

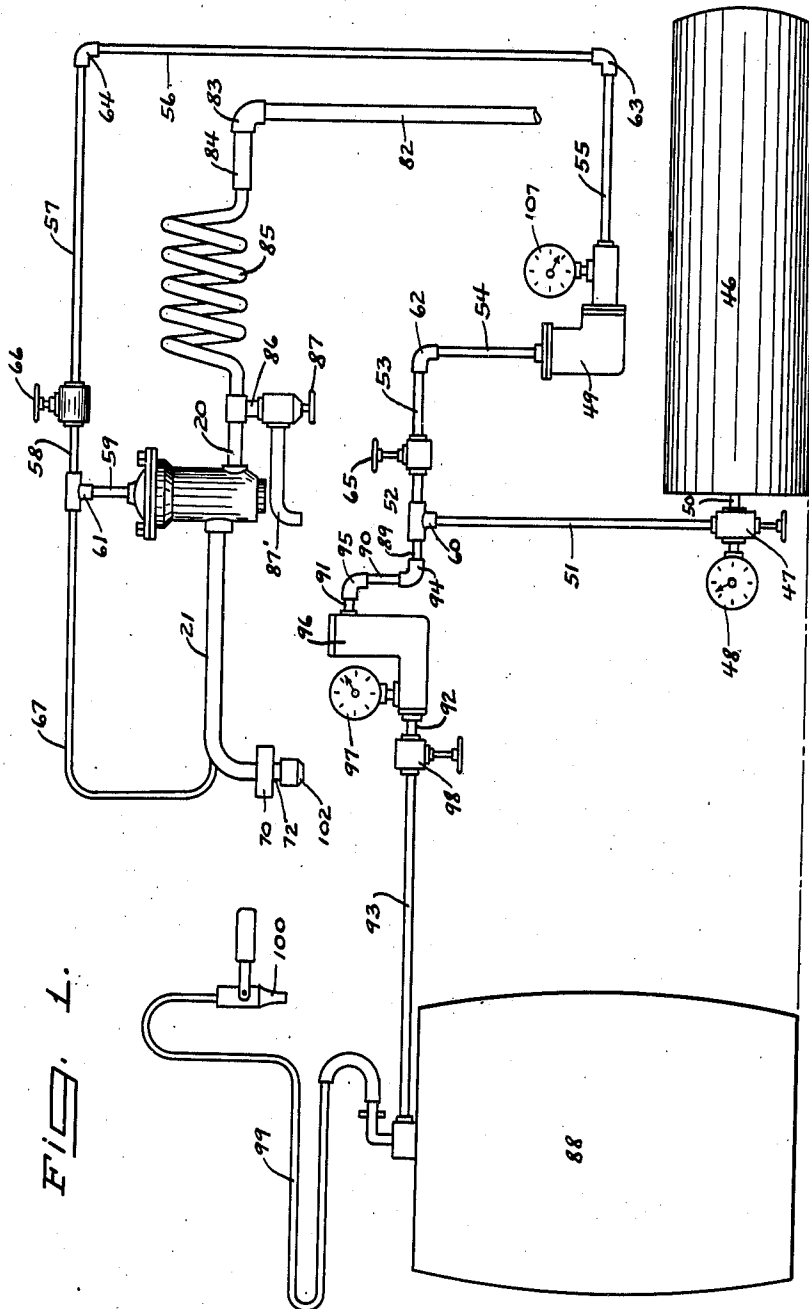
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F. M. TOWLE ET AL
LIQUID CARBONATING DEVICE

