

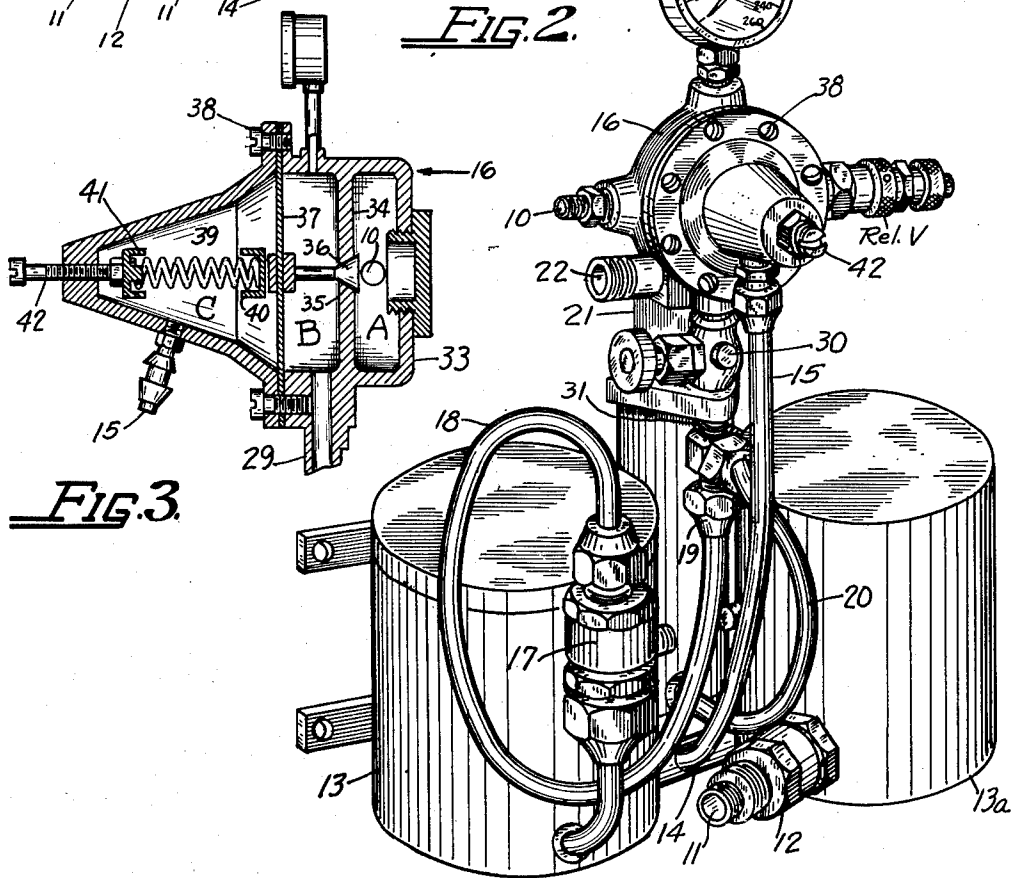
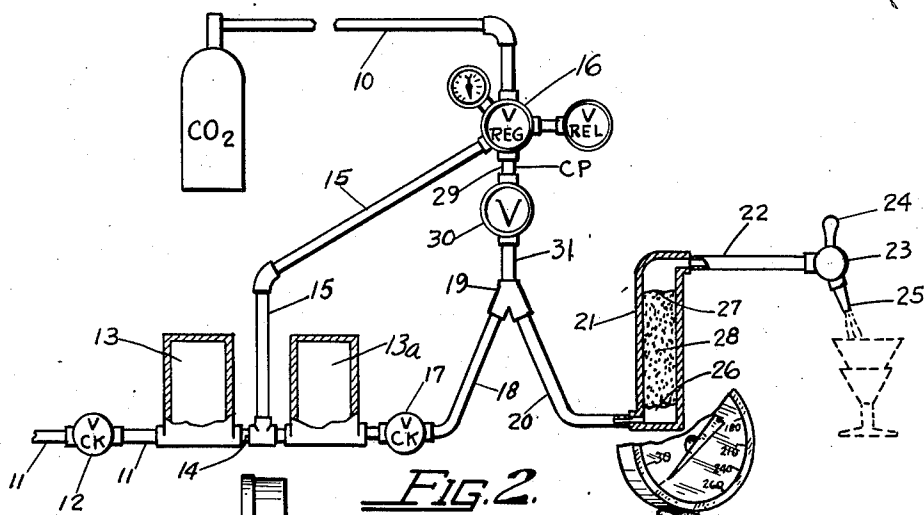
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CARBONATING MACHINE

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CARBONATING MACHINE

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This invention relates to improvements in carbonating machines and has reference more particularly to a carbonating machine of the type employed in connection with the dispensing of carbonated beverages.

