

Dec. 28, 1937.

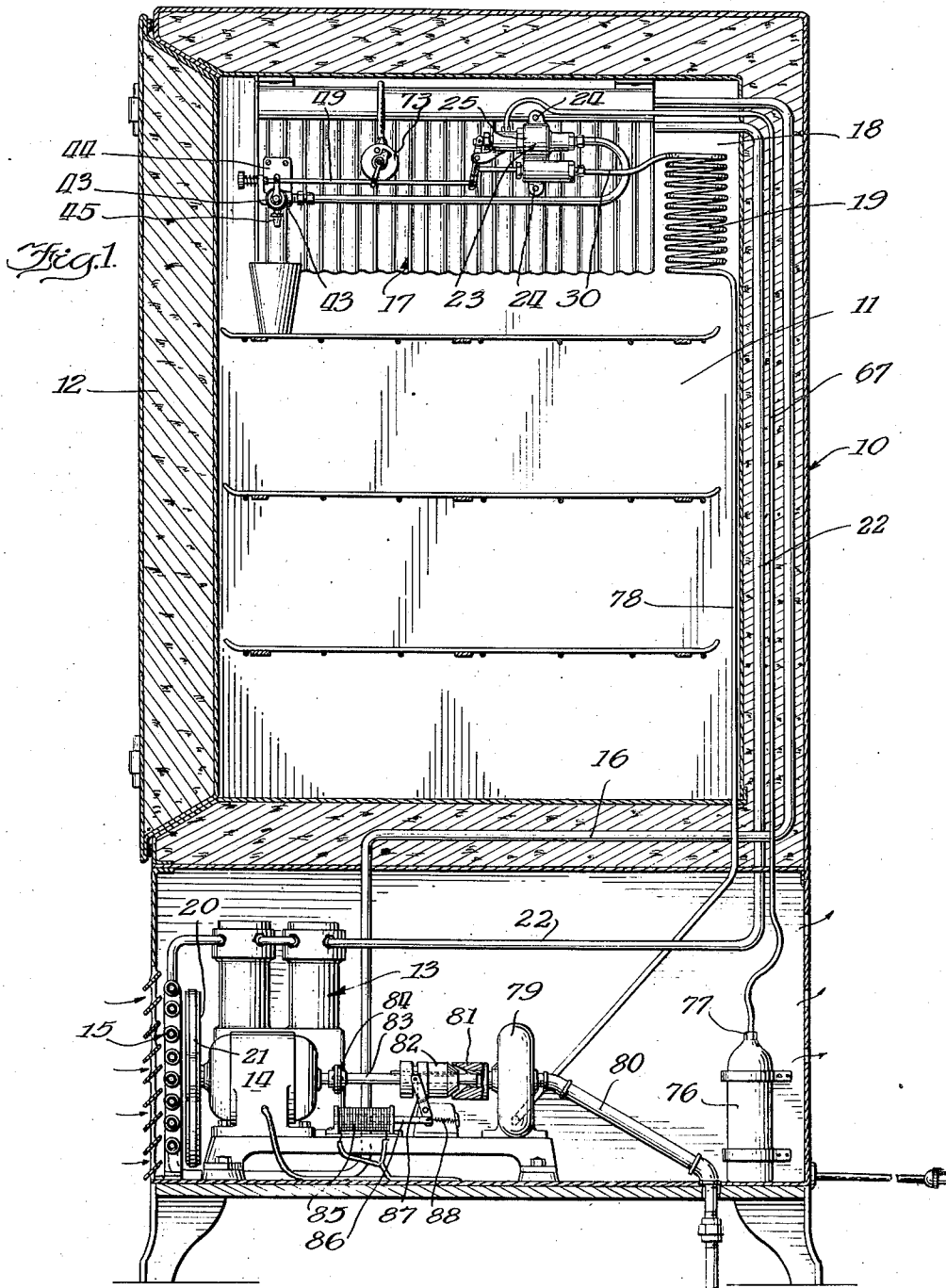
W. MAGEE

2,103,479

HOUSEHOLD CARBONATOR

Filed Nov. 17, 1932

2 Sheets-Sheet 1



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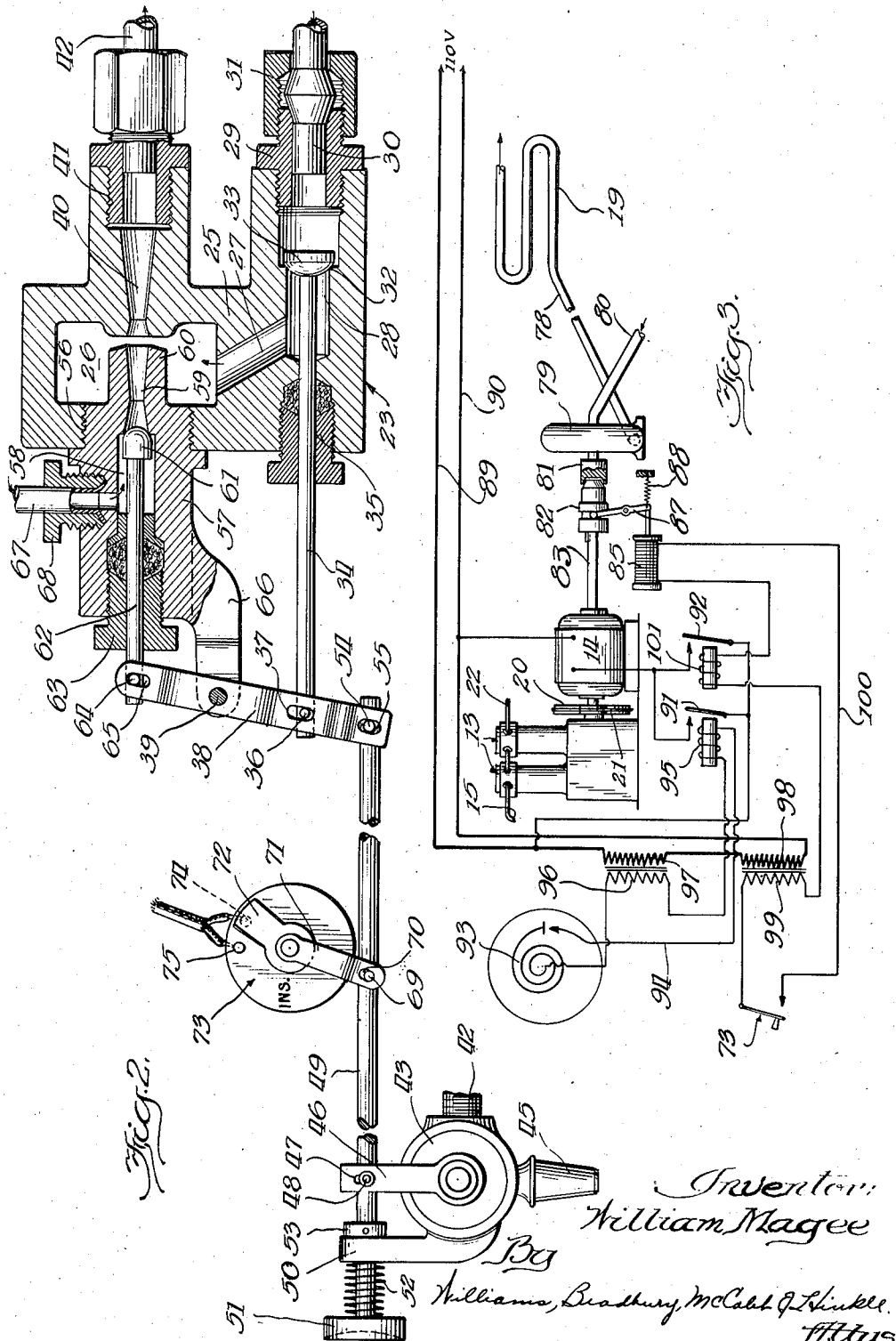
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UNITED STATES PATENT OFFICE

2,103,479

HOUSEHOLD CARBONATOR

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Application November 17, 1932, Serial No. 643,038

14 Claims. (Cl. 62—92)

This invention relates to household carbonators and has for its principal object the provision of a simple and effective means for providing carbonated water, preferably chilled, in the home.

A further object of the invention is to provide a combined household refrigerator and water carbonator.

