March 14, 1939. M. A. MARTIN 2,150,233

REFRIGERATING SYSTEM AND APPARATUS

Filed Nov. 18, 1936

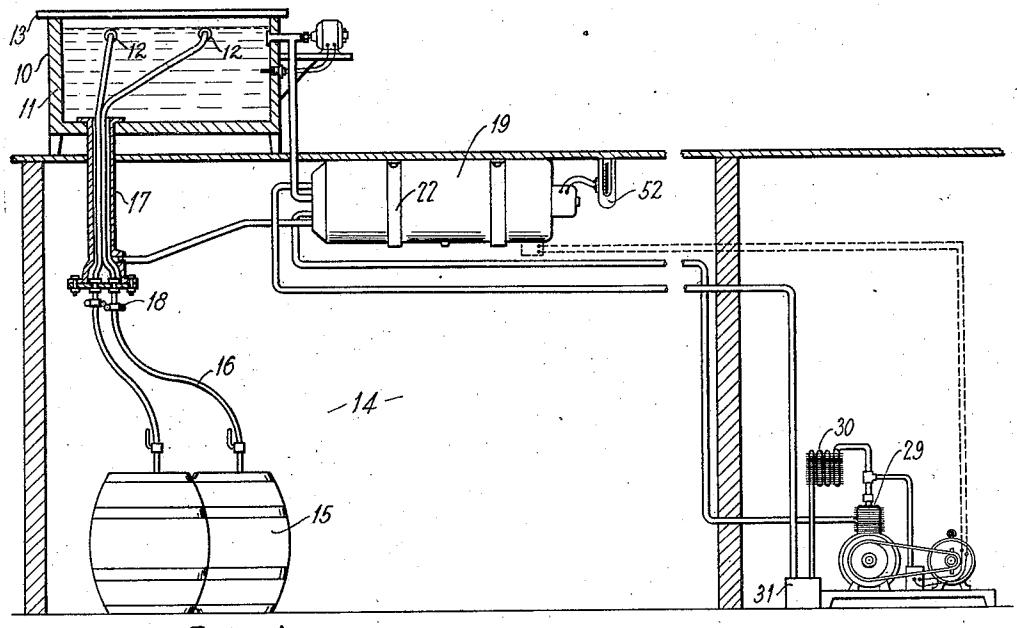


FIG. 1

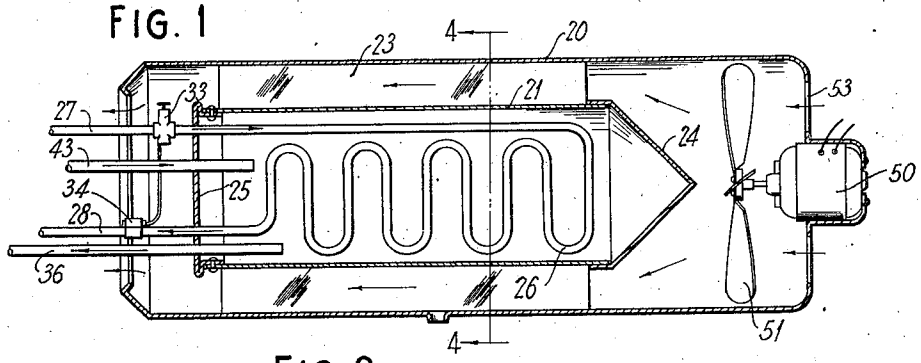


FIG. 2

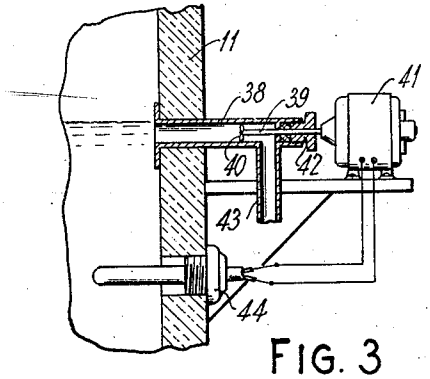


FIG. 3

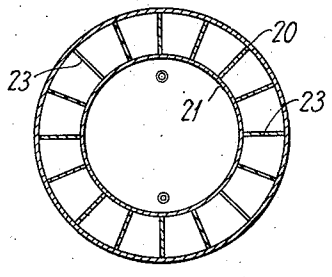


FIG. 4

INVENTOR,
Michael A. Martin.
BY Slough & Canfield.
ATTORNEY.

