Oct. 18, 1960 | G. McCANN | 2,956,418

BEVERAGE CHILLER AND DISPENSER

Filed July 11, 1958 | 3 Sheets-Sheet 1

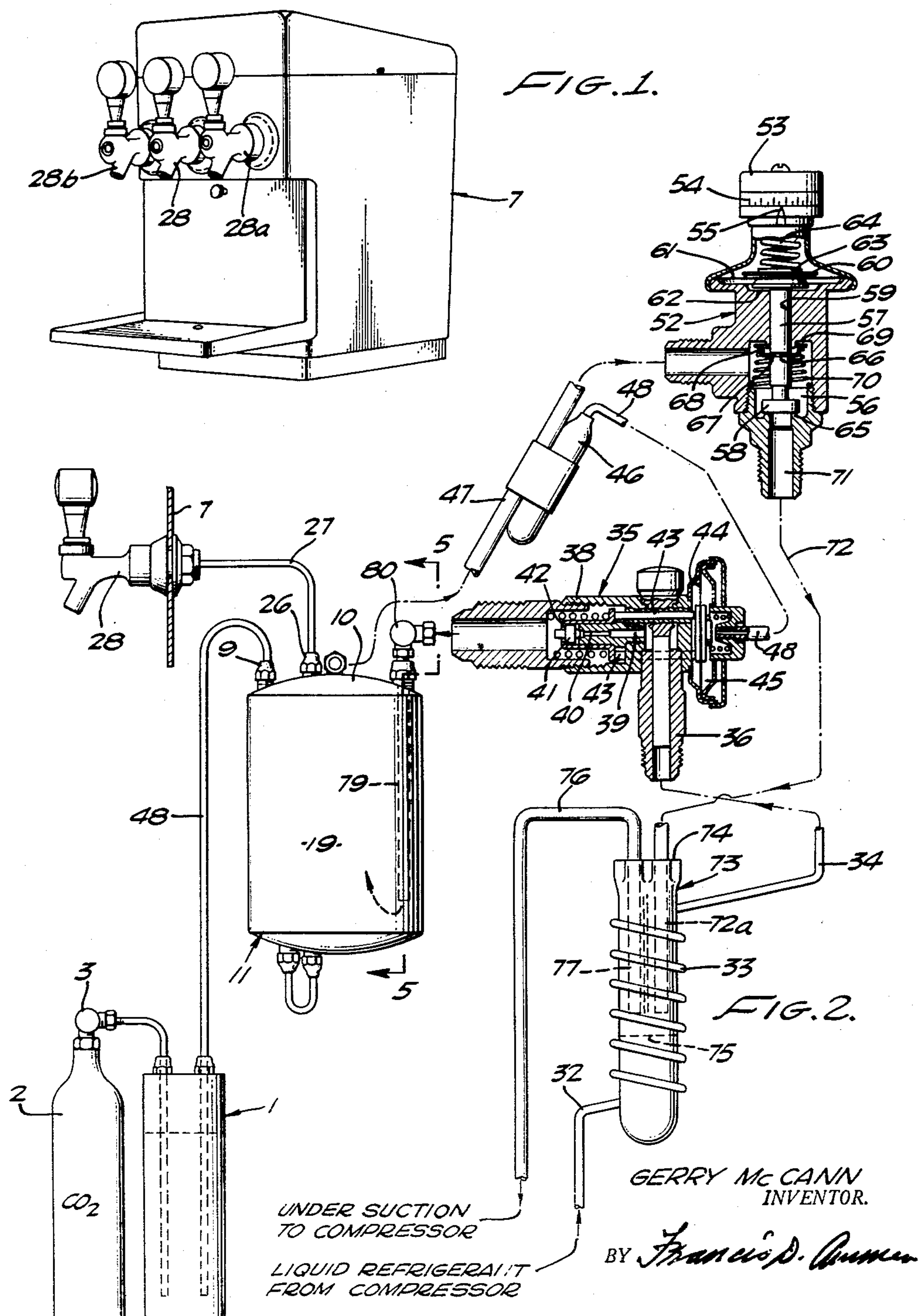


FIG. 1.

