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SYSTEM FOR COOLING BEVERAGES

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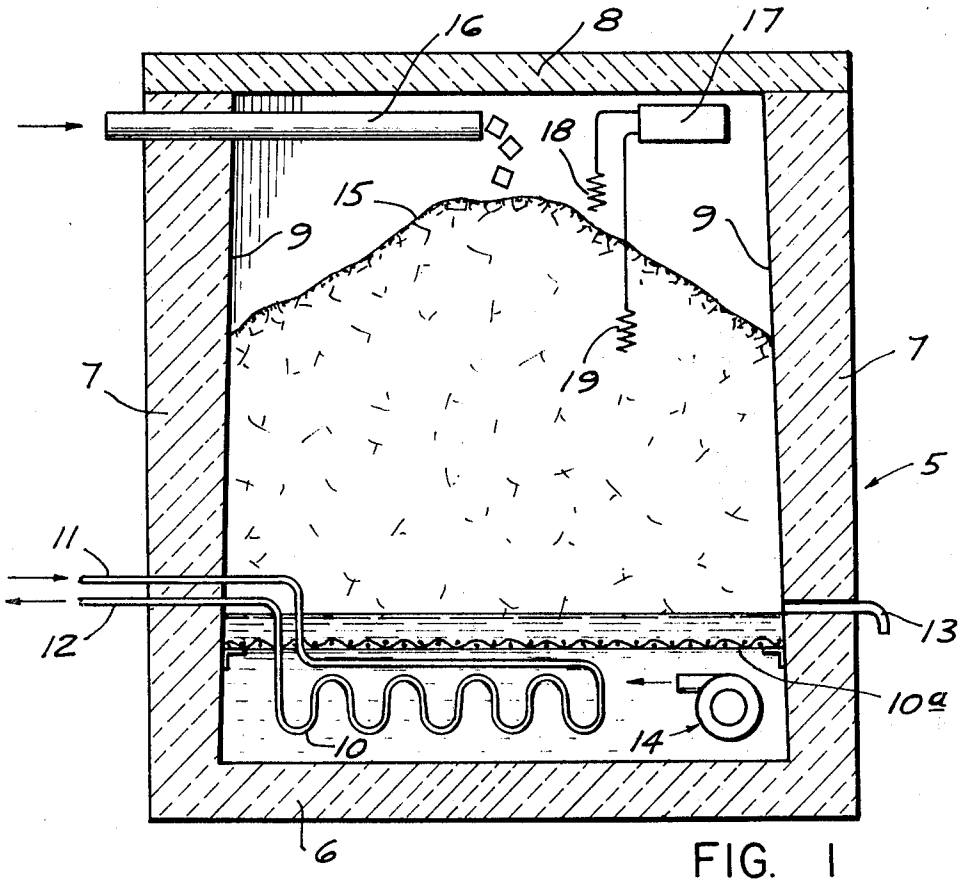


FIG. 1

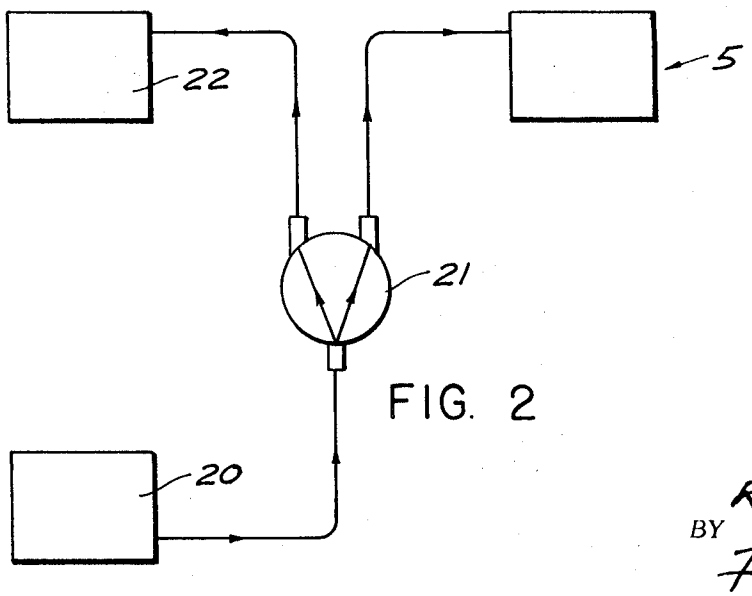


FIG. 2

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SYSTEM FOR COOLING BEVERAGES

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ABSTRACT OF THE DISCLOSURE

Thjs invention is directed to a cooler for post mix carbonated beverages and includes an insulated cabinet for retaining ice and at least one horizontal ingredient cooling coil located adjacent the bottom of the cabinet. The ice rests on a support screen above the coil and progressively melts to form a cold water bath around the coils. Excess water is drained off at a predetermined level above the support screen and the water bath is agitated. Bin level sensors may be used to control admission of ice to the cabinet.

