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LIQUID CARBONATOR

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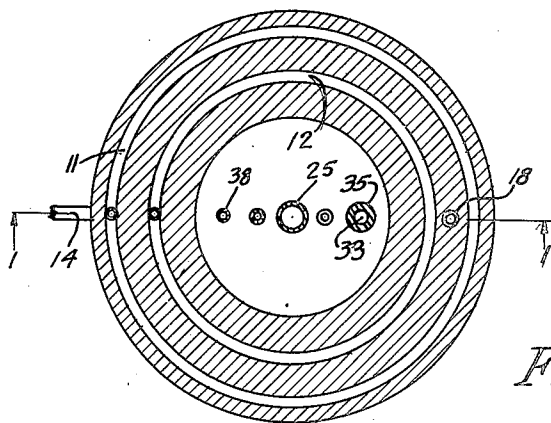


Fig. 2.

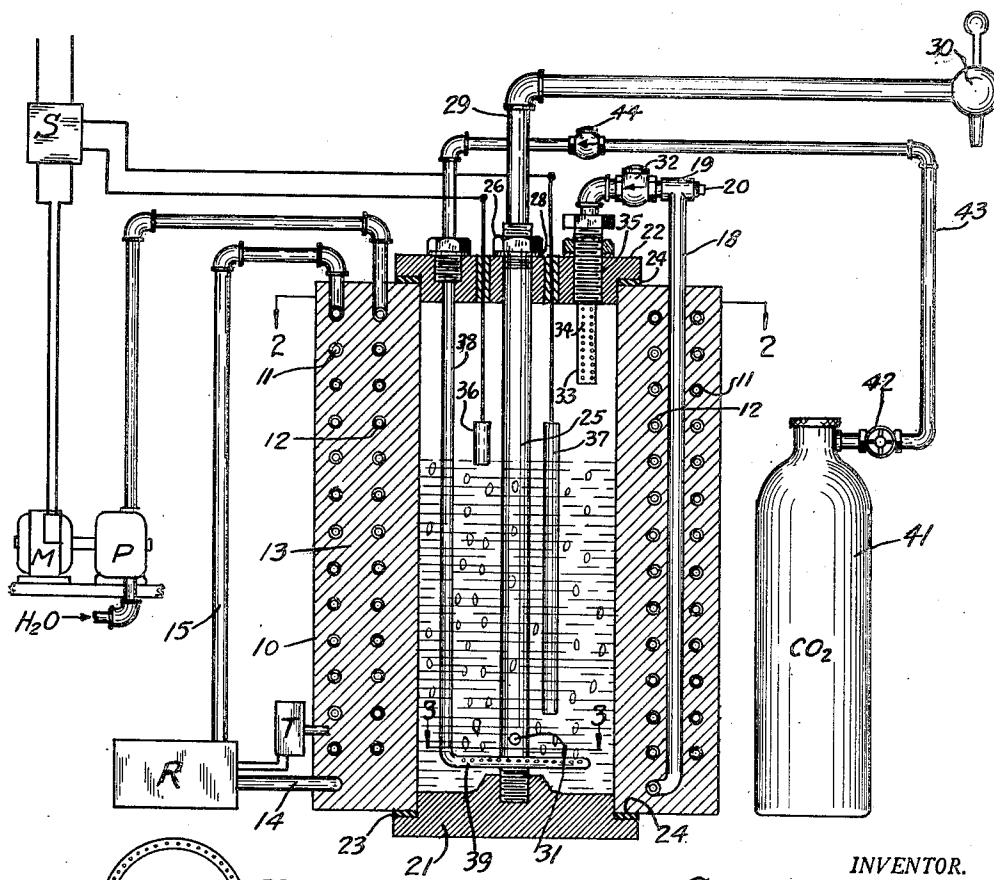


Fig. 1.

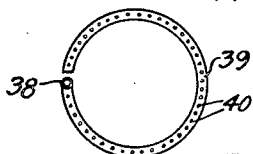


Fig. 3.

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LIQUID CARBONATOR

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2 Claims. (Cl. 261-11)

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This invention relates to improvements in liquid carbonators and more particularly to a carbonator which utilizes a conventional water cooler as an essential part of its construction.

Certain water coolers are available which are formed as cylindrical shells, the water cooling coil and the refrigerating coil being arranged in heat exchange relationship between the inner and outer walls of the shell. In this type of cooler the cylindrical space within the shell serves no useful purpose, although it is a necessary incident of construction for the optimum efficiency of the water cooler.

One of the principal objects of the invention, therefore, is to provide a water carbonator which is so constructed that the otherwise wasted space of a shell type water cooler is utilized to house the carbonator.