FIG. 2.

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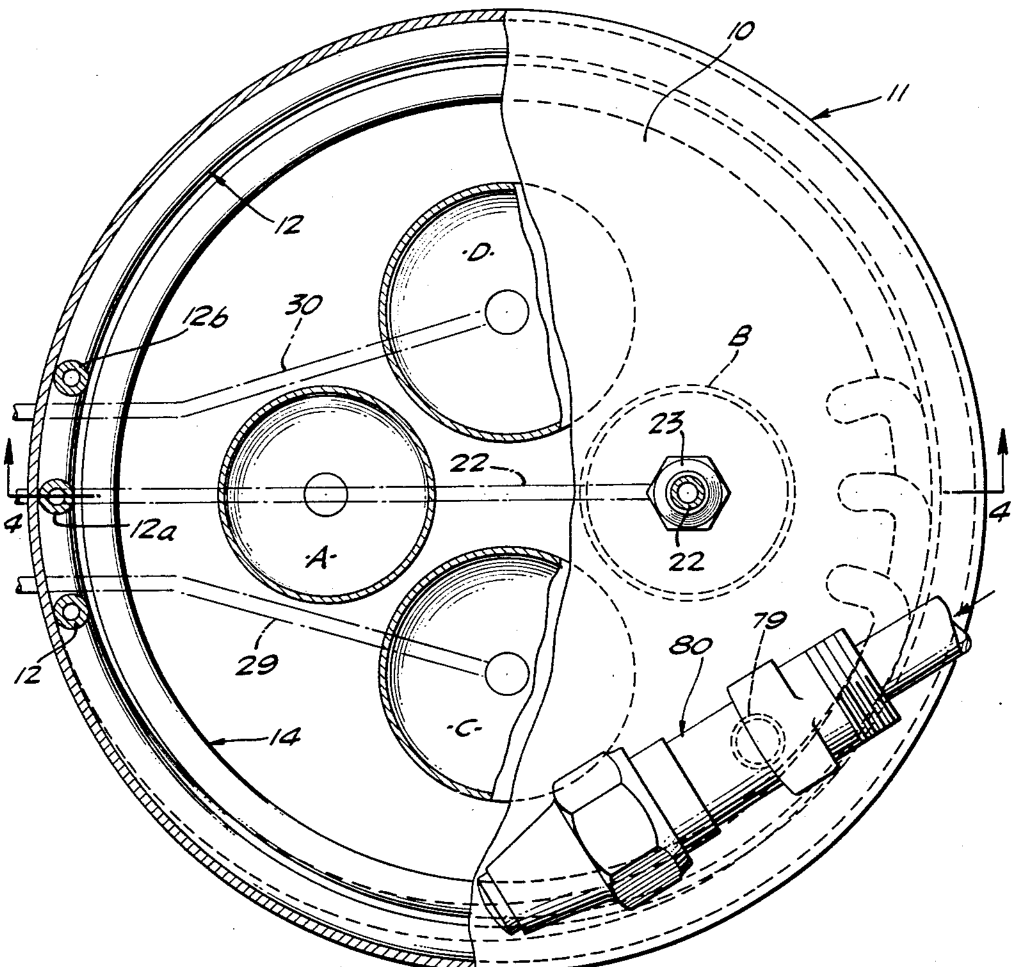


FIG. 3.

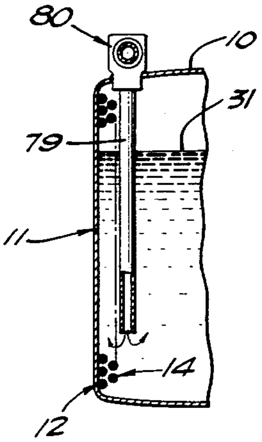


FIG. 5.

