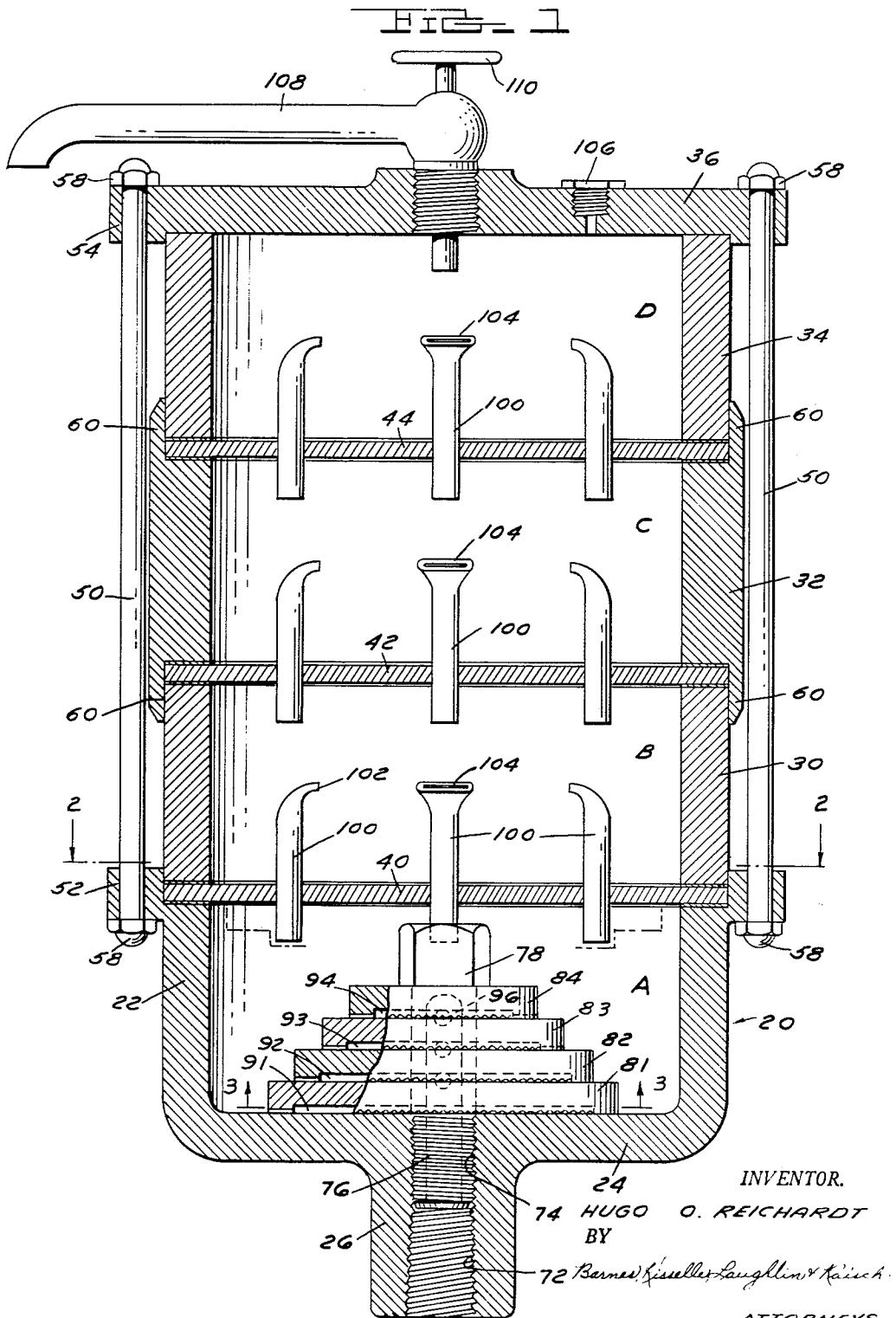
Oct. 18, 1955

H. O. REICHARDT  
CARBONATING DEVICE

2,721,064

Filed Oct. 3, 1951

2 Sheets-Sheet 1



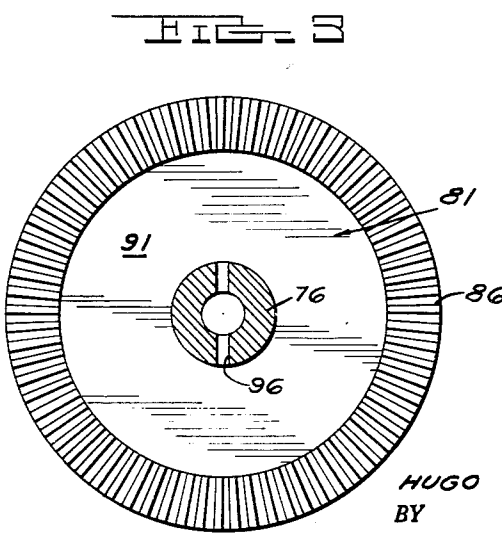
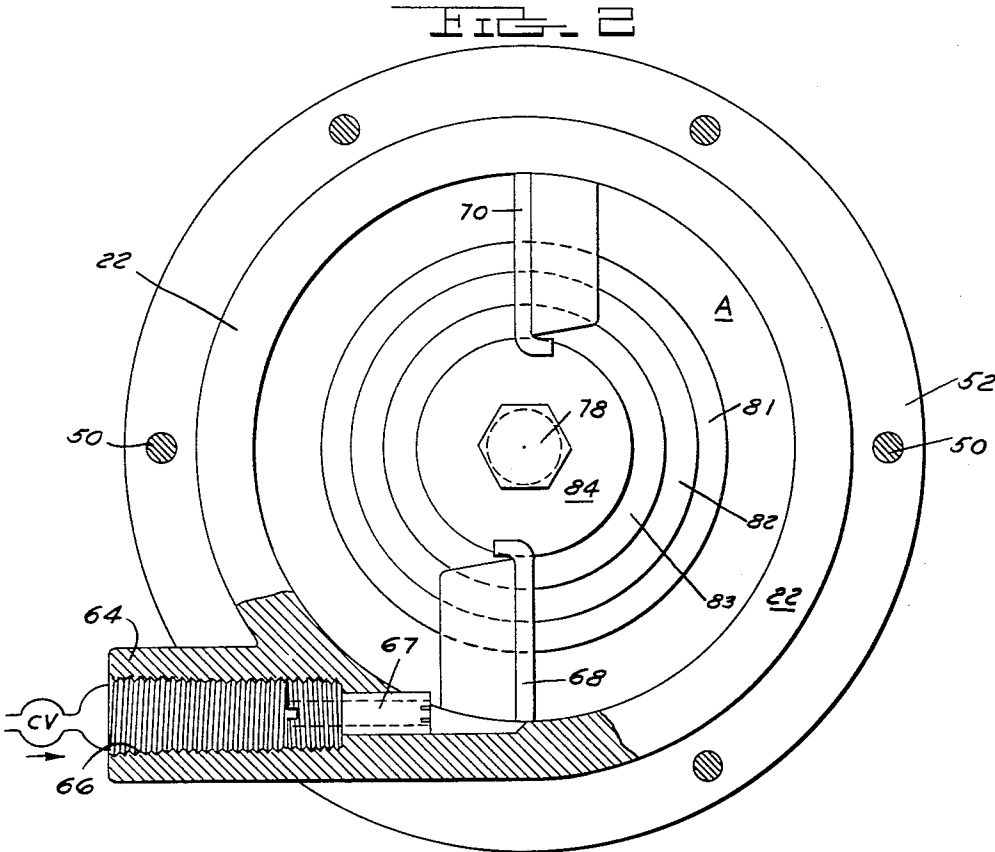
Oct. 18, 1955

H. O. REICHARDT  
CARBONATING DEVICE

2,721,064

Filed Oct. 3, 1951

2 Sheets-Sheet 2



INVENTOR.  
HUGO O. REICHARDT  
BY  
*Barnes, Kisselle, Laughlin & Reisch*  
ATTORNEYS

1

2,721,064

## CARBONATING DEVICE

Hugo O. Reichardt, Detroit, Mich.

Application October 3, 1951, Serial No. 249,536

7 Claims. (Cl. 261—21)

This invention relates to a carbonating apparatus and has as its object the provision of such a device with no moving parts.

Most carbonating units in use today use stirring mechanism and other moving parts to obtain intimate association between the carbonating gas and the liquid. The present device obtains complete carbonation with no moving parts within the unit to get out of order or to wear in use. The unit is also adaptable to different degrees of carbonation as desired and to easy adjustment for varying capacities.