A further object of the invention is to provide a combined electric refrigerator and household carbonator in which a single motor is employed to drive the compression unit of the refrigerator and a water pump for supplying the carbonator with water under pressure.

Other objects, advantages and capabilities of the invention will appear from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, in which

Figure 1 is a sectional elevation through a household refrigerator provided with my improved carbonator;

Fig. 2 is a sectional detail of the carbonator, and

Fig. 3 is a wiring diagram associated with a diagrammatic showing of the electric motor, refrigerator compressor, and water pump.

Referring to the drawings, the reference numeral 10 designates a conventional electric refrigerator having a food compartment 11 and a door 12. The reference numeral 13 designates the compressor which is driven in known manner by an electric motor 14. In the embodiment of the invention shown, the compressor and motor are located below the food compartment 11, but it will readily be understood that the invention may be applied to refrigerators of radically different design in which the motor and compressor are located elsewhere. The compressor 13 supplies compressed refrigerant to a coil 15 and the cooled refrigerant passes by a pipe 16 to a chilling unit 17. In practically all commercial electric refrigerators known to me there is left a space 18 behind the chilling unit 17, in which space I prefer to locate a coil 19, the purpose of which will hereinafter be described.

The drive of the motor 14 is communicated to the compressor 13 by means of a pulley wheel 20 and belt 21. The pulley wheel 21 is arranged to serve as a fan to draw air inwardly between the pipes of coil 15 so as to cool the same. The expanded gaseous refrigerant returns to compressor 13 through pipe 22.

The carbonator is designated generally by the reference numeral 23 and is preferably mounted

near the upper end of the food cabinet. It may be supported from the top or, as shown in Fig. 1, it may be mounted by means of brackets 24 upon the side of the chilling unit 17. The carbonator 23 is best shown in Fig. 2. It comprises a body 25, which may be a metal casting suitably machined. The body 25 comprises a chamber 26 which is connected by means of a duct 27 with a longitudinal passageway 28.

The rearward end of the passageway 28 is enlarged and threaded for the reception of a correspondingly threaded fitting 29 to which an end of a copper pipe 30 is secured by means of a threaded collar 31. Forwardly of the fitting 29 the passageway 28 is reduced to provide a valve seat 32 which is adapted to be engaged by a valve 33 so as to close off communication between the pipe 30 and duct 27. The valve 33 carries a forwardly extending stem 34 which extends through a suitable packing gland 35. The valve stem 34 is provided at its forward end with a pin 36 which extends into slots 37 of a double lever 38 pivotally mounted on a pin 39 carried by the body 25, as will hereinafter be described. The body 25 has formed therein a venturi 40 which extends rearwardly from the chamber 26 and terminates in an internally threaded enlarged portion 41, to which is secured a copper pipe 42 in the same manner, as already described with respect to the pipe 30.

The pipe 42 connects to a valve or spigot 43 which is mounted at a suitable position near the door 12 of the refrigerator. A suitable position for the spigot 43 is near the forward end of the chilling unit 17, to which it may be secured by a bracket 44.

The spigot 43 is provided with a discharge nozzle 45 and is adapted to be actuated by an arm 46. The arm 46 is provided with a slot 47 in which is received a pin 48 carried by a rod 49. The rod 49 is substantially horizontal and is guided in a suitable opening in an arm 50 carried by the body of the spigot 43. At its forward end the rod 49 carries a push-button 51 and a coil spring 52 is located around the rod 49 between the pushbutton 51 and arm 50, so that it tends to move the rod 49 forwardly. The forward position of the rod 49 is determined by a collar 53 rigidly secured to the rod 49 rearwardly of the arm 50 against which it is adapted to abut. At its rearward end the rod 49 carries a pin 54 which extends into slots 55 in the double lever 38 at a point below the pin 36 of the rod 34.

