Dec. 5, 1961 W. R. KROMER 3,011,681

METHOD OF AND APPARATUS FOR COOLING, STORING, MIXING AND DISPENSING BEVERAGES

Filed Feb. 18, 1959

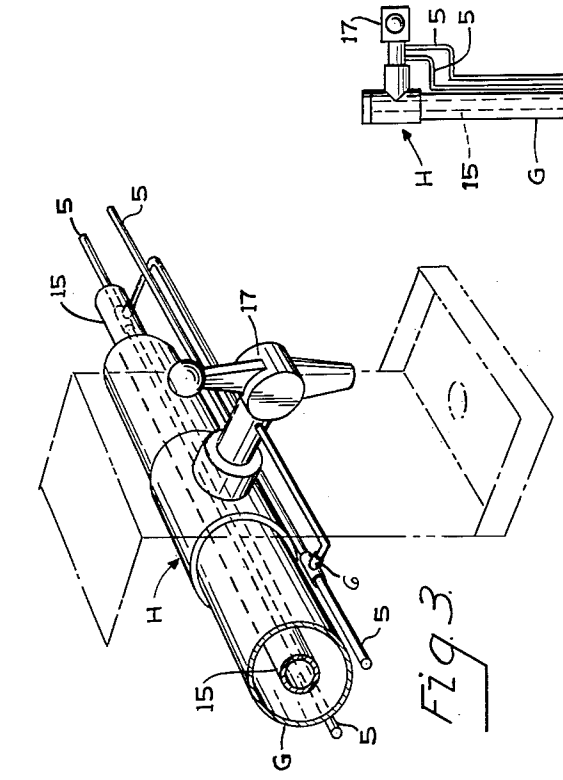


Fig. 3

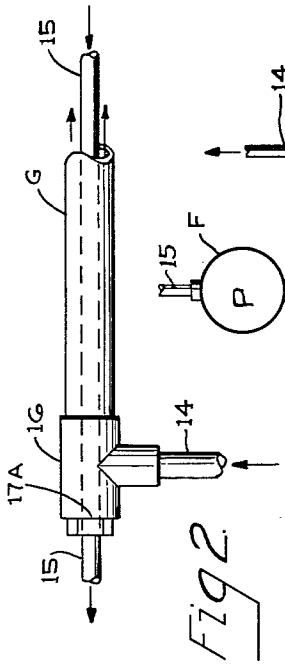


Fig. 2

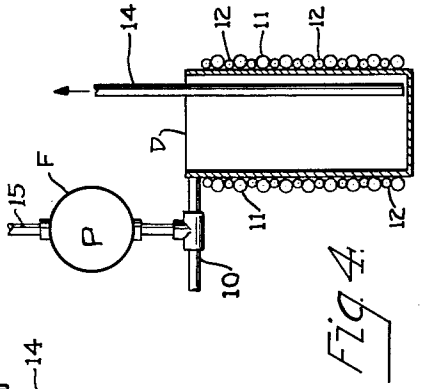


Fig. 4

Fig. 1

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United States Patent Office 3,011,681
Patented Dec. 5, 1961

3,011,681

METHOD OF AND APPARATUS FOR COOLING, STORING, MIXING AND DISPENSING BEVERAGES

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Filed Feb. 18, 1959, Ser. No. 794,088
11 Claims. (Cl. 222—1)

This invention relates to an improved method of and apparatus for cooling, storing, mixing, and dispensing gas charged beverages such as carbonated water and flavored gas charged drinks.

Beverages of the character mentioned are made on the premises of the vendor by charging water with carbon dioxide gas and by mixing carbonated water and flavored syrup in accordance with a predetermined formula. Mixing is done as by introducing charged water and flavored syrup into a drinking glass or as by using a specialized mixing faucet adapted to receive both water and syrup and adjusted to allow the correct amount of each ingredient for a palatable drink. The carbonated water is delivered through a tube or line to the faucet by CO_2 gas pressure maintained on a body of such water at a storage point, such pressure being required for proper carbonation; syrup is pushed through a separate tube or line to the mixing faucet as by CO_2 gas pressure on the syrup in a storage container. The proper pressure for uniform delivery of syrup is determined at the time of installation of the system. However, should the temperature of the syrup in the line increase, the rate of flow will increase. Thus, if a conventional syrup line is exposed to fluctuating room or basement temperatures, there will be fluctuation in the rate of flow of the syrup in it. The result is objectionable change in formula and taste.

It is desirable that carbonated water be cooled to the desired drink temperature prior to being dispensed even though ice may be used in the beverage glass or cup. This is advisable as CO_2 gas escapes faster from warm than from cool carbonated water. Warm carbonated water provides a flat drink because of the escape of a relatively high percentage of the CO_2 gas content as the water is released from the faucet.