It is the object of this invention to produce a simple carbonating machine that will operate without the use of a motor.

Another object of the invention is to produce a carbonating machine that shall be entirely automatic in its operation.

A further object of the invention is to produce a carbonating machine of small size that can be readily kept in ordinary refrigerators during operation.

The above and other objects of the invention that may become apparent as the description proceeds, are obtained by means of a construction and an arrangement of parts that will now be described in detail and for this purpose reference will be had to the accompanying drawings in which the invention has been illustrated, and in which:

Figure 1 is a perspective view of the machine;

Figure 2 is a diagrammatic view showing the relationship of the several elements; and

Figure 3 is a section through an ordinary type of constant pressure regulator.

Referring more particularly to Figures 2 and 3, reference numeral 10 designates a pipe that is connected with a supply of liquid carbon dioxide and reference numeral 11 is a pipe that is connected with the water supply of the building or with any other water supply where the water is maintained under pressure.

A check valve 12 is inserted in pipe 11 and the latter connects with a surge tank 13 near the bottom thereof. A pipe 14 connects tank 13 with another tank 13a. A small pipe or tube 15 is connected with pipe 14 in the manner shown in Figure 2 and extends to and connects with the constant pressure regulator 16 in the manner and for a purpose that will presently appear. At this point it may be stated that tanks 13 and 13a may be combined into a single tank positioned between the check valve 12 and pipe 15. In the present device two tanks have been shown and are employed because the resultant machine is thereby given a more symmetrical appearance, and some other advantages of construction are obtained thereby. At the delivery side of tank 13a, there is another check valve which has been designated by reference numeral 17. A pipe 18 extends from the outlet of check valve 17 to Y coupling 19. Another pipe 20

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connects coupling 19 with the bottom of a mixing tank 21 from which a pipe 22 extends to the dispensing valve 23 which is of the usual construction employed with machines for dispensing carbonated water and which has a handle 24 and a discharge nozzle 25. The mixing tank 21 is provided near the bottom with a screen 26 and near the top with another screen 27. These screens are of fine mesh stainless steel or some other material not affected by the liquid. Between the two screens 26 and 27 the space is filled with a clean sharp sand 28 that has been screened to remove all particles small enough to pass through the screens. It is now evident that if water under pressure is contained in pipe 11 and valve 23 opened, water will flow through tanks 13 and 13a through check valve 17, pipes 18 and 20 and through the mixing tank 21 to the dispensing faucet. In order to automatically carbonate the water that is being dispensed, the following mechanism is added to the one just described and combined therewith in the following manner. Pipe 10 connects with the inlet of the constant pressure regulator 16. The outlet has pipe 29 connected therewith and that extends to a manually operated valve 30 which is preferably of a type that is adapted to control the flow of gas very accurately. Such valves are some times referred to as "needle valves." Instead of valve 30, it is possible to substitute an orifice having the necessary cross sectional area to permit the required amount of gas to flow. A pipe 31 connects the outlet of valve 30 with the Y coupling 19.

Attention is now directed to pipe 15 whose lower end is in communication with the interiors of tanks 13 and 13a and is therefore subjected to the pressure of the liquid in the tanks. This pipe is connected as shown in Figure 3 with the interior of the bonnet 32 of the constant pressure reducing valve 16. In Figure 3, a rough diagrammatic representation of the construction of this valve is shown. The valve, itself, consists of a housing 33 that is divided by means of a partition 34 into an inlet chamber A and an outlet chamber B. Partition 34 has a valve seat 35 with which a valve 36 cooperates. A diaphragm 37 is positioned between the body 33 and the bonnet 32 and clamped between the latter by means of screws 38. A spring 39 has one end positioned in the spring cup 40 that rests against the outer surface of the diaphragm. The other end of the spring is positioned in a cup 41 that can be moved inwardly or outwardly by

means of a screw 42. Spring 39 functions to move the valve 36 out of sealing engagement with the valve seat and therefore when the pressure in chamber B falls below a predetermined amount, valve 36 will open, permitting high pressure gas to enter chamber B; as soon as the pressure in chamber B reaches the desired value it overcomes the action of spring 39 and closes the valve. This is the usual manner in which constant pressure regulator valves operate and Figure 3 is submitted principally for the purpose of showing how the diaphragm 37 is acted upon by the pressure in tanks 13 and 13a in addition to the pressure exerted thereon by spring 39. Pipe 15 is connected with the inside of the bonnet and therefore chamber C which is bounded by the inner walls of the bonnet and the outer surface of the diaphragm is always subjected to the pressure of the water in tank 13, and spring 39 is adjusted so that the pressure of gas in chamber B is always greater than the pressure in chamber C.

Particular attention is called to the construction just described which makes it possible to maintain a given pressure differential between the water in the surge tanks 13 and 13a and the gas delivered from the regulator valve 16. The importance of this will appear hereinafter.