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BEVERAGE CHILLER AND DISPENSER

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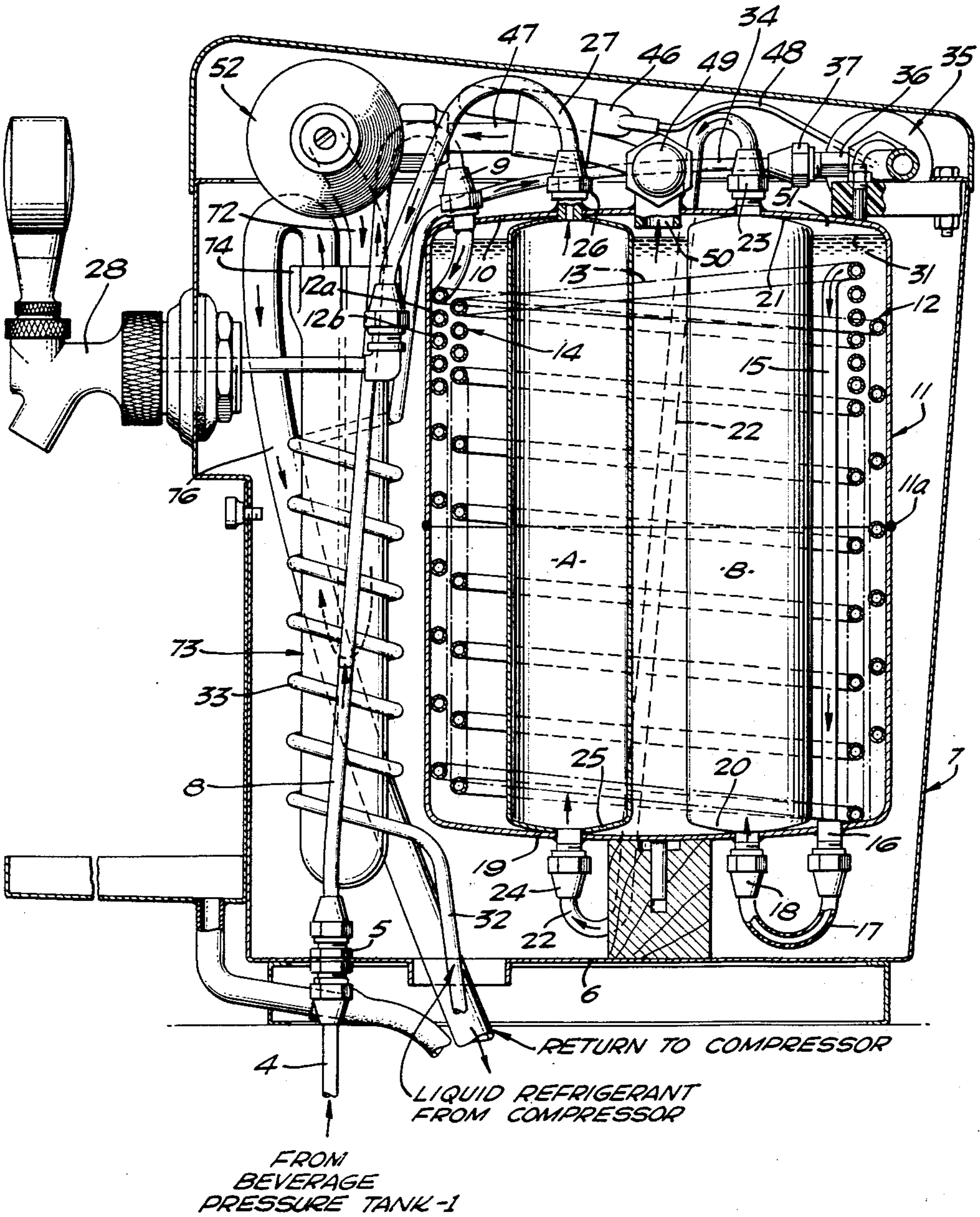


FIG. 4.