2,331,248

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3 Sheets-Sheet 1



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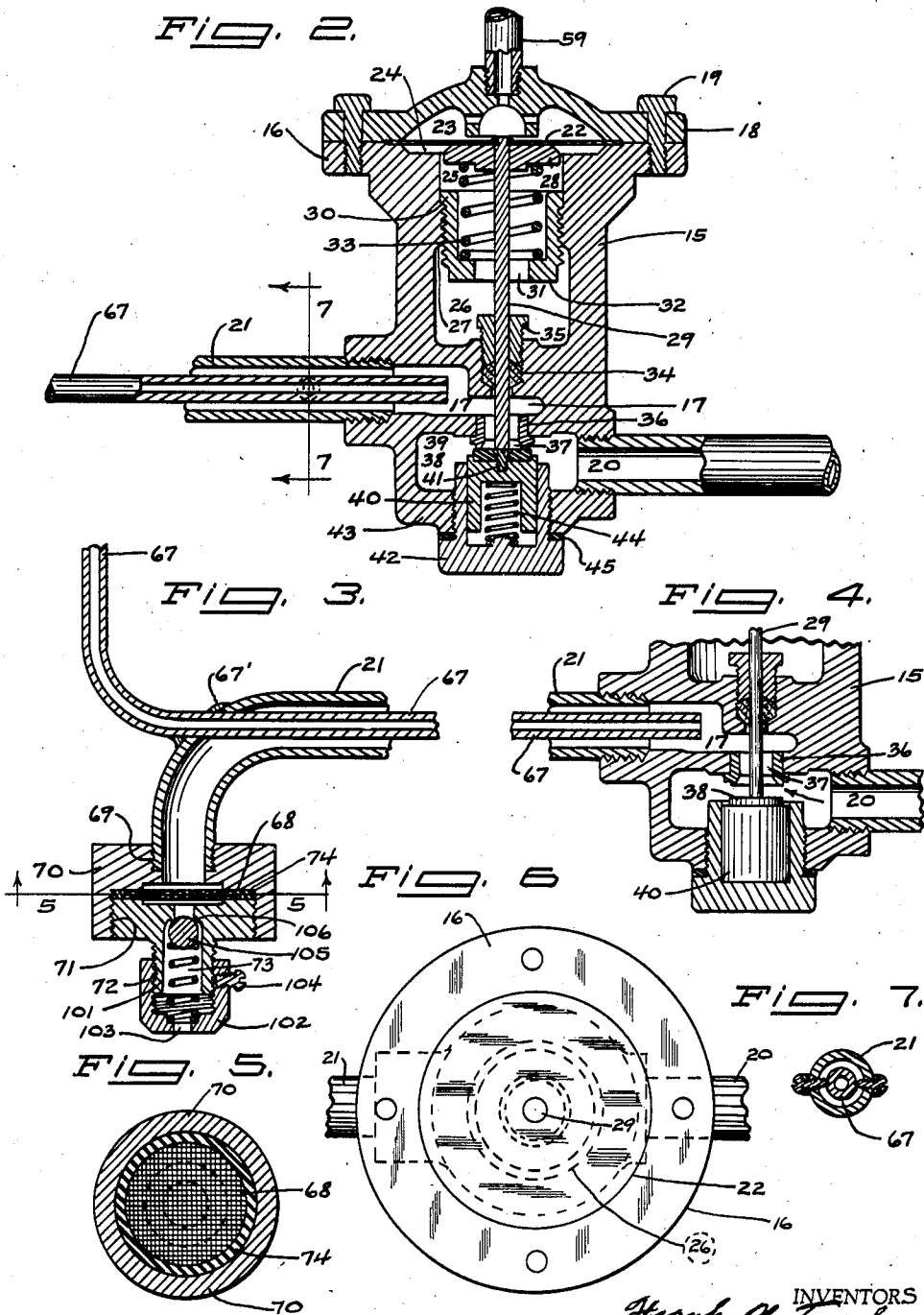
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Fig. 8.