The body 25 of the carbonator is provided with

a threaded opening 56 in alignment with the venturi 40, this opening extending into the chamber 26. The opening 56 receives a correspondingly threaded portion of a plug 57 which is provided interiorly with a valve chamber 58. The valve chamber 58 communicates through a venturi 59 with the interior of the chamber 26, the rearward portion of the venturi 59 being located within a rearwardly extending nipple 60 which extends into the chamber 26 to a point a short distance from the opening of the venturi 40. As best seen in Fig. 2, the venturis 59 and 40 are in alignment and water supplied to the chamber 26 by the pipe 30 may pass into the venturi 40 to be delivered to the pipe 42, together with carbon dioxide gas which enters through the venturi 59. Within the chamber 58 is located a valve 61 which normally closes the forward end of the venturi 59. The valve 61 is secured to a stem 62 which extends forwardly through a gland 63 and is provided with a pin 64 at its forward end. The pin 64 projects into slots 65 in the double lever 38 previously referred to. The pin 39 is supported on an arm 66 rigidly carried by the plug 57. As readily seen in Fig. 2, when the button 51 is pushed inwardly that is to the right, valve stem 34 is pushed to the right to move valve 33 into open position and valve stem 62 is moved to the left so as to move valve 61 to open position, the pins 36 and 64 being located in opposite sides of the pivot 39.

A carbon dioxide gas pipe 67 is secured to the plug 57 by means of a hollow threaded plug 68 so that this pipe communicates into the valve chamber 58. As will hereinafter be shown, the pipe 67 is adapted to supply carbon dioxide gas under pressure to the chamber 58, while the pipe 30 is adapted to supply water under pressure, which water is supplied when the valve 33 is opened, to the chamber 26.

At a suitable position, the rod 49 carries a pin 69 which extends through a slot 70 in an arm 71. This arm is connected to a pole member 72 of a switch 73. The switch comprises contacts 74 and 75 which are adapted to be connected by the pole member 72 to complete a circuit, which will hereinafter be described, when the rod 49 is pushed to the right, as viewed in Fig. 2. When the button 51 is released, the spring 52 moves the rod 49 to the left as viewed in Fig. 2, the contacts 74 and 75 are electrically disconnected and the valves 61 and 33 are moved to closed position. It is to be noted that these valves close with pressure so that the pressure of the carbon dioxide gas and the water serve the more securely to hold these valves on their seats when the carbonator is not in operation.

The carbon dioxide pipe 67 extends to a suitable position at which a carbon dioxide bottle or cylinder 76 may be placed. In the embodiment illustrated, the bottle 76 may be located in the mechanism compartment of the refrigerator and the pipe 67 may suitably extend through the center of the rear wall so that it is not subjected to excessive cooling within the food chamber 11. The lower end of the pipe 67 is provided with a fitting 77 whereby it may removably be secured to the bottle 76. The pipe 30 communicates with the upper end of the coil 19. The lower end of the coil 19 is connected by a pipe 78 which may suitably extend downwardly within the food chamber 11, from which it passes through a suitable opening into the mechanism compartment of the refrigerator, being connected to the outlet side of a pump 79 therein.

The inlet of the pump 79 is connected by means of a pipe 80 to the city water supply. It will be understood that in the functioning of the apparatus the water supplied through the pipe 78 is chilled by its passage through the cold food compartment 11, and is further chilled in the coil 19. The coil 19 is of sufficient dimensions that it serves as a storage compartment for the amount of chilled carbonated water which the carbonator is intended to deliver. In ordinary household use, carbonated water is required only at intervals so that between successive withdrawals there is sufficient time for the chilling of a further supply of water.

The shaft of the pump 79 is preferably located in alignment with the shaft of the motor 14 and is adapted to be driven therefrom when the spigot 43 is opened. This drive may be controlled by a clutch member 81 secured to the shaft of the pump 79 and a corresponding clutch member 82 slidably and non-rotatably mounted on a shaft 83 which is united to the shaft of the motor by a coupling 84. In the preferred embodiment illustrated in the drawings, the clutch member 82 is shown as actuated electrically. It will be understood, however, that I may employ any type of clutch whatsoever for connecting the pump 79 to the motor 14 when the spigot 43 is opened. In the embodiment shown in the drawings I use a solenoid 85, the armature 86 of which is connected to a pivoted yoke 87 which engages the clutch member 82 in known manner. A spring 88 is provided which is adapted to move the clutch member 82 into unclutched position when the solenoid 85 is no longer energized.