The purveyor who requires a number of dispensing stations, one for each of several waiters or bartenders serving from a long counter or bar, is faced with a varying change in temperature of syrup and carbonated water dispensing stations. Even though secondary cooling is sometimes employed at the remote stations, such re-cooling at dispensing points after line warm-up is expensive and subject to human error.

This invention aims to provide carbon dioxide charged water for consumption as a beverage, for mixing with liquor as a beverage and for mixing with syrups in making flavored carbonated beverages all having consistently uniform high carbonation and uniform temperature characteristics throughout the entire system in both single and multiple station installations for bar and fountain owners who wish to make and dispense their own beverages on the premises and as required.

It is, therefore, one of the principal objects of this invention to provide the purveyor or retailer with a generally improved charged water beverage making, cooling, storing, and dispensing method and system or apparatus capable of servicing one or several beverage dispensing stations, inexpensive in installation and operation and that will provide as an additional feature, if desired, the combination of uniformly cool carbonated water and syrup throughout the entire system regardless of distance and number of stations, thereby providing consistent palatable drinks according to formula and with consistent and

proper CO_2 content with no effect from weather or business conditions.

Another object is to provide such a method and system which, through continuous refrigeration and action of the carbonated water, maintains a consistent high point of carbonation likened to carbonating water originally as distinguished from and not evident in systems that allow carbonated water to stand stagnant in the lines at varying temperatures.

Another object of the invention is to provide generally improved apparatus or equipment for making and dispensing on the premises of the retailer carbonated water beverage and carbonated soft drinks that are of uniform delicious taste and palatability, and to provide storage for a ready supply of carbonated water within the system under proper and uniform conditions of temperature, pressure, and santitation. The invention specifically aims to provide gas charged beverage making and handling equipment which occupies a minimum of space and which includes improved means for refrigerating the stored components of the finished drink and all parts coming into contact with the liquids, including the faucet.

Another object is to provide a beverage making, storing and dispensing system of the character referred to that is compact and neat in appearance, occupies a minimum of space, and is inexpensive to manufacture, install, maintain, and operate.

Another and more specific object is to provide a novel and improved method of and system for chilling, storing, and supplying carbonated water of the proper temperature simultaneously at a dispensing master station and at any number of dispensing sub-stations as may be required in a retailing establishment, in which method and system secondary refrigeration or re-cooling of the liquids is not required, and in which the carbonated water itself is circulated in the form of a continuous stream from and to a refrigerated storage body. The stream is subjected to a rapid chilling, to reduce it to any desired predetermined dispensing temperature, is thereafter maintained at predetermined temperature in a reserve refrigerated storage tank, is drawn from the tank by means of a circulating pump and supplied through an insulated conduit to each of several dispensing stations in series. To complete the circuit, a return tube, either parallel to or within the main supply conduit, returns unused carbonated water to the reserve storage tank from the last station. The entire system of refrigerated carbonated water is kept in continuous motion and is available at a substantially uniform temperature at any point in the system. As carbonated water is drawn from the conduit, the supply is automatically replenished by suitable carbonating means connected to suitably regulated sources of water and carbon dioxide.

Another object of the invention is to provide flexibility and economy in installation and modification, it being feasible to add a new dispensing station at any point in the system at any time, this being accomplished by merely cutting the supply conduit and inserting a dispensing unit comprising an attaching plate and drain pan, faucet, and connectors to the conduit and the syrup lines.

Another and more specific object is to provide improved and economical method of and means for cooling the syrup lines. The various flavors of syrups are flowed to the mixing faucet or faucets through lines that are maintained in direct heat exchanging relation with respect to the circulating liquid coolant or carbonated water travelling between the master storage station and the dispensing zone or zones, thereby cooling the syrups and minimizing temperature fluctuations during such flow and without cost of secondary refrigeration; the syrup lines being immersed in the refrigerated carbonated water by being run through the conduit, or being taped to and in

contact with the conduit containing the circulating refrigerated carbonated water.

Still further objects and advantages which pertain to certain useful and novel features of construction and combinations of parts advantageous in installation and operation of a system such as referred to will be apparent from the following detailed description of the invention made in connection with the accompanying drawings which form a part of the specification. Like parts throughout the several views are indicated by the same letters and numerals of reference.