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# BEVERAGE CHILLER AND DISPENSER

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5 Claims. (Cl. 62—177)

This invention relates to a dispenser for beverages and one of the objects is to provide an apparatus containing a compact organization of means for maintaining a number of chilled supply reservoirs of drum-form, and of considerable capacity for a beverage or beverages, chilled by the apparatus and capable of serving a small group of persons, simultaneously; thereby assuring that the glasses of all the persons in the group will be properly chilled.

The invention involves the use of an evaporator having a chamber to which a liquid refrigerant is admitted under pressure through an expansion valve. The reservoirs referred to above for the beverage are carried immersed in the bath of liquid refrigerant, and receive their supply of the beverage from coils of stainless steel of relatively small inside diameter which are also immersed in the bath of lubricant.

Due to the small diameter of the stainless tubing the area of contact afforded by the tubing walls is relatively high as compared with the quantity of beverage passing a given point, so it is appropriate to call this feature the "instantaneous" cooling effect to which the beverage is subjected, that in a few moments passes into one or more of the supply reservoirs. And the cooling effect in the supply reservoirs is a close second to that of tubes because, as the reservoirs are completely immersed in the refrigerant bath, their entire superficial area functions to carry off an additional amount of heat still remaining in the beverage.

In other words, as the thin wall of each reservoir is composed of highly conductive metal, stainless steel, or an equivalent the four immersed reservoirs themselves constitute quite efficient heat exchangers.

Most of the States of the United States, for safety reasons have laws limiting the quantity of refrigerants employed, if they are inflammable. By providing a considerable number of supply reservoirs the quantity of refrigerant in the refrigerant bath can be very materially reduced.

Any slight incidental tendency to create reduction in efficiency due to the cooling effects involved, the more rapid raising of the temperature of the refrigerant composing the bath, is compensated for in this invention by providing automatic means for maintaining the bath of the refrigerant at a substantially constant level, and at a substantially constant temperature.

In accordance with this invention the evaporator is preferably in the form of an unright drum composed of two sections—a cover section and a bottom section.

In the practice of the invention the "instantaneous cooling" coils referred to above are mounted on the inside of the head of the evaporator drum.

After the previously formed up coils are attached in place on the under side of the head of the cover section of the evaporator and the four reservoirs are also attached to the under face of the upper section of the evaporator drum referred to, is completed by hermetically sealing the two drum sections by means of a welding girth at the meeting point of the edges of the two sections, it has been one of the objects of this invention to provide this organization of parts to enable this sealed assembly to be effected.



However, coils such as those referred to are, of course, practically inaccessible; such coils are sometimes subject to freezing up if they are operating under difficult conditions.

In view of this, one of the objects of this invention is to provide means for reducing or eliminating any "freezing up" effects such as referred to, and at the same time practically reducing or eliminating the tendency to develop tendencies of the beverage to foam as frequently happens when the beverage is one that is charged with a gas such as carbon-dioxide.

In this apparatus refrigerant vapors pass from the space space above the level of the refrigerant bath in the evaporator to a regulator valve from which they pass in the return line toward the inlet side of the compressor; these vapors or gases are so wet that it is impractical to admit them directly to the intake side of the compressor, as they would interfere with ready compression of the refrigerant medium.

One of the objects of this invention is to provide simple means for eliminating the excess moisture in the return line before the refrigerant reaches the compressor.

Further objects of the invention will be evident from a careful reading of the following specification and study of the accompanying drawing.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce a beverage chiller and dispenser.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawings:

Figure 1 is a perspective of the dispenser embodying this invention.

Figure 2 is a view of a diagrammatic nature, further illustrating some of the parts and their organizations that enables them to cooperate as described in the accompanying specification.