This invention relates generally to new and useful improvements in heat exchangers and particularly seeks to provide a novel system for cooling dispensable beverages, especially those of the carbonated post mix type.

In post mix dispensers carbonated water and a beverage syrup are fed separately to a mixing valve or faucet from which the carbonated beverage is dispensed. It is desirable to cool the ingredients prior to dispensing in order to maintain product quality. If the dispensed drink leaving the faucet is warmer than about 40° F., an undesirable loss of carbonation is likely to occur.

Heretofore, the ingredients generally have been cooled either through the use of a so-called cold plate heat exchanger or a mechanically refrigerated water bath.

A typical cold plate installation may consist of a metal plate, preferably aluminum, into which beverage ingredient cooling coils are embedded. The plate is positioned at the bottom of an insulated ice cabinet and the cabinet is filled with ice from an ice making machine located on the top thereof. The ice serves two purposes, namely, as a supply for consumption in the finished drink and as a coolant by melting through contact with the cold plate.

Although the cold plate has the advantage of low cost, it has several disadvantages, such as bridging of the ice over the cold plate, which greatly reduces the area of contact therebetween and consequently the rate of heat transfer. This prevents the beverage ingredients from becoming sufficiently chilled to avoid loss of carbonation when dispensed. Furthermore, the cold plate has a slow response and takes a long time to reach the desired chilled temperature after having been warm, as at start up or when the ice supply is insufficient.

In a typical mechanically refrigerated water bath the ingredients are pumped through coils that are submerged in a circulating water bath that is cooled by refrigerated coils that are also submerged in the water. Ice is allowed to form on the refrigerated coils in order to provide reserve cooling capacity during periods of peak beverage dispension.

Although this type of water bath can provide reasonably consistent and effective cooling, it has several disadvantages, such as the need for two separate refrigeration systems, one for the water bath and the other for an ice maker to provide ice for consumption. Furthermore, a significant percentage of the refrigeration load is created by heat leakage from the circulating water through the walls of the insulated water tank.

The cooling system of this invention retains the advantages of such prior systems and overcomes the disadvantages thereof.

Therefore, an object of this invention is to provide a novel cooler for beverage ingredients in which the ingredients are pumped through coils submerged in a circulating shallow chilled water bath at the bottom of an insulated cabinet carrying a supply of ice that progressively melts to supply the chilled water for the bath.

Another object of this invention is to provide a cooler of the character stated in which the ice is intermittently supplied to the cabinet from an ice maker operating from bin level controls in the cabinet to maintain the ice levels within a predetermined range, the minimum of which will always leave a sufficient amount of ice to provide the necessary cooling of the ingredient coils.

Another object of this invention is to provide a cooler of the character stated in which the ice is supported by a horizontal grid or coarse mesh screen positioned slightly above the beverage coils so that substantially only water circulates around the coils.

Another object of this invention is to provide a cooler of the character stated in which the water from melted ice is maintained at a predetermined level above the horizontal screen by a drain positioned at the desired water level.

Another object of this invention is to provide a cooler of the character stated that includes means for agitating or circulating the cooling water.

A further object of this invention is to provide a cooler of the character stated in which the insulated side walls of the cabinet diverge downwardly whereby to prevent the ice from bridging.

A further object of this invention is to provide a system for cooling post mixed carbonated beverages in which a single ice maker divertably supplies cooling ice to the cooler and consumer ice to a separate insulated storage cabinet with bin level controls for both of the cooling and storage units.

A further object of this invention is to provide a cooler of the character stated that is simple in design, rugged in construction and economical to manufacture.

With these and other objects, the nature of which will be apparent, the invention will be more fully understood by reference to the drawing, the accompanying detailed description and the appended claims.

In the drawing:

FIG. 1 is a partly schematic longitudinal vertical section of a beverage ingredient cooler constructed in accordance with this invention; and

FIG. 2 is a schematic diagram showing how the cooler can be incorporated into a consumer ice and cooler ice system in which the cooler and a separate ice storage unit may be selectively supplied with ice from a single ice making machine through a two position ice diverter valve.

Referring to the drawing in detail, the invention, as illustrated, is embodied in a beverage cooler generally indicated **5** that includes a cabinet having an insulated bottom **6**, insulated side walls **7** and a removable insulated top **8**. The inner faces **9** of the side walls **7** diverge downwardly from top to bottom to avoid bridging of ice contained within the cabinet.

The desired number of ingredient cooling coils **10** are horizontally disposed adjacent to or on the bottom **6** of the cabinet with their inlets **11** and outlets **12** extending through one side wall **7**. An ice-supporting horizontal grid or coarse mesh screen **10***a* is positioned slightly above the tops of the coils **10**.