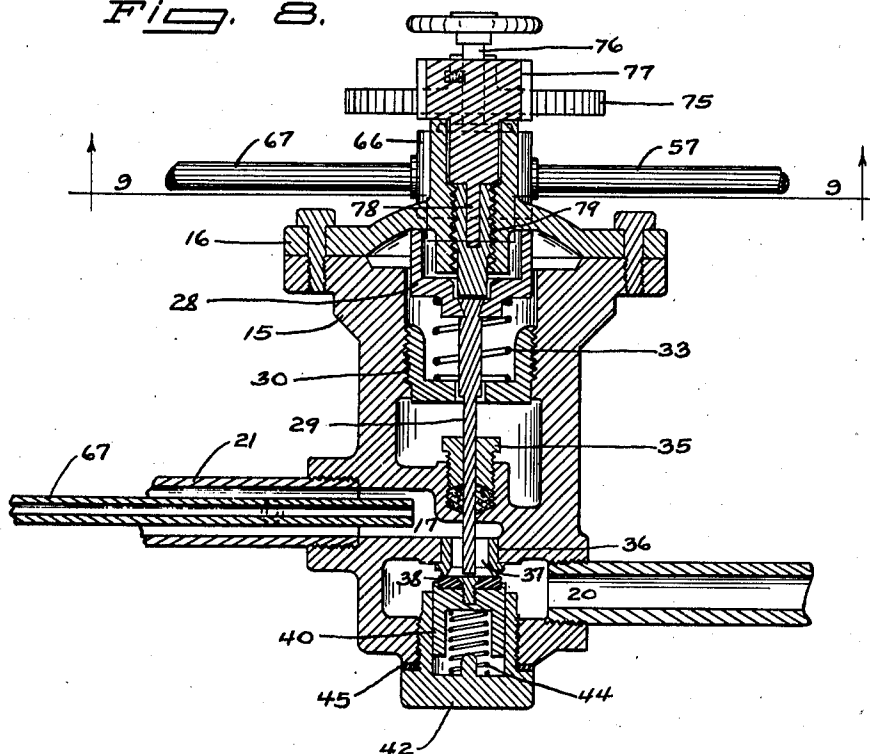
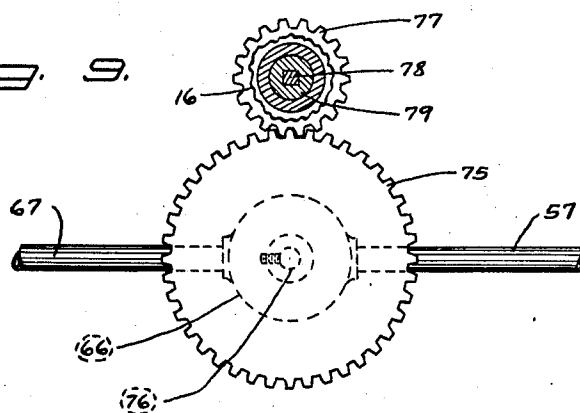


Fig. 9.



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LIQUID CARBONATING DEVICE

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1 Claim. (Cl. 261—75)

This invention relates to a new and improved fluid carbonating device and has particular reference to an especially constructed device for instantly carbonating water and to a method of controlling the same in a beverage dispensing system.

An object of the present invention is to provide an improved device for carbonating liquid without the use of storage tanks, equalizing containers or containers of any description for holding the liquid.

Another object of the invention is to instantly carbonate the liquid automatically when the liquid is drawn for immediate use.

Another object of the invention is to provide an automatically controlled water regulating valve for use in connection with a CO₂ gas supply tank and a water supply line and means whereby the water is carbonated within the body of the valve when water is drawn for immediate use from the water supply line.

Another object of the invention is to automatically operate the water regulating valve by the pressure from the source of gas supply that carbonates the fluid.

Another object of the invention is to provide a carbonating chamber within the body of the valve and to convey liquid and gas in different directions into said chamber.

Another object of the invention is to provide a fluid outlet line from the carbonating chamber and to convey the CO₂ gas into the carbonating chamber through the fluid outlet line.

Another object of the invention is to provide a fluid retarding element in the outlet line for producing in said line a back pressure.

Another object of the invention is to use the fluid carbonating device in a beverage dispensing system having a supply of carbonated beverage, such as beer and a CO₂ gas supply tank for maintaining gaseous pressure on the carbonated beverage and to provide automatic controlling means whereby the one CO₂ gas supply tank will maintain the gaseous pressure on the carbonated beverage and also operate the fluid carbonating device.

The invention further consists in the particular combination, construction and association of the different parts, such as described in the following specification and possesses various other objects and features of advantage, some of which, with the foregoing will be made manifest in the following description of the preferred form of the invention that is illustrated in the

drawings accompanying and forming part of the specification.

It is to be understood that it is not intended to limit the invention to the embodiment shown by said drawings and description, as variations can be adapted within the fundamental principle of the invention as set forth in the claim.

In the accompanying drawings:

Fig. 1 is an elevational diagrammatic assembly view of the fluid carbonating device shown in a beverage dispensing system and illustrates the relative arrangement of the water line, the gas supply tank and gas line and the valves and pressure regulators for operating and controlling the invention.