Figure 3 is a plan view showing part of the upper head of the evaporator, and a horizontal section at a lower level through the supply reservoirs for the beverages that are immersed in the refrigerant bath.

Figure 4 is a vertical section taken about in the plane of the line 4—4 of Figure 3.

Figure 5 is a fragmentary view and is a small scale section on the line 5—5 of Figure 2.

Referring to the parts of the apparatus and particularly to Figures 2 and 3, in the present instance the beverage is supplied from a tank **1** charged under pressure with carbon-dioxide gas passing to it from a bottle **2** through a reducing valve **3** which not only charges the beverage but also maintains pressure of approximately 50 p.s.i. in the space within the tank **1** above the beverage level, which of course descends as the beverage is consumed.

Through a pipe line **4** and a connection **5** the beverage is delivered through the bottom **6** of a housing **7** (see Figure 3) from which point a pipe **8** with a gooseneck at its upper end that connects to a fitting **9**, as shown, preferably welded through the upper head **10** of an evaporator **11**.

The lower end of the fitting **9** just referred to, carries a coil **12** of tubing that serves to keep two reservoirs A and B full of the beverage.

The highest wrap **13** in the inner course **14** of this coil, which is what might be called a double wrap, turns down to form a "down-take" pipe **15**, located just inside the outer coil, whence it runs down in a vertical line and passes out of the evaporator through a pipe fitting 16 like the fitting 9, and also welded in place.

Through a loop 17 of a certain plastic material that will be named in this specification, and another fitting 18 that is mounted through the bottom head 19 of the evaporator 11 and the bottom head 20 of reservoir B.

In order to connect the reservoir B to the reservoir A, in tandem a downpipe 22 with a gooseneck at each end is connected to an upper pipe fitting 23 and to a bottom fitting 24 mounted through the bottom head 19, and the bottom head 25 of the reservoir A.

The reservoir A has an outlet through an upper fitting 26 mounted like the other fittings just described that carries a pipe connection 27 that leads into a horizontal delivery pipe that leads to a center faucet 28.

All of the connecting tubes 8, 17, 22 and 27 are composed of a certain plastic material.

As further illustrated in Figure 3, two additional reservoirs C and D are provided, which would be duplicates of the reservoirs A and B. They are also preferably of cylindrical form, and these reservoirs would be connected up to their coils that would correspond to the coils 12*a* and 12*b*, that are associated with the reservoirs C and D. And the wraps of coils for these reservoirs C and D would be nested into the spaces between consecutive wraps of the coil 12 as shown somewhat diagrammatically in Figure 3.

These coils for the reservoirs C and D are omitted for the sake of clearness. There would also be a pipe connection similar to the pipe connection 22 and its fittings which would be supplied for the reservoirs C and D to connect them to a faucet such as the faucets shown at 28 in Figure 1.

In Figure 3 the locations of the connecting tubes 29 and 30 are indicated as they conduct the beverage from the reservoirs C and D to the two laterally located faucets 28*a* and 28*b*.

Referring now particularly to Figure 2, which diagrammatically illustrates the parts and their relation in the apparatus that are particularly concerned with the controlling of the refrigerant in its course to the evaporator 11, and the controls employed on its return line to the compressor unit (not illustrated) that is assumed to be operating in conjunction with the apparatus illustrated, it should be stated that refrigerant, that is, the refrigerating medium, is composed of a commonly used mixture of Freon and a light oil that is miscible with the Freon throughout the range of temperatures incidental to the operation of the apparatus.

The refrigerant bath in the evaporator 11 is maintained at a high level such as indicated by the line 31 in Figure 3. This level is sufficiently high to assure that the reservoirs A, B, C and D and the coils that carry the beverage will always be immersed in the refrigerant.

The refrigerant in liquid state is delivered to the apparatus through a tube 32 composed of copper or stainless steel of relatively small inner diameter. As shown, tube 32 is an integral extension of a coil 33 the function of which will presently appear, and beyond the coil 33 an extension 34 conducts the refrigerant to a thermostatically controlled expansion valve 35 where it enters an inlet 36 past a fitting 37 (see Figure 3).