The wiring diagram shown in Fig. 3 will now be described. In this diagram the mains are indicated by the reference numerals 89 and 90. The main 90 is connected directly to the motor 14, and the main 89 is adapted to be connected to the motor by means of either switch 91 or 92. The refrigerator is controlled in any known manner, for example by means of thermostat 93, which is located in a circuit 94. The circuit 94 includes a relay 95 which is adapted to close the switch 91. The circuit 94 includes a secondary winding 96 of a transformer 97, the primary of which is connected to the mains 89 and 90, being preferably in series with the primary of a transformer 98. The primary of the transformer 98 is in a circuit 100 which includes the switch 73, the solenoid 85 and the relay 101. The relay 101 controls the switch 92, which is moved to start the motor 14 when the relay 101 is energized.

The operation of the machine is as follows: In normal condition, the switch 73 is off, the switch 92 is open and the solenoid 85 is deenergized so that the clutch element 82 is out of contact with the clutch element 81. The motor 14 is now under the control of the thermostat 93. For example, when the temperature of the food compartment 11 falls to a predetermined point, the thermostat completes the circuit 94 and the relay 95 is energized so as to complete the motor circuit through the switch 91. The motor 14 now operates until the desired low temperature prevails in the food compartment 11.

When it is desired to draw carbonated water from the spigot 43, the button 51 is pushed inwardly, opening the spigot. In addition, this movement moves the valves 33 and 61 to open position and also actuates switch 73 to close the circuit 100. Immediately the solenoid 85 is ener-

gized, the clutch member 82 is moved to clutching position. At the same time the relay 101 is energized and the motor circuit is completed through the switch 92. This occurs whether or not the motor circuit is completed through the switch 91 controlled by the thermostat 93. The movement of the clutch member 82 causes the pump 79 to be driven so as to impart high pressure to the water which is supplied to the carbonator body 25 through the pipe 30. The carbon dioxide gas entering this body through the pipe 67 is forced into the water entering the venturi 40 and is immediately dissolved therein, the solution of the gas being aided materially by the low temperature of the water which has been stored in the coil 19 for some time, and also the high pressure of the water, produced by the pump 79. The pressure of the mixture of gas and water is reduced in the throat of the venturi 40 and the gas is distended and distributed throughout the water. Immediately thereafter, as the mixture moves away from the throat of the venturi 40, the pressure increases with the result that the widely distributed gas is forced into solution in the water by the increasing pressure. As a result, the spigot 43 discharges cold water having a high content of carbon dioxide suitable for the preparation of beverages.

It will be understood that many changes and modifications can be made in the present invention without departing from the essential features thereof. It will be understood that the arrangement of wiring herein described is illustrative only and the same results may be obtained in other ways.

Although the invention has been disclosed in connection with the specific details of a preferred embodiment thereof, it must be understood that such details are not intended to be limitative of the invention except in so far as set forth in the accompanying claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a household refrigerator having a power unit, a switch adapted to control said power unit, and a carbonator mounted in said refrigerator, said carbonator comprising valves adapted to admit water and carbon dioxide gas thereto, a pump adapted to supply water under substantial pressure, a clutch adapted operatively to connect said pump to said motor, a spigot for discharging carbonated water, and means for actuating simultaneously said valves, clutch and said switch.

2. In combination, a household refrigerator having a refrigerant compressor and an electric motor for operating same, a carbonator mounted within the food chamber of said refrigerator and having a discharge spigot therein, valves in said carbonator adapted to control the admission of carbon dioxide gas and water, a pump adapted to be driven by said motor and an electric clutch adapted to connect the motor and pump, said pump being adapted to supply water under high pressure to said carbonator, means for controlling the carbonated water spigot and said valves simultaneously, and a switch associated with said means adapted to complete a circuit so as to move the clutch to clutching position and to start the motor irrespective of the normal refrigerator controls.

3. In combination, a household refrigerator having a food compartment and a refrigerating unit including a motor, a carbonator mounted in

said food compartment and having a discharge spigot therein, a pump for supplying water to said carbonator under substantial pressure, and a water coil of substantial capacity in said food compartment, means for supplying carbon dioxide gas to said carbonator, a valve in said carbonator controlling the admission of carbon dioxide gas, and means for controlling said spigot and said valve and said motor whereby said spigot is caused to discharge cold carbonated water.