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REFRIGERATING SYSTEM AND APPARATUS

Michael A. Martin, Erie, Pa.

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7 Claims. (Cl. 62—141)

This invention relates to cooling systems for beverages, and more particularly to cooling beverage dispensers and pre-cooling beverage containers disposed at a point remote from the dispensers by a single unit.

It is well known that a beverage such as beer must be stored in a relatively cool place. For this reason, together with the inconvenience and the lack of available space adjacent the dispensing apparatus, the beer is usually stored at a remote point such as another room, maintained at a lower temperature than that of the bar. The storage room is usually in the basement of a building, and although ordinarily cooler than the bar, the temperature cannot be maintained below a desired predetermined value without some type of cooling apparatus. This necessitates separate cooling means for the storage room and the dispenser at the bar.

I have provided a single unit adapted to cool both the storage room for the beverage containers and the beverage dispenser. Additionally, I provide a relatively large supply of cooling liquid at a relatively low temperature adapted to be circulated through the dispenser, and due to the pre-cooled condition of the beverage or beer, together with the supply of cold liquid quickly available a considerable quantity of beer may be drawn substantially continuously for a considerable period, without a rise in temperature of the beer above a desired level.

This can be effected without the customary coils or drums through which the beverage passes in the dispenser, but merely a straight length of conduit may be employed, permitting greater ease in cleaning the beverage conduit by a brush or the like, and enlarging the space available in a given size dispenser for cooling liquid.

The temperature of the storage room and the temperature of cooling liquid in the dispenser, may be independently controlled, whereby the temperature of the cooling liquid may be substantially maintained at a desired withdrawal temperature for the beer in order to be most palatable, such as 40° Fahrenheit, and the temperature of the beverage containers may be maintained at a temperature somewhat lower.

It is an object of my invention, therefore, to provide a cooling system and apparatus adapted to concurrently cool a beverage dispenser and beverage containers disposed at a point remote from the dispenser in a walk-in storage room.

Another object of my invention is to provide a cooling system and apparatus adapted to cool a beverage dispenser and a storage room remote from the dispenser, within which are disposed beverage containers, and wherein means are provided to independently control the temperature of cooling liquid within the dispenser and the storage room temperature.

Another object of my invention is to provide a cooling system and apparatus wherein a beverage dispenser and beverage containers at a point remote from the dispenser are employed, adapted to pre-cool the beverage prior to entering the dispenser and eliminating the necessity of beverage coils or drums within the dispenser thereby providing relatively greater space for the circulation of cooling liquid through the dispenser.

Another object of my invention is to provide a cooling system and apparatus for a beverage dispenser adapted to pre-cool the beverage prior to entering the dispenser and eliminating the necessity for an evaporator unit, and beverage coils or the like within the dispenser, whereby a beverage conduit interconnecting the container and dispenser may be easily cleaned.

Another object of my invention is to provide a unit adapted to beverage cooling systems, whereby a relatively large supply of cooling liquid is available for the dispenser and the temperature of a walk-in storage room for beverage containers is maintained below a predetermined value through circulation of air in heat exchange relation with said supply of cooling liquid.

Other objects of my invention and the invention itself will become increasingly apparent from a consideration of the following description and drawing, wherein:

Fig. 1 is a diagrammatic view of beverage dispensing apparatus embodying my invention;

Fig. 2 is a longitudinal sectional view on an enlarged scale of a cooling unit illustrated in Fig. 1;

Fig. 3 is an enlarged fragmentary view of a circulator unit which I may employ and

Fig. 4 is a section taken along the line 4—4 of Fig. 2.

Referring now to the drawing, and more particularly to Fig. 1, I have illustrated generally at 10 a dispenser located in a bar or the like, and comprising a conventional box-shaped and heat-insulated cabinet 11, provided with conventional dispensing nozzles 12. The usual removable cover 13 is provided permitting access to the interior of the dispenser when necessary for cleaning the beverage conduits, or for supplying ice to the dispenser in the event of a temporary shut-down of the cooling apparatus.