In the drawings:

FIGURE 1 is a diagrammatic view and layout partly elevational, partly in plan and partly in perspective, showing a beverage making, cooling, storing, and dispensing system, illustrative of and embodying the principles of the present invention;

FIGURE 2 is a fragmentary elevation detail showing a portion of the main conduit or manifold and certain of the related conduits employed in the apparatus of FIG. 1, and enlarged with respect to that figure;

FIGURE 3 is a fragmentary perspective view of a dispensing station assembly as employed in the apparatus of FIG. 1, this view being partly in phantom and enlarged with respect to that figure; and

FIGURE 4 is a vertical sectional view, partly diagrammatic, with parts broken away and removed, through the receptacle or storage tank of the system of FIG. 1, showing the attached refrigerant lines or coils and the incoming carbonated water line or supply tube through the circulating pump, this view being enlarged with respect to that figure.

In the illustrated system for mixing, cooling, storing and dispensing carbonated non-alcoholic beverages, the components are, in general, represented diagrammatically for the reason that, except where structure is specifically described and illustrated, the invention is concerned with the combinations involved rather than with the structural details of the individual parts and components. A CO_2 storage tank A, equipped with a high pressure regulator **1** and gauge, delivers CO_2 gas through a conduit or line **2** to low pressure regulator and gauge **3** where pressure is regulated to supply through a suitable branched conductor or line **4** a blanket of CO_2 gas under regulated pressure on flavored syrups in tanks C. By this gas pressure the syrups are forced to flow through lines **5** which are wrapped tightly to and extend substantially the full length of a refrigerated or main conduit G. T's **6** are provided in the syrup conduits or lines at dispensing stations H so that the syrups are available as needed, being regulated through faucets **17**.

Providing highly carbonated water for the apparatus is a carbonator B supplied with high pressure CO_2 gas from a T **19** in the line **2** and with drinking water from a suitable source such, for example, as a city water line **7**. Pump **8**, connected between the water source and the carbonator B, is driven by a motor using power from electric line **9**, forcing water from the source under high pressure into and mixing with the CO_2 in the storage tank of the carbonator B. Automatic operation and replenishment of the supply of water to the carbonator B is accomplished by making electrical contact for operation of the water pump **8** through electrodes (not shown) that make and break contact and start and stop the pump in repeating the mixing operation as the surface of the water in the mixing tank of the carbonator is lowered and raised to the contact level. The carbonated water is forced by the pressure within the storage or mixing tank of the carbonator B through line **10** into a cooling coil **11** attached to and coiled with a refrigerant line **12** wrapped about a storage tank D. A suitable refrigerant condensing unit E, operating automatically, supplies the refrigerant to the conduit **12**, the size and capacity of such unit being determined conventionally by the desired rating of the system in gallons of cooled beverage per hour. The temperature of the carbonated water is thus reduced to desired serving temperature before reaching the last coil that empties into the storage tank D.

The refrigerant coil **12** serves a double purpose as, wrapped around the tank D, it holds the temperature of carbonated water stored therein at a predetermined temperature, say between 34 and 40 degrees Fahrenheit. The condensing unit E is preferably water cooled so that its efficiency is not impaired if it is installed in a cabinet or under a counter or in some similar enclosed and restricted space, such water is supplied as from the T **20** in the supply line **7**. Waste water exiting from the condensing unit E through pipe or line **13** may be run to drain or can be piped to a sink under or associated with one of the dispensing stations H to provide warm, clean rinse water.

The storage tank D is connected to one, preferably the near, end of the conduit G through a tap rod or dip pipe **14** and a header **16**, the carbonated water returning from the other or remote end of the conduit G through a return conduit or line **15**. This return line **15** may be run on the outside of and parallel to the supply line G through use of a return bend at the remote station or, as shown, preferably line **15** is run inside the conduit G, through an opening **17A** (FIG. 2) in the near header **16** and thence to a circulating pump F, the pump connecting by a T **21** to the supply line **10** from the carbonator B, thereby completing a closed circuit. Placement of the return line within the supply conduit minimizes the surface area of such line exposed for heat gain, no heat being absorbed on the return flow through the refrigerated water within the supply line G. The conduit G and the conduit **15** serve as containers supplementing the storage container D in providing a reserve supply of refrigerated carbonated water.

When the faucet **17** is opened at the last or remote station, any entrapped air will be driven from the conduit G and the return line **15** and the conduit system will fill with refrigerated carbonated water. The circulating pump F, powered by motor supplied with energy from the electric line **9**, is in constant operation. Carbonated water is drawn from the remote end of the supply conduit G through the return conduit **15** and circulated through the cooling coil **11**, thereby removing any heat gain or pick-up by the stream in its travel through the length of the supply and return conduits. The desired rate of flow of the stream of carbonated water depends upon the length of run and the expected heat gain through the walls of the insulated supply conduit. The rate of flow is conveniently adjusted as by change of impeller in the pump F so that in operation the circulating water charged with carbon dioxide varies in temperature very little, in some instances less than about one degree from the tank D to the remote station H.