Fig. 2 is a vertical central longitudinal sectional view of the water regulating control valve forming the main body of the carbonating device, showing portions of liquid and gas inlet and outlet pipes that are connected thereto, and also, showing the valve parts in their normal positions.

Fig. 3 is a vertical central longitudinal sectional fragmentary view of the outer end portion of the carbonated liquid outlet line showing the liquid retarding element and also the method in which the CO₂ gas inlet line is connected into the liquid outlet line.

Fig. 4 is a vertical central longitudinal sectional fragmentary view of the main body similar to Fig. 1, except showing the water inlet valve in its open position.

Fig. 5 is a horizontal sectional view taken through the liquid retarding member on line 5—5 of Fig. 3, looking in direction of the arrows.

Fig. 6 is a top plan view of the main body of the device.

Fig. 7 is a vertical sectional end view taken through the carbonated liquid outlet pipe and the CO₂ gas inlet pipe on line 7—7 of Fig. 2.

Fig. 8 is a vertical central longitudinal sectional view of a modified form of the device and is similar to that shown in Fig. 2, and illustrates how a mechanical means can be provided for automatically operating the water regulating valve.

Fig. 9 is a horizontal sectional view taken on line 9—9 of Fig. 8, looking in direction of the arrows.

Referring in detail to the drawings and the different parts thereof, wherein for the purpose of illustration, like reference numerals designate like parts throughout the various views, the numeral 15 designates the body of the device

which is formed with a liquid carbonating chamber 17 and provided with a removable cover 18 that is secured to the upper enlarged portion 16 of the body by suitable cap screws 19 as shown in Fig. 2. The numeral 20 designates the liquid inlet that is preferably a suitable pipe threadedly secured into the lower portion of the body 15 and positioned underneath the carbonating chamber 17. The numeral 21 designates the liquid dispensing outlet pipe threadedly secured into the body 15 and leading from the carbonating chamber 17.

A suitable valve is provided for admitting liquid into the carbonating chamber. This valve can be of the diaphragm type or can be a positive mechanically controlled valve. In Fig. 2 there is shown, a diaphragm 22 interposed between the cover 18 and the top end portion 16, of the body, said cover and body being recessed as at 23 and 24, respectively, to accommodate the operating movement of the diaphragm. The body 15 is further recessed as at 25, formed hollow as at 26 and internally threaded as at 27. The diaphragm is provided with a reinforcing disk 28 that carries a valve push rod 29 which projects through the center of the diaphragm and is peened thereto as shown in Fig. 2. A cup shaped member 30, having a hole 31 in the bottom 32 thereof, is threaded into the body 15 and supports a coiled spring 33 which is compressed between said bottom and the reinforcing disk 28 of the diaphragm, resiliently holding the diaphragm in its normal position. Suitable packing means 34 is provided for packing the valve push rod 29 and a packing gland 35 is threadedly mounted into the body 15 for adjusting the packing.

The preferred construction for admitting liquid into the chamber 17 is shown as comprising a bushing 36 extending tightly into and through the opening formed in the bottom of said chamber, and a sealing washer 38 is provided and is resiliently held against the bottom of the bushing completely closing the opening 37 therein as shown in Fig. 2. The bushing is formed with an annular shoulder portion 39 that fits against the outer surface of the bottom of the chamber 17. The sealing washer 38 is fixed to a resiliently controlled plunger 40 by a suitable screw 41, said plunger being slidably mounted into a counter-bored cap 42 that is threadedly secured into the bottom portion 43 of the body 15. The plunger 40 is also counter-bored to accommodate a coiled spring 44 which is mounted into the cap 42, serving to resiliently hold the washer 38 against the bottom end of the bushing 36. The numeral 45 designates a suitable gasket interposed between the cap 42 and the bottom end of the body 15.

From the foregoing description taken in conjunction with the drawings it will readily be seen that when the push rod 29 is longitudinally moved against the sealing washer 38 the plunger 40 will be caused to recede and an opening will be provided for liquid to flow from the inlet 20 into the carbonating chamber 17. The movement is preferably imparted to the push rod 29 in synchronism with the opening of a gas valve for conveying gas into the carbonating chamber, thus dispensing gas and liquid into the carbonating chamber simultaneously. The movement of the push rod 39 can be accomplished either by providing means for applying the CO₂ gas pressure against the diaphragm 22 when the gas valve is opened or by a positive mechanical means operated in connection with the operating of the gas valve handle.