Another object of the present device is a carbonator in which gas cannot flow through. The only outlet needed is the faucet outlet. Gas cannot, therefore, waste through vents.

Briefly the invention includes a series of tank tiers vertically arranged. The bottom one has a tiered series of discs receiving gas in spaces therebetween and discharging gas through small openings into the bottom tank. Liquid in spray form enters the bottom tank and the gas and liquid pass upwardly through walls between the tiered tanks through turbulence tubes adapted to further mix the two. A faucet in the top tank taps the carbonated liquid.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

Figure 1, a vertical sectional view of the assembled unit.

Figure 2, a horizontal section on line 2—2 of Fig. 1.

Figure 3, a horizontal section on line 3—3 of Fig. 1.

The purpose of this device is the carbonation of liquids almost instantaneously and without any mechanical aid such as paddles or other stirring mechanisms. The required turbulence for the action is created by the manner in which the liquid and gas is introduced into the device, and the manner in which it is moved from one chamber to another until the desired degree of carbonation is obtained. As shown in the drawings, the device consists of a primary mixing chamber 20 which has a cylindrical wall portion 22 and an integral bottom 24 provided with an inlet neck 26. Above the primary chamber 20 are cylindrical wall portion units 30, 32, and 34, capped by a top plate 36. Beneath the wall portions of the assembled unit are separator plates 40, 42, and 44. Suitable gaskets are positioned between the wall units and the separator plates, and the entire device is held together by tie rods 50 which cooperate with a flange 52 at the top edge of unit 20 and the edge flange 54 of the top plate 36. Tension may be placed on these rods by nuts 58 to draw the entire assembly together in a water- and gas-proof condition.

The shape of the walls of the unit 32 is such that axially extending aligning flanges 60 position the adjacent units 30 and 34 with respect to the unit 32. The flange 52 on the bottom unit serves as a locator for unit 30, and the flange 54 on the top plate locates the plate with respect to unit 34.

As shown in Fig. 1, the unit above described forms

2

chambers A, B, C, and D, vertically superimposed on each other in the order named. The chamber A, referred to as the primary mixing chamber, has a tangential inlet for water shown at 64, having a threaded portion 66 to receive a connection pipe. A nozzle or spray device 67 is fashioned to break up water as it enters the chamber A into a fine spray to facilitate mixture of the liquid with the gas. Two vertical baffle plates 68 and 70 are positioned in diametrically opposed positions in chamber A in relation to a diffusing device which will be described later.

The gas inlet neck 26 is tapped at 72 to receive the gas inlet pipe. This neck portion is also tapped at 74 to receive the end of a bolt having a hollow shank portion 76 and a head portion 78. This bolt serves to hold in place four diffusing plates, 81, 82, 83, and 84. These plates have an undercut portion centrally positioned leaving a narrow flange portion at the periphery of one surface, each flange portion being knurled at 86 on this surface (see Fig. 3). Thus, as the plates are stacked coaxially in Fig. 1, there is formed flat circular chambers 91, 92, 93, and 94. The knurled portions on the periphery surfaces surrounding these chambers are cut from two to five thousandths of an inch deep so that these chambers are connected to the primary mixing chamber A through small radially extending passages formed between the plate 81 and the bottom 24 and between the other plates and its next adjacent lower neighboring plate. Each of the chambers, 91, 92, 93, and 94, are connected to the opening in the shaft 76 by diametrical holes 96 (see Fig. 3).

The baffles 68 and 70, previously referred to, are staggered on their inside edges to conform to the stepped shape of the plates 81, 82, 83, and 84.

Each of the separator plates 40, 42, and 44, are pierced by a plurality of tubes 100 which extend vertically through the plates and terminate at their upward end in flattened sections 102, leaving a relatively narrow pinched opening 104 extending toward the center of each particular chamber. In the top plate 36, a safety block 106 of well known construction is inserted to relieve excessive pressures. Also centrally of this plate 36 is a faucet 108 controlled by a valve handle 110.

In the operation of the device, gas and water are introduced into the primary chamber A through the inlets 26 and 64. Suitable pressure control units known to the art can be used to control the relative pressures of the entering fluids. The gas is diffused into chamber A through the small openings formed by the knurled portions of plates 81 to 84, and the water, in sprayed condition, will be intimately mixed with the gas due to the turbulence caused by the entering water and the action of the baffles 68 and 70.