Let us now assume that valve 30 is open so as to permit a free passage of gas from the regulator valve to coupling 19 and that the dispensing valve 23 is open. Liquid will now flow as above explained. The compressed CO₂ gas mixes with the water at coupling 19 and this mixture will then enter the mixing tank 21 and pass upwardly through the sand or other granular material which serves to effect a thorough mixture of the gas and the water and which prevents the gas from being transmitted to the dispensing faucet in large bubbles. It has been found that in the absence of valve 30, or of a restricting orifice at this point, the most desirable operation is not possible because when the dispensing valve is suddenly opened, the pressure is reduced quickly and due to the greater inertia of the water compared to the gas, and to the higher pressure of the latter, the gas is admitted in greater quantity than necessary. Valve 30 has been inserted so as to control the maximum quantity of gas that can flow at a given time in response to the pressure at which it is delivered from regulator 16. By operating valve 30 an adjustment is found that gives the best results for the average speed of operation. Instead of a manually controlled valve 30, it is possible to substitute an orifice having a cross sectional area corresponding to the opening of the valve that is found to be most desirable.

With the construction shown in the drawing and just described, a prescribed differential of pressure between the water and the gas is automatically maintained and by means of the valve 30, or its equivalent, the danger of an excess amount of gas in proportion to the water is eliminated.

Check valve 17 prevents gas from flowing into the tanks and accumulating there as it might otherwise do, because the pressure of the gas is greater than that of the water. Check valve 12 guards against the reverse flow of water from tank 13 into the water system if the pressure of the latter should fall for any reason.

Attention is called to the fact that the point where the gas mixes with the water (19) is above the level where pipe 18 connects with the water

supply. This forms a water seal that prevents gas from filling pipe 18.

In Figure 2 pipe 31 and coupling 19 have been shown as of normal size. It is to be understood, however, that these elements may be of any size found to be most desirable and that coupling 19 may have any shape so long as it performs its intended function.

In the embodiment illustrated, a single reducing valve has been shown in the gas line. A single step reduction has been found to work well. It is, however, possible that somewhat better results may be obtained by a two-stage pressure reduction and applicant wants it to be understood that the pressure applied to regulating valve 16 may be below that normal to liquid CO₂.

Having described the invention what is claimed as new is:

1. In an automatic carbonating machine having a dispensing faucet for delivering carbonated water, a source of carbon dioxide under high pressure, a source of water under lower pressure, and a mixing station wherein the carbon dioxide is added to the water, the improvements comprising: automatic means for delivering carbon dioxide to the water at the mixing station only when the faucet is open, said means comprising, a water conduit connected to the source of water having first and second check valves therein spaced in series, the second check valve being downstream from the first check valve, both of which are adapted to automatically open when the faucet is open to permit water to flow to the mixing station, a pressure regulating device connected to the source of carbon dioxide having a carbon dioxide control valve adapted to be opened by the combined pressure of water in the conduit at a point in the latter between said check valves and the added pressure exerted by resilient means tending to open the control valve, the control valve being adapted to be closed when the pressure of the carbon dioxide at the mixing station balances said combined pressures, said second check valve being closed when the faucet is closed to prevent the water pressure between said check valves from exceeding the pressure of the source of water.

2. Apparatus in accordance with claim 1 including means for varying the urge of the resilient means.

3. Apparatus in accordance with claim 1, including adjustable metering means disposed between the regulating device and the mixing station, through which carbon dioxide may flow from the former to the latter.

4. Apparatus in accordance with claim 3, including means for varying the urge of the resilient means.

5. Apparatus in accordance with claim 1, wherein said pressure regulating device comprises first and second chambers separated by a substantially flat diaphragm adapted to flex in a direction perpendicular to its plane, said carbon dioxide control valve being operably connected to said diaphragm for axial movement in the named direction, one of said chambers being connected to the water conduit between the check valves therein, and also containing the resilient means, the second chamber adapted to receive carbon dioxide flowing beyond the carbon dioxide control valve.

6. In an automatic carbonating machine having a dispensing faucet for delivering carbonated water, a source of carbon dioxide under high

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pressure, a source of water under lower pressure, and a mixing station wherein the carbon dioxide is added to the water, the improvements comprising: automatic means for delivering carbon dioxide to the water at the mixing station only when the faucet is open, said means comprising, a pressure regulating device connected to the source of carbon dioxide having a carbon dioxide control valve adapted to automatically open when the faucet is opened and automatically close when the faucet is closed, said control valve being constructed to be opened by a predetermined water pressure in the system and closed by a second gas pressure which exceeds said predetermined pressure, and automatically operable means disposed between the mixing station and the source of water, for preventing the gas pressure at the mixing station to add to said predetermined pressure when the faucet is closed.

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