In Fig. 1 there is illustrated a general assembly view of a beverage and water dispensing system involving the invention. The numeral 46 designates a conventional tank of CO₂ gas and is provided with a valve 47 and a pressure gauge 48. The numeral 49 designates a pressure regulator positioned in the gas line between the CO₂ gas tank and the liquid carbonating device, and numerals 50, 51, 52, 53, 54, 55, 56, 57, 58 and 59 designate suitable pipes forming said line, numerals 60 and 61 designating suitable elbows for making the proper connections. A standard shut-off valve 65 is located in the gas line between the gas tank 46 and the pressure regulator 49 for enabling the gas pressure to be closed with respect to said regulator, when it is necessary to adjust or service the same, without interfering with the gas flow in the beverage system. The numeral 66 designates the valve that controls the entire carbonating operation. This valve can be an ordinary hand valve, a foot controlled valve or any other suitable valve arranged in any suitable location and positioned in any suitable manner that will best serve the purpose of the invention.

When the valve 66 is opened the gaseous pressure from the tank 46 will be applied against the diaphragm 22 and will force the push rod 29 downwardly causing the sealing washer 38 to be moved off of its seat as shown in Fig. 4 and thus providing an opening for the liquid to flow from the inlet 20 into the carbonating chamber 17. When the valve 66 is opened the gas from the tank 46 will also pass into the gas inlet pipe 67 and will enter the carbonating chamber 17 simultaneously with the liquid and will be forced against the liquid. It will be noted that the flow of liquid and gas are in opposite directions and are forced against each other in the carbonating chamber 17. It will also be noted that the gas inlet pipe 67 leads into the carbonating chamber 17 through the outlet pipe 21 and is welded thereto as at 67. This construction and arrangement increases the efficiency of the carbonation and is one of the features of the invention.

In order to more perfectly complete the carbonation of the fluid it is necessary to provide means for enabling a back pressure to be produced in the fluid outlet line. A liquid retarding element 68 is therefore provided at the end portion of the liquid outlet line as shown in Fig. 3. This element is composed of suitable cloth or other fibrous material or can be a fine screen or can be any suitable form of construction provided into or mounted onto the outlet line. The end portion of the outlet line 21 is preferably threaded as shown at 69 and a collar 70 is threadedly secured thereon. The collar 70 is formed with a female threaded portion 71, and a threaded male member 72 having an opening 73 therein is threadedly mounted into the collar 70, the liquid retarding element 68 being interposed between the members as shown in Fig. 3. A suitable washer 74 can be provided if desired. This construction enables the liquid retarding element 68 to be changed and also enables a different number of the retarding elements to be used.

Additional means is provided for controlling the back pressure in the outlet line 21 and consists in providing a ball 105 into the outlet opening 73, said opening forming a shoulder as shown at 106. The ball is resiliently held against said shoulder by a coiled spring 101 that is mounted into the outlet opening 73 and applied against said ball and adjustably held thereagainst by a

hollow member 102 that is threadedly secured to the member 72 as shown in Fig. 3. A set screw 104 holds the member 102 in a fixed position.

The back pressure in the outlet line 21 can thus be adjusted to suit the exact condition required. For example, with 30 pounds water pressure flowing into the carbonating chamber 17, the spring tension on the ball will be adjusted above 30 pounds pressure. The gas pipes 57 and 59 that convey the gas pressure to the top of the diaphragm 22 are of a larger size than the gas pipe 67 leading to the carbonating chamber. When the ball pressure control means is used it is desirable to remove the packing 34 and the gland 35 to admit pressure into the chamber 26 and underneath the diaphragm. It will thus be seen that when the valve 66 is opened the gas line leading to the diaphragm being larger than the gas line leading to the carbonating chamber the pressure will first be exerted against top of diaphragm, opening water valve 37 and allowing water to flow through to ball 105. Then the gas pressure becoming equalized on both sides of diaphragm, the water pressure acting against the bottom of the diaphragm will close the water valve. Then the gas pressure, which is around 60 pounds per square inch, being added to water will produce a pressure sufficient to overcome spring tension against the ball 105 and the carbonated water will intermittently flow automatically out of the opening 103.