For purpose of illustration, I have shown a walk-in storage room generally indicated at 14, located directly beneath the room in which the dispenser is disposed, but it is understood that the relative location of the bar and storage room is immaterial although a relatively lower temperature is normally maintained in the storage room than in the bar. Within the storage room one or more beverage containers or barrels 15 may be located, with conduits indicated at 16 extending upwardly and projected through the dispenser base to connect with the nozzles 12. The bever-

age is elevated to the dispensing nozzles by gas pressure within the containers 15, in the usual manner.

A relatively large pipe 17 mounted in the dispenser base and projected through the floor separating the bar and storage room is adapted to encase the beverage conduits 16 preferably for a major portion of their length. In a manner to be later described, cooling liquid will be passed through the pipe 17 whereby the portion of the beverage conduits 16 disposed therein will be maintained cool when passing through the relatively warmer upper air of the storage room.

Although the pipe 17 is illustrated as of relatively short length, it may be of considerable length, dependent upon the location of the beverage containers relative to the dispensers. The conduits 16, externally of the pipe 17, are preferably provided with suitable heat insulating material such as sponge rubber tubing.

It will be noted that due to the absence of the usual coil or drum through which the beverage travels in passing through the dispenser, that a substantially rectilinear or gradually curved form of beverage conduit is provided whereby the beverage conduit may be disconnected externally of the pipe 17 by a coupling 18, and a long brush or the like projected through the conduit to remove undesirable sedimentation formed on the conduit inner walls.

The regularity and degree of cleaning of the beer or beverage conduits is a major factor in rendering beer properly palatable and I have found that liquid cleaning agents for this purpose are unsatisfactory as compared to mechanical means, such as a brush.

Also located within the storage room 14 and preferably mounted on the ceiling thereof is a cooling unit, generally indicated at 19 comprising an outer generally cylindrical shell 20 and an inner generally cylindrical tank 21.

The outer shell 20 may be mounted in any suitable manner as by straps 22 encircling the shell and secured to the storage room ceiling. The inner tank 21 is supported in co-axial relation to the outer shell by a plurality of longitudinally extending radial fins 23 suitably secured along their edge portions to the shell and tank by welding or similar means. The fins 23 are formed of any suitable material having high heat conductivity.

The tank 21 is provided with a preferably conical end 24 and a perforated planar end 25 and disposed within the tank is an evaporator 26 of any suitable form having refrigerant supply and return conduits 27 and 28 projected through the tank end 25. The supply conduit 27 extends from a conventional compressor unit 29 through a condenser 30 and liquid receiving tank 31 to an expansion valve 33. The return line 28 leads back to the compressor unit 29.

The valve 33 is thermally responsive and comprises a capillary tube 34 contacting the return conduit 28 whereby upon a rise of evaporator temperature above a predetermined value, the back pressure of the refrigerant medium in the evaporator will be increased and correspondingly lower the evaporator temperature. A conventional automatic pressure control on the condenser unit controls the operation of the compressor motor in a well known manner to maintain a desired pressure and temperature in the refrigerant system.

The tank 21 is filled with a cooling liquid, such as water or brine, and the temperature of the cooling liquid in the tank will be substantially that of the evaporator and will be maintained below a predetermined value through regulation of the evaporator temperature as previously described.

Leading from the tank 21 is a cooling liquid supply line 36 which connects with a lateral port provided in the pipe 17 permitting cooling liquid to pass from the tank 21 to the dispenser. The liquid level in the dispenser is preferably maintained above the dispensing nozzles whereby beverage will be maintained cool up to the point of withdrawal through the nozzles 12.

Although I have illustrated the operation of the compressor as being controlled by an automatic pressure control valve, I contemplate that this may be dispensed with, and the operation of the compressor motor controlled by switch means thermally responsive to the temperature of the cooling liquid in tank 21.