4. In combination, a household refrigerator having a food compartment and means for chilling said compartment, a carbonator in said compartment comprising a discharge spigot and a valve for controlling the admission of carbon dioxide gas thereto, and means for supplying water under pressure to said carbonator, said spigot and valve being interconnected to be opened and closed in unison.

5. In combination, a household refrigerator having a food compartment and means for chilling said compartment, a carbonator in said compartment comprising a discharge spigot and a valve for controlling the admission of carbon dioxide gas thereto, and means for supplying water under pressure to said carbonator, said means including a water chamber of substantial volume within the food chamber, so that the discharged carbonated water may be suitably chilled, and said spigot and valve being interconnected to be opened and closed in unison.

6. In combination, a household refrigerator having a food chamber, an electric motor and a compression unit adapted to be operated hereby, a thermostat adapted to control the operation of said motor, a carbonator located within said food chamber, means for supplying carbon dioxide gas and chilled water under pressure to said carbonator, means controlling the discharge of carbonated water from said carbonator, and means associated therewith for starting the motor irrespective of the condition of said thermostat.

7. In combination, a household refrigerator having a power unit, a switch adapted to control said power unit, and a carbonator mounted on said refrigerator, said carbonator comprising valves adapted to admit water and carbon dioxide gas thereto, a pump adapted to supply water under substantial pressure, a clutch adapted operatively to connect said pump to said motor, a spigot for discharging carbonated water, and means for actuating simultaneously said valves, clutch and said switch.

8. In a mechanical refrigerator having a food compartment and a freezing unit therein, a carbonator mounted on said refrigerator, means within the food compartment adapted to supply chilled water to said carbonator, means adapted to supply carbon dioxide gas to said carbonator, valves controlling each supply, and means interconnecting said valves whereby they are adapted to open simultaneously and close simultaneously.

9. In combination, a household refrigerator having a food compartment and means for chilling said compartment, a carbonator in said compartment comprising a discharge spigot and a valve for controlling the admission of carbon dioxide gas thereto, and means for supplying water under pressure to said carbonator, said spigot and valve being interconnected so that they may both be in opened condition or both in closed condition at the same time.

10. In a mechanical refrigerator having a food compartment and a freezing unit therein, a carbonator mounted on said refrigerator, means

within the food compartment adapted to supply chilled water to said carbonator, means adapted to supply carbon dioxide gas to said carbonator, valves controlling each supply, and means inter-
5 connecting said valves whereby they may both be in opened condition or both be in closed condition at the same time.

10 11. In a mechanical refrigerator having a food compartment and a freezing unit therein, a carbonator mounted on said refrigerator, a container within the food compartment adapted to main-
tain a supply of water to be chilled and carbonated, means adapted to supply carbon dioxide gas to said carbonator, a valve controlling the outlet
15 of chilled carbonated water from said carbonator, a valve controlling the supply of carbon dioxide gas to the carbonator, and a single manual control for actuating both said valves.

20 12. In combination, a mechanical refrigerator having a food compartment and a chilling unit therein, a carbonator mounted on said refrigerator, a container within the food chamber for maintaining a supply of water to be chilled and carbonated, means for supplying water under
25 pressure to said container, a switch controlling

the operation of the water supplying means, a valve controlling the supply of carbon dioxide gas to the carbonator, a spigot controlling the delivery of chilled carbonated water from the carbonator, and means interconnecting said valve, spigot and
5 switch for correlated operation.

13. A carbonator comprising a conduit for supplying water under pressure thereto, a valve in said conduit, a conduit for supplying carbon dioxide to the carbonator, a valve in said conduit, a single manual control for actuating both
10 said valves, and Venturi means through which the mixed water and carbon dioxide are forced.

14. A carbonator comprising a mixing passage through which carbon dioxide and water are
15 adapted to flow, Venturi means in said mixing passage varying the pressure of the fluids passing therethrough, a valve controlling the supply of water to said passage, a valve controlling the supply of carbon dioxide to said carbonator, means
20 linking said valves together to enable them to be operated simultaneously, and a single manual means for operating said valves.

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