The mixed gas and water will be forced upwardly through the tubes 100 in plate 40 by the pressure of the fluids in the receiving chamber A. At the restricted outlets 104 of the tubes any unmixed gas and water will be forced together as it enters the next adjacent chamber B. Also there will be considerable turbulence in each chamber since the restricted openings 104 are directed toward each other and toward the center of each chamber. Thus the gas will move upwardly through each chamber in turn until it reaches the outlet chamber D. The mixture of the gas and the liquid will be increased as it moves from one chamber to another and thus the degree of carbonation can be increased by adding additional chambers to the unit. Due to the pressure in the unit the carbonated liquid may always be tapped off by opening the valve 110 and admitting the liquid to the faucet 108.

It will thus be seen that I have disclosed a carbonating device having no moving parts within the carbonating

chambers so that there is nothing to get out of order, or to wear. The required turbulence in the mixing of the fluids is created by the fluids themselves as they enter each chamber, and the construction of the unit in individual sections makes it extremely flexible for various carbonation requirements.

What I claim is:

1. A device for intimately associating a liquid and a gas which comprises a liquid retaining tank formed of a plurality of encircling wall units tiered vertically, horizontal separator plates between each encircling wall unit, a gas inlet in the bottom unit, a water inlet in the bottom unit, a mixed fluid outlet in the top unit, and transfer means for each unit comprising tubes in said separator plates extending into the unit on each side of said plate and having a narrow restricted opening into the upper unit in each case to cause intimate association of gas and water passing through said tubes by reason of the pressure of both fluids, said gas inlet comprising a plurality of stacked discs, each shaped to provide a chamber between itself and an adjacent disc, a peripheral knurled surface on each disc facing an adjacent disc and having the knurls terminating at the chamber between said discs to provide a plurality of tiny gas openings to the interior of the bottom unit, and means to introduce gas under pressure from a source to each of said chambers.

2. A device as described in claim 1 in which the stacked discs each have an undercut portion in one facing surface surrounded by a knurled peripheral surface contacting an adjacent disc to form tiny openings from the chamber formed by the undercut portion and an adjacent disc to the interior of the bottom unit.

3. A device as described in claim 1 in which the means to introduce gas under pressure from a source to each of said chambers comprises a hollow, headed bolt projecting through each of said discs and into the bottom of the assembly to hold said disc in place, holes formed in the walls of said bolt to register with said chambers, and means to connect the interior of said bolt to a source of gas under pressure.

4. A device as described in claim 2 in which each disc decreases in diameter upwardly.

5. A device for intimately associating a liquid and a

gas which comprises a liquid retaining tank formed of a plurality of encircling wall units tiered vertically, the bottom unit having a closed bottom, the top unit having a closed top, horizontal separator plates between each encircling wall unit, means to hold said units together in aligned, sealed relation, a water inlet in the bottom unit to introduce water under pressure in a fine spray, a gas inlet to introduce gas under pressure through a multitude of fine openings into the bottom unit, a mixed fluid outlet in the top unit, and means in said plates to transfer gas and liquid from one unit to another upwardly by reason of the pressure of both fluids, said last means comprising tubes projecting through said plates from the interior of one unit to the interior of another, the opening in the tube at the upper end being restricted to cause intimate association of gas and water passing through said tube.

6. A device as claimed in claim 5 in which the restricted openings of the tubes are directed centrally and horizontally to increase the turbulence in the receiving chamber.

7. A liquid carbonating device comprising a tank with a plurality of superposed chambers connected by restricted openings, a water inlet in the bottom chamber to introduce water under pressure in a fine spray, a gas inlet to introduce gas under pressure through a multitude of fine openings into the bottom chamber, and a mixed fluid outlet in the top chamber, said gas inlet comprising a plurality of stacked discs, each having an undercut portion in one facing surface surrounded by a knurled peripheral surface on said same face surface contacting a face surface of an adjacent disc to form tiny openings from the chamber formed by the undercut portion and an adjacent disc to the interior of the bottom unit.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |            |               |
|-----------|------------|---------------|
| 889,516   | Fox        | June 2, 1908  |
| 918,567   | Marek      | Apr. 20, 1909 |
| 1,209,490 | Pindstofte | Dec. 19, 1916 |
| 1,567,456 | Newton     | Dec. 29, 1925 |
| 2,078,288 | Sherman    | Apr. 27, 1937 |
| 2,229,441 | Carlson    | Jan. 21, 1941 |