Another object is to provide a combined water cooler and water carbonator which has approximately the same outside dimensions as a water cooler alone.

Another object is to utilize the inside wall of a shell type water cooler as a container wall for the carbonator.

A further object is to provide an apparatus which may be associated with a water cooler in such manner that the combined apparatus serves the purpose of both a water cooler and a carbonator.

Another object is to improve the efficiency of a water cooler by associating a carbonator therewith.

Further objects are to provide a carbonator which is simple in construction, readily and economically manufactured, automatic in operation, and easily serviced.

Still further objects will become more apparent from a consideration of the description to follow, the appended claims, and the accompanying drawing in which:

Figure 1 is a vertical section of a preferred embodiment taken on line 1-1, Figure 2;

Figure 2 is a section taken on line 2-2, Figure 1; and

Figure 3 is a section taken on line 3-3, Figure 1.

Referring in detail to the drawing, there is shown a shell type water cooler 10, which contains within the shell, a refrigerant coil 11 and a water coil 12. These coils are constructed of copper, or other material, and are embedded in a solid aluminum shell 13, by casting the aluminum around the preformed coils suitably supported in a mould. The ends of the refrigerant coil 11 are connected by suitable pipes 14 and 15 to a re-

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frigerant supply unit R and the temperature of the shell is maintained as desired by a suitable thermostat control T. A pump P supplies water to coil 12 which is cooled in the shell heat exchanger and delivered to outlet pipe 18. This pipe is normally connected to a tap or drinking fountain, a suitable control (not shown) operating the pump P in accordance with the requirements for cold water. Since the structure so far described is conventional and forms no part of the invention per se, certain of these well known details have been omitted in the interests of clarity and the pipe 18 is shown with a T 19 one side of which is plugged at 20, the plugged end normally being connected with the tap or drinking fountain.

The carbonator to be described utilizes either a portion of the cold water delivered by the heat exchanger or all of such water, if no cold water is desired. It will be understood that if only a portion of the water is carbonated, a suitable pipe will be connected from T 19 to the tap. As shown, however, this is omitted and all of the cold water is delivered to the carbonator to simplify the disclosure.

The carbonator reservoir is formed by a lower plug 21 and an upper plug 22 which close the ends of the cylindrical space within the shell 10. These plugs are shouldered at 23 and engage suitable gaskets 24 interposed between the plugs and the ends of the shell 10. An outlet pipe 25 is threaded into the lower plug and passes through a hole in the upper plug. The outer end is also threaded and carries a nut 26 which draws the two plugs toward each other, thus effecting a seal at the gaskets previously mentioned. Pipe 25 is sealed where it passes through the upper plug in any suitable manner such as by gasket 28 beneath nut 26. A pipe 29 is joined to the outer end of pipe 25 and is connected to a suitable tap 30 which delivers carbonated water to any suitable receptacle, such as a drinking glass. To permit entry of carbonated water into pipe 25 an aperture 31 is provided in the lower end thereof.

It is to be noted particularly, that the carbonator structure so far described utilizes the inside wall of the heat exchanger to form the reservoir wall and that the pipe 25 performs the dual function of holding plugs 21 and 22 to the shell and also delivering carbonated water from the reservoir.

Cold water is delivered to the reservoir from T 19, through check valve 32 and spray tube 33. The spray tube is provided with a large number

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of very small holes 34 which atomize the water as it enters the reservoir, the spray thus formed taking into solution carbon dioxide gas which is present above the surface of the liquid in the reservoir. Since these small holes are subject to clogging, the spray tube is made removable from the top of plug 22 by the threaded connection 35 so that the holes may be cleaned or the spray tube replaced.

To regulate the quantity of liquid in the reservoir a pair of electrodes 36 and 37 are provided, the difference in levels between the bottoms of these electrodes determining the difference in levels of the liquid in the reservoir. These electrodes are connected by wires passing through suitable insulation in plug 22 to a "Warwick" switch S which controls motor M which drives water pump P. When the water in the reservoir falls below the level of the lower end of electrode 37, the pump is actuated and supplies water to the reservoir until it rises to electrode 36, at which time the pump ceases operation. Since the specific circuit features of the level control form no part of the invention per se and are well known in art, detailed description thereof is omitted.

For adding carbon dioxide to the water, a tube 38 is provided, extending through the top plug and terminating at its lower end in a circular pipe 39 having a plurality of small apertures 40 therein which direct carbon dioxide upwardly in the reservoir. The carbon dioxide is supplied to pipe 38 by a cylinder 41 of carbon dioxide, delivery being effected through a suitable pressure regulator valve 42, pipe 43, and check valve 44.