In Fig. 3 there is illustrated a modified form of the valve that can be used for controlling the flow of liquid and CO₂ gas and is the equivalent of the valve shown in Fig. 2 but is included in the application to illustrate that a mechanical means can be provided for operating the water valve in synchronism with the gas valve instead of operating the valves in synchronism with the use of the gaseous pressure from the tank 46. The mechanical means simply consists in providing a gear wheel 75 on the valve stem 76 of the gas valve 66 and is adapted to engage with a pinion 77 that is revolvably mounted in the top portion of the cover 18. The pinion 77 is formed with a rectangular shank 78 that is keyed into a threaded stud. The gear wheel 75 is fixed to the valve stem 76 by a set screw 81. When the valve stem 76 is turned to open the gas valve, the gear 75 will revolve the pinion 77 which will revolve the threaded stud 79 causing said stud to be moved against the push rod 29, thus opening the water valve at 38 in exactly the same manner as when the gaseous pressure from the tank 46 is applied against the diaphragm 22 that imparts movement to the push rod 29. When the valve stem 76 is turned to close the gas valve the coiled springs 33 and 34 will automatically return the valve parts to their normal positions.

The carbonating device has communication with a water line that preferably conveys water at normal city pressures. The numeral 82 in Fig. 1 designates a water pipe leading from the main source of supply and the numerals 83, 84, 85 and 86 designate an elbow, another pipe, a cooling coil and a pipe T, respectively. The numeral 87 designates a valve that is provided for drawing plain water and numeral 87 an outlet pipe that leads therefrom.

In Fig. 1 there is further illustrated a beverage dispensing system in which there is used a tank of CO₂ gas and shows the liquid carbonating de-

vice located in the system. The numeral 88 designates a container of carbonated beverage, such as beer, and the numerals 89, 90, 91, 92 and 93 designate suitable gas pipes, numerals 94 and 95 designate elbows, and numerals 96, 97 and 98 designate a pressure regulator, a pressure gauge and a shut off valve, respectively. The numerals 99 and 100 designate the cooling coils and the faucet, respectively, that are associated with the container of beverage 88. It will be noted from the foregoing description and the illustration shown in Fig. 1 that the one tank of CO₂ gas accommodates both the fluid carbonating device and the container of carbonated beverage and that the gaseous pressures on each can be varied and maintained separately.

The unique improved features of construction consisting in the providing the fluid carbonating chamber directly in the body of the valve, the manner in which the valve elements are operated, the method in which the liquid and gas is conveyed against each other in the carbonating chamber, together with conveying the CO₂ gas through the carbonated liquid outlet line and providing means for producing a back pressure in said line causes the liquid to become instantly carbonated and ready for immediate use. This method not only carbonates the liquid in an improved manner by more completely impregnating the CO₂ gas in the fluid and eliminating the necessity of using storage tanks and equalizing containers but also provides a superior product that is not subject to any losses due to the fact that the liquid is instantly carbonated and used immediately.

Having thus illustrated and described a certain form of construction and arrangement of parts pertaining to the invention, it is to be understood that the parts forming the invention can be made in any suitable size and shape and of any suitable material and combined and arranged in any suitable manner into which the device can be made, and it is desired to include in this application for Letters Patent of the United States of America, any and all patentable novelty that exists in the description disclosed and all that comes within the fundamental principle of the invention as set forth in the claim hereinafter mentioned.

What is claimed is:

50 A liquid carbonating device for use in combination with a supply of liquid under pressure and a tank of CO₂ gas, comprising a housing forming a reduced carbonating chamber, an inlet for admitting liquid therein, a gas inlet pipe positioned oppositely opposed said liquid inlet for conveying the CO₂ gas against the flow of liquid whereby the liquid becomes carbonated, valve means for simultaneously controlling the flow of liquid and CO₂ gas, an elongated outlet pipe line leading from said carbonating chamber for enabling the carbonated liquid to pass therefrom, a liquid retarding member provided onto the outer end of the outlet line, the CO₂ gas inlet pipe extending into the carbonating chamber through a portion of said elongated outlet line whereby the carbonated liquid reaches a higher state of carbonation as it passes around and in between the surfaces of the two pipes in its travel through the outlet line.

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