As shown in Figure 2, the body 38 of the expansion valve has a horizontal passage 39 delivering into a port 40 of smaller diameter, the outlet end of which presents a seat for a button form valve closure 41. The valve-closure 41 is carried on a spring biased sliding thimble 42, a flange on the end of which lies against three slidable pins such as pins 43.

The rear ends of the pins 43 lie against a pad on the adjacent face of a diaphragm 44 having a pressure chamber 45 directly back of it.

The thermal means for increasing or decreasing the pressure in chamber 45 of the diaphragm comprises a thermostatic bulb 46, which is clamped to the side of tube 47 of conductive material such as copper or stainless steel and from the bulb a small diameter tube 48 extends over to deliver to the pressure chamber 45.

The tube 47 is connected by a fitting 49 to an outlet 50 from the vapor space 51 (see Figure 3) above the level 31 of the bath of refrigerant in the evaporator. The tube 47 mentioned above that carries the thermal bulb 46 leads over to a regulator valve 52, the function of which is to control the pressure in the return line.

By means of an indexing head 53 carrying a scale 54 and cooperating with a fixed pointer 55, the regulator valve 52 should be set to maintain 30 lbs. pressure in its valve chamber 56. This is the equivalent to approximately 34 degrees Fahrenheit of temperature in the vapors. With this setting the temperature of the liquid refrigerant inside the chilled tank cannot go below this setting. It can go higher, but not lower. When the refrigeration unit is running and is drawing off the relatively warmed up gas from the chiller this regulator valve will control its rate of withdrawal.

In reading the view that shows the regulator valve in section it should be understood that the stem 57 that carries the valve head 58 at its lower end has a rather loose fit in the guide bore 59, for it, and from which it projects slightly so as to abut against the underside of a pad 60 that is also placed on the underside of a diaphragm 61.

Just below the diaphragm the upper face of the body that carries the guide bore has a counterbore which results in presenting a depressed face 62 here.

On the upper side of the diaphragm rests a centering collar 63 for a spring 64 that normally holds the valve head 58 on its seat 65. By reason of the loose fit of the stem 57 in its guide bore 59 the gas under pressure in the valve chamber 56 can find its way up into the space just below the diaphragm 61, and if the pressure in the valve chamber 56 rises above 30 p.s.i. it will flow upwardly and pull the valve head 58 off of its seat. This will relieve the higher pressure, but when it rises to 30 lbs. the valve head will reseat.

The lower end of the stem 57 preferably has a circumferential groove 66 in its side which serves to enable it to carry a disc 67 that forms the bottom wall of a cup shaped stop member 68; this stop member has a flange at its upper end which strikes the upper wall of the valve member 56 to prevent the valve head 58 from rising to too great an extent, and a second coil spring 70 gives the valve a slight bias in an upward direction.

From the outlet 71 of the regulator valve the gas or vapor from the refrigerating medium passes as indicated by the broken line 72 and the arrows on it, so as to deliver the refrigerating medium into the upper end of a tubular body generally referred to as an accumulator which performs the function of reducing the amount of moisture in the "wet" gas that enters the upper end of an accumulator 73 which is indicated as in the form of a tube closed at its lower end.

The lower end of tube line 72 is in the form of a straight shank 72*a* that passes through the upper head 74 down into the interior of this tubular accumulator to a low level, but preferably above the normal level 75 of any condensed liquid refrigerant that may be trapped in the accumulator's tubular body.

The accumulator is also provided with a tubular outlet line 76 having a long shank 77 that extends down through the head of the tube, like the shank 73.

As stated above, the accumulator functions to prevent wet gas from returning to the compressor and refrigeration unit. Wet gas would be difficult for the compressor unit to compress to a liquid. Furthermore, the wet gas causes condensation on the return line going to the refrigeration unit, which is objectionable.