In accordance with the patent statutes the principles of the present invention may be utilized in various ways, numerous modifications and alterations being contemplated, substitution of parts and changes in construction being resorted to as desired, it being understood that the embodiment shown in the drawings and described above the particular methods set forth are given merely for purposes of explanation and illustration without intending to limit the scope of the claims to the specific details disclosed.

What I claim and desire to secure by Letters Patent of the United States is:

1. In a beverage system for carbonating, referigerating, storing and dispensing water, a storage receptacle, a dispensing faucet remote from the receptacle, conduit means connecting the faucet and the receptacle and providing separate paths to and from the faucet in a closed pressurized circuit, pump means forcing water over the circuit, refrigerating means in heat exchange relation to the circulating water, sources of water and of carbon dioxide under pressure, a pressure regulator for

and connected to the carbon dioxide source, and supply means connected to said sources and regulator to receive water and regulated carbon dioxide therefrom automatically supplying water and carbon dioxide to the pressurized circuit in continuous replenishment of that dispensed through the faucet, said supply means being adapted to maintain the water and the carbon dioxide in the circuit within predetermined volume and pressure limits.

2. In a beverage system as defined in claim 1 the conduit means comprising an outer tube and, within such outer tube and separated therefrom by a surrounding clearance space, an inner tube, the circulating water flowing in one direction through the outer tube and in the other direction through the inner tube.

3. In a beverage system as defined in claim 1 the supply means being connected to the conduit means to introduce the automatically supplied water and carbon dioxide at a point in the circuit ahead of the refrigerating means with respect to the faucet.

4. In a beverage system as defined in claim 1 the supply means comprising a carbonator, means supplying water under pressure to the carbonator, and a pipe connecting the carbonator to the conduit means at a point in the circuit ahead of the refrigerating means with respect to the faucet.

5. In a beverage system as defined in claim 1 in which the faucet is of the type adapted to receive flavored syrup and carbonated water through separate inlets and, when opened, to discharge such syrup and water in predetermined proportions as a mixed beverage, a syrup tank, tube means connecting the tank to the syrup inlet of the faucet, and means forcing syrup in the tank to travel through such tube means to the faucet, the tube means paralleling the conduit means in heat exchange relation for cooling of syrup travelling to the faucet.

6. In a beverage system as defined in claim 5 the carbon dioxide source comprising a container of carbon dioxide under pressure, and the syrup forcing means comprising a connection between the syrup tank and the carbon dioxide container through which carbon dioxide is let into the tank to maintain pressure therein.

7. A beverage system for carbonating, refrigerating and storing water, and for dispensing such carbonated water as desired from any of a plurality of separated points, said system comprising a storage receptacle, a plurality of dispensing faucets remote from the receptacle and spaced from one another, conduit means series connecting the faucets and the receptacle and providing

separate paths to and from the faucets in a closed pressurized circuit in which the water flows past the faucets seriatim, pump means forcing water over the circuit, refrigerating means in heat exchange relation to the circulating water, sources of water and of carbon dioxide under pressure, a pressure regulator for and connected to the carbon dioxide source, and supply means connected to said sources and regulator to receive water and regulated carbon dioxide therefrom automatically supplying water and carbon dioxide to the pressurized circuit in replenishment of that dispensed through the faucets, said supply means being adapted to maintain the water and the carbon dioxide in the circuit within predetermined volume and pressure limits.

8. The method of cooling, storing and dispensing carbonated water which comprises maintaining a body of carbonated water under pressure above atmospheric and in heat exchange relation with a refrigerating medium, circulating the refrigerated water over a closed path in a continuous stream and under pressure above atmospheric between the body and a dispensing point remote therefrom, intermittently withdrawing water from the stream at the dispensing point for consumption as desired, and automatically adding water and carbon dioxide to the body as required and while maintaining said pressure on the latter to replace that withdrawn and to maintain the volume of the body between predetermined limits.

9. The method of cooling, storing and dispensing carbonated water as defined in claim 8 in which one portion of the stream moving in one direction relative to the dispensing point is surrounded by and in heat exchange relation to another portion of the stream moving in the opposite direction.

10. The method of cooling, storing and dispensing carbonated water as defined in claim 8 in which the water and carbon dioxide are added at a point in the closed path at which the stream is flowing toward the body of water.

11. The method of cooling, storing and dispensing carbonated water as defined in claim 8 in which the replacement water and carbon dioxide are mixed together before being added to the body of water.

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