A water drain **13** extends through one side wall **7** and is located at a height above the bottom **6** to maintain

a water bath in the bottom of the cabinet just sufficiently deep to cover the screen **10***a*. A pump or other agitator generally indicated at **14** is provided to circulate the water of the bath.

Ice **15** is supplied to the interior of the cabinet through an inlet pipe **16** and a bin level control **17**, having an upper sensor **18** and a lower sensor **19**, maintains the ice supply within a predetermined range. Fresh ice is supplied when the ice level reaches the lower sensor **19** and the supply is stopped when the ice level reaches the upper sensor **18**. In this manner, a substantial quantity of ice is always maintained within the cabinet and provides adequate cooling capacity for the coils **10** even under conditions of peak demand for the beverage ingredients.

The ice is supported by the screen **10***a* and, as it progressively melts, the resultant 32° F. water rises to the level of the drain **13** through which additional water from the melting ice is removed. Thus, the ice is always in contact with the circulating water and can maintain the desired 32° F. temperature thereof. As the circulating water melts the ice on the screen **10***a*, the mass of ice progressively settles and more of it is lowered into the upper part of the water bath above the screen for continued cooling.

As mentioned above, when the ice mass becomes sufficiently lowered that its top reaches the level of the lower bin sensor **19**, additional ice is supplied until the level is restored to that of the upper sensor **18**.

Although it is possible to use the ice in the cooler for both cooling and consumer purposes, it is considered preferable to provide a separate storage unit for consumer ice for improved sanitation and to make more efficient use of the associated ice making machine. This can be best accomplished if dice ice, such as that produced by the apparatus of U.S. Pat. No. 3,371,505, of Mar. 5, 1968, is used because that type of ice can be readily transported through pipes and can be diverted from one receiver to another.

FIG. 2 of the drawings schematically illustrates an arrangement for this type of system in which the output from a dice ice maker **20** is directed through a two position diverter valve **21** either to the cooler **5** or to a consumer storage unit **22**. In such an installation the diverter valve **21** preferably should be of the type disclosed and claimed in U.S. patent application Ser. No. 816,248, filed Apr. 15, 1969.

Such a system may be controlled in a variety of ways, such as an automatic or preferential demand control for the cooler **5**, followed by an automatic switchover to the storage unit **22** until it is filled; or the diverter valve **21** may be automatically controlled with respect to the cooler and manually controlled with respect to the storage unit; or the whole system may be manually controlled, in which case the bin level controls will serve only as level indicators.

When the cooler **5** is to be used specifically in a post mix carbonated beverage system, it must contain at least two of the cooling coils **10**, one for carbonated water and the other for beverage syrup. Furthermore, the cooler **5** is particularly well suited to a post mix system such as that disclosed in pending patent application Ser. No. 708,087, filed Feb. 26, 1968.

It is of course to be understood that variations in arrangements and proportions of parts may be made within the scope of the appended claims.

I claim:

1. A cooler for liquids including a cabinet having a bottom and side walls extending upwardly therefrom and defining an ice-receiving chamber, a horizontally disposed cooling coil located within said chamber adjacent the bottom thereof and through which a liquid to be cooled may be circulated, the inner surfaces of said side walls diverging from top to bottom whereby to prevent any ice deposited within said chamber from bridging over said coil, and a drain extending through a side wall at a height sufficient to establish a water level within said chamber higher than the top of said cooling coil whenever ice deposited in said chamber melts.

2. A cooler for liquids including a cabinet having a bottom and side walls extending upwardly therefrom and defining an ice-receiving chamber, said bottom and side walls being insulated, means for supplying ice to said chamber, a horizontally disposed cooling coil located within said chamber adjacent the bottom thereof and through which a liquid to be cooled may be circulated, a drain extending through a side wall at a height sufficient to establish a water level within said chamber higher than the top of said cooling coil whenever ice deposited in said chamber melts, a horizontal perforate ice support positioned above said cooling coil but below said drain, means for circulating any water present in the bottom of said chamber below the level of said drain, and control means for sensing, at upper and lower vertically separated locations, the corresponding heights of ice that has been deposited within said chamber and for initiating a fresh supply of ice when the ice height within said chamber has been reduced to correspond to the lower of said sensing locations and for stopping the supply of ice when the ice height within said chamber has been raised to correspond to the upper of said sensing locations.

3. The cooler of claim **2** in which the inner surfaces of said side walls diverge from top to bottom whereby to prevent any ice deposited within said chamber from bridging over said coil.

4. The cooler of claim **2** additionally including a separate ice storage unit, an ice diverter valve for directing ice either to said cooler or to said storage unit and operably connected thereto, and an ice making machine for supplying ice to said diverter valve and operably connected thereto.

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MEYER PERLIN, Primary Examiner

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62—344, 399, 400