In operation, the refrigerating apparatus R supplies a refrigerant to the shell 13 which is maintained at substantially constant temperature, say 34 degrees Fahrenheit, by thermostatic control T, thus maintaining the water in coil 12 at the same temperature. During initial filling of the carbonator reservoir, water will flow in under pressure of pump P until the water reaches electrode 36 at which time the pump will be shut off. The pressure reducing and regulator valve 42 is adjusted for a predetermined pressure desired in the reservoir and the carbon dioxide gas is bubbled through the water by pipe 39. The space above the carbonated water will also contain gas which comes into intimate contact with the atomized water as it is sprayed through spray pipe 33. When it is desired to use carbonated water tap 30 is opened and carbonated water will be delivered therefrom, the level falling in the reservoir to the end of electrode 37 at which time pump P starts and refills the reservoir to the level of electrode 36, the process of carbonating repeating. If it is desired to also tap uncarbonated water from the cooler, a suitable pipe and tap is connected to T 19 in place of plug 20. The check valve 32 prevents any carbon dioxide from entering this uncarbonated water. The check valve 44 prevents any reverse flow of carbonated water to valve 42 in event the water delivery pressure to the reservoir should exceed the pressure to which the valve 42 is originally set.

As will now become apparent, the apparatus has relatively few and simple parts which may be readily manufactured. The inside wall of the water cooler which normally serves no useful purpose is utilized to form a wall for the carbonator, two simple plugs close the end of the space therein and a single pipe serves to hold the carbonator together and also deliver carbonated water therefrom. By closing the ends of this space, heat loss which would normally occur at

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the inside wall of the cooler shell is eliminated and such heat loss as may occur is limited to the area of the end plugs. This, of course, improves the efficiency of the water cooler by reducing its heat loss area.

While the water cooler has been shown as a right circular cylindrical tube, it will become apparent that cylinders may be employed having elliptical, rectangular, or other cross sectional shapes. The term "cylindrical" as used in the claims is therefore to be given its broadest and most generic meaning and not limited to a circular cylinder. It is also apparent that the shell could be frusto-conical or otherwise tapering between its ends, and that the two ends might otherwise be of different size or cross sectional shape. The space within the shell cooler might also be utilized as a carbonator with reservoirs which utilize a separate wall rather than the shell wall and the entire unit be made as a complete cartridge nestable with the cooler shell. Many other modifications within the spirit of the invention will also become apparent to those skilled in the art, hence, the invention is not to be limited to the precise construction shown except as defined by the scope of the appended claims.

Having described the invention what is claimed as new is:

1. A carbonator apparatus comprising; a water cooler having a solid circular cylindrical metallic shell with a refrigerant and water coil imbedded therein, top and bottom shouldered plugs, each adapted to engage a respective end wall of the shell, whereby a reservoir is formed within the inner wall of the shell, a pipe threadedly engaging the bottom plug centrally thereof and passing through the upper plug centrally thereof, means threadedly engaging the pipe for drawing the plugs toward each other, a carbon dioxide delivery tube extending through the top plug and terminating adjacent the bottom plug, the tube where it terminates being circular and surrounding said pipe and having a plurality of apertures in the circular portion thereof, an electrode sensing device having portions extending through the top plug, a spray pipe extending through the top plug removable from outside the reservoir, means including a pressure reduction valve for supplying carbon dioxide to said delivery tube, a pump for supplying water to one end of said water coil, means including a check valve connecting the other end of said water coil to said water spray tube, means adapted to control the operation of said pump in response to level conditions sensed by said electrodes, means for circulating a refrigerant through said refrigerant coil, and means for controlling the temperature of said shell.

2. A carbonator apparatus comprising; a water cooler having a solid circular cylindrical metallic shell with a refrigerant and water coil imbedded therein, top and bottom shouldered plugs, each adapted to engage a respective end wall of the shell, whereby a reservoir is formed within the inner wall of the shell, a pipe threadedly engaging the bottom plug centrally thereof and passing through the upper plug centrally thereof, means threadedly engaging the pipe for drawing the plugs toward each other, a carbon dioxide delivery tube extending through the top plug and terminating adjacent the bottom plug, the tube where it terminates having a plurality of apertures, an electrode sensing device having portions extending through the top plug, a remov-

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able spray pipe extending through the top plug, means including a pressure reduction valve for supplying carbon dioxide to said delivery tube, a pump for supplying water to one end of said water coil, means including a check valve connecting the other end of said water coil to said water spray tube, means adapted to control the operation of said pump in response to level conditions sensed by said electrodes, means for circulating a refrigerant through said refrigerant coil, and means for controlling the temperature of said shell.

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