When the wet gas in the suction line is withdrawn from the chiller tank it goes on through the suction pressure valve (if open) and then passes down (see Figure 2) in the tube **72** and its terminal shank **73** that delivers the gas into the accumulator. When it enters the larger chamber within the accumulator body it expands in volume again and naturally warms up. In order to assist it in expanding as much as possible I employ the relatively warm refrigeration liquid in the coil **32** which is wrapped around the accumulator body and bonded with solder to the accumulator. This relatively warm liquid refrigerant from the condenser of the refrigerating unit causes the suction gas in the return line to expand further, thereby raising its temperature and reducing immediate condensations.

In this way the accumulator operates somewhat as a trap to eliminate wet gas from the line that is connected to the intake side of the compressor, which of course, increases the efficiency of the compressing operation.

The reservoirs A, B, C, and D not only function as storage points for the beverage but the supply within them is drawn upon first when any faucet is opened. However, if the quantity of beverage being dispensed exceeds the capacity of the reservoirs the beverage continues to be dispensed because of the presence of the coils, **12**, **12***a*, and **12***b*, in which the heat exchange from them to the reservoirs is actually more prompt in action than is the chilling effect established through the walls of the reservoirs.

The immersion of the reservoirs in the refrigerant in the evaporator is also an advantageous feature because that reduces the quantity of liquid refrigerant in the bath in the evaporator, and renders it easier to comply with the laws of some states that are not as lenient as to the quantity of a refrigerant permitted for considerations of safety.

The fact that the admission of the beverage from their coils **12**, **12***a*, and **12***b* occurs through the bottoms of the reservoirs, from which point they pass upward, is advantageous in preventing accumulation of sediment or thickened strata of the beverage at or near the bottom heads of the reservoirs.

In constructing the drum that constitutes the evaporator **11**, first all the coils **12**, **12***a*, and **12***b* are assembled in the cover sections; also the four reservoirs are assembled with their upper connection through the upper head of the evaporator.

The completed cover section is then lowered over the upright bottom section with the threaded nipples of the pipe fittings **18**, **24**, etc. in place and centered over their corresponding openings in the bottom head **19** of the bottom section.

A butt weld **11***a* is then made as a girth encircling the wall of the evaporator. Mechanically, in addition to their function as reservoirs the four reservoirs act as stout braces between the crown-form heads of the evaporator tank. This bracing effect is contributed to, also, by the fact that the reservoir heads are also of crown form.

As the interior of the completed evaporator is inaccessible, I prefer to employ a new plastic material known as Kraloy in the connecting tubes **17**, **22** and **27**. This is a safety feasure, in case a freezing occurs, anywhere in the flow line for the beverage that might occur particularly in some one of the beverage carrying coils **12**, **12***a* and **12***b*. To make repairs that might occur inside the evaporator wall would entail separating the two sections of the evaporator and a most difficult search to locate the damaged points.

The walls of the Kraloy tubes can readily withstand internal pressures incidental to normal operation of the refrigerant pressure system, but will readily rupture under an unduly high internal pressure.

Another feature and object of this invention that should be emphasized involves an additional fact relating to the coils **12**, **12***a* and **12***b* that carry the beverage through the chiller **11**. This fact that each of these coils consists of a single piece of pipe bent into wraps to form the coil, the ends thereof pass through sealed outlets in the heads of the chiller.

The result of this is that there is no joint at any point within the chiller that could start a leak.

As all the couplings or fittings that could possibly leak are outside of the chiller, they are fully accessible for tightening or repairing them.

Referring again to Figure 5, it should be said that this view illustrates a down pipe **79** extending down through a sealed opening in the upper head of the evaporator from a fitting **80**, and supplied with high pressure liquid from the expansion valve **35** which in turn is supplied with high pressure liquid refrigerant from the coil **33**, that received its liquid from the air compressor through the pipe extension **32**. The downpipe preferably extends down to a low level in the evaporator.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

I claim as my invention and desire to secure by Letters Patent:

1. In apparatus for chilling, and dispensing a charged beverage, the combination of a plurality of faucets, an evaporator presenting a chamber, means for maintaining a bath of the refrigerating medium within the evaporator chamber, a plurality of drum-form supply reservoirs for the beverage with conductive walls, immersed in the refrigerating medium with connections to the faucets; lengths of conductive tubing of relatively small inner diameter immersed in the bath of refrigerant within the evaporator, containing the beverage flowing therethrough, and connected to the said supply reservoirs to maintain quantities of the chilled beverage therein capable of supplying a group of persons promptly with the chilled beverage from the reservoirs; distendable plastic tube connections of relatively small diameter between the said supply reservoirs, carrying the beverage to and from the same, functioning when distended to reduce the internal pressure and prevent failure at some point of the said metallic conductive tubing.

2. Apparatus for chilling and dispensing a beverage according to claim 1, to cooperate with a compressor, including an expansion valve supplied with the refrigerant, and delivering the same into the chamber of the evaporator, and a regulator valve through which the said delivery of the refrigerant is effected, to the said expansion valve, and return piping for returning refrigerant back to the intake side of the compressor, a thermostatic control device in thermal contact with said return piping, with means connecting the same to the regulator valve for increasing or decreasing the amount of opening of said regulator valve to increase or decrease the supply of the refrigerant that is passing to said expansion valve and from the same into the bath of the refrigerant in said chamber.

3. In apparatus for chilling and dispensing a charged beverage in cooperation with a compressor and a refrigerating unit, the combination of an evaporator presenting an evaporating chamber, means for maintaining a bath of the refrigerant within the evaporator chamber, reservoir supply means of drum-form and relatively large capacity immersed in the said chamber with connections from the same to the faucet for conducting the beverage to the same, thereby enabling a considerable number of drinking mugs to be filled in rapid succession, coil means also immersed in the said bath, with means for circulating the beverage through the same and through the said reservoir means; a return line for the refrigerant to the compressor, and means for maintaining the liquid level in the said bath controlled through the agency of the temperature of the vapor in the return line to the compressor.

4. Apparatus for chilling and dispensing a beverage according to claim 3, including an accumulator having a tubular body in an upright position, a regulator-valve with means for maintaining the same at a predetermined

internal pressure, means for withdrawing refrigerant gas from the space above the level of the refrigerant bath in the evaporator, and for passing the same through the regulator valve, said accumulator including a coil soldered to its body, and means for passing liquid refrigerant from the refrigerating unit through the said coil to eliminate the moisture of wet gas in the tubular body of the accumulator.

5. Apparatus for chilling and dispensing a beverage according to claim 3, including an accumulator having a tubular body in an upright position, a regulator-valve with means for maintaining the same at a predetermined internal pressure, means for withdrawing refrigerant gas from the space above the level of the refrigerant bath in the evaporator, and for passing the same through the regulator valve, said accumulator including a coil soldered to its body, and means for passing liquid refrigerant from



the refrigerating unit through the said coil to eliminate the moisture of wet gas in the tubular body of the accumulator, and means for circulating gas from the regulator through the body of the accumulator from its closed upper end.

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

UNITED STATES PATENTS


| | | |
|---|---|---|
| 1,985,785 | Kellogg | Dec. 25, 1934 |
| 2,059,967 | Leach | Nov. 3, 1936 |
| 2,450,735 | Millet | Oct. 5, 1948 |
| 2,482,171 | Gygax | Sept. 20, 1949 |
| 2,485,610 | Kromer | Oct. 25, 1949 |
| 2,646,667 | Kromer | July 28, 1953 |
| 2,762,209 | Bennett | Sept. 11, 1956 |
| 2,799,999 | Swanson | July 23, 1957 |