The manner of effecting circulation of the cooling liquid through the system will now be described. A tube 38 is projected through the side wall of cabinet 11 adjacent the level of the cooling liquid therein, and has a shaft 39 projected thereinto upon the end of which is mounted an impeller 40. The shaft 39 is actuated by a motor 41 and a liquid seal of the shaft 39 relative to the tube 38 is effected by a stuffing-box arrangement 42. A return line 43, leading from the tube 38 to the tank 21 permits the return of cooling liquid to the tank.

The motor 41 is actuated by a thermally responsive switch 44 of any suitable form, but which is illustrated as a tube projected into the cooling liquid within the dispenser. The motor is adapted to actuate the impeller and cause circulation of relatively colder liquid from tank 21 through the dispenser upon a rise in temperature of the cooling liquid within the dispenser above a predetermined value. Thus, a relatively large supply of cooling liquid may be maintained in the tank 21 at a low temperature such as 20° Fahrenheit and the dispenser cooling liquid temperature may be maintained at 40° Fahrenheit, and this reserve supply enables a considerably greater quantity of beer or the like to be drawn through the dispenser for a long period while maintaining the beverage temperature below a desired point.

The conventional method of disposing the evaporator in a dispenser only permits of the heat exchange capacity of the cooling liquid in the dispenser to be utilized, necessitating a large capacity compressor for peak loads, and resulting in inefficient intermittent operation, since if the temperature of the cooling liquid in the dispenser is lowered too rapidly and to too low a value, the beer in the beverage conduits within the dispenser is liable to freeze. This problem is not encountered insofar as the temperature of the cooling liquid in tank 21 is concerned.

Thus, a relatively small capacity compressor may be employed in my system, and run substantially continuously, resulting in increased efficiency.

The manner of maintaining the temperature in the storage room below a predetermined value will now be described. One end of the shell 20 has a motor 50 mounted therein which operates a fan 51 responsive to the temperature of the storage room 14, under the control of a thermal responsive switch of any suitable type, indicated at 52. Actuation of the fan 51 is adapted to draw air through perforations indicated at 53

provided in an end of the shell 20, and force the air over the tank 21 and intermediate the fins 23, whereby it will be cooled, due to the high heat conductivity of the fins 23 and their resultant high heat exchange capacity. The air thus cooled will drop to the floor of the storage room 14 displacing warmer air which will be drawn through the perforations 53 to maintain the room temperature below a predetermined value.

It will be noted that the room temperature control is independent of the dispenser cooling liquid temperature control, and that the temperature of the cooling liquid within tank 21 will provide proper cooling for controlling both temperature limits.

Although I have shown and described a preferred embodiment of my invention, I contemplate that numerous and extensive departures may be made therefrom without departing from the spirit of my invention and the scope of the appended claims.

I claim:

1. A cooling unit adapted to provide a supply of cooling liquid for a beverage dispenser and to control temperature within a beverage storage room, said unit comprising a tank adapted to contain cooling liquid, heat exchange means within the tank adapted to maintain the liquid below a predetermined temperature, conduit means adapted to transmit the cooling liquid from the tank to the dispenser, and means for circulating air in the room over the tank to cool the air, comprising guide means directing the air in heat exchange relation with the tank and fan means directing air through the guide means.

2. The combination with a beverage dispenser adapted to contain cooling liquid, of a unit adapted to be disposed in a beverage storage room, said unit comprising a tank adapted to contain cooling liquid, heat exchange means within the tank adapted to maintain the liquid below a predetermined temperature, conduit means interconnecting the dispenser and tank whereby liquid may be transmitted therebetween, circulating means associated with the conduit means adapted to effect circulation of relatively cold liquid from the tank to the dispenser responsive to the temperature of cooling liquid in the dispenser, and means for circulating air in the storage room over the tank to cool the same responsive to the air temperature comprising guide means directing air in heat exchange relation with the tank and fan means for circulating air through the guide means.

3. The combination with a cooling unit adapted to be disposed in a beverage storage room, of a beverage dispenser disposed at a remote point and adapted to contain a cooling liquid, the unit comprising a tank adapted to contain cooling liquid, heat exchange means associated with the tank adapted to maintain the liquid therein below a predetermined temperature, said temperature being substantially lower than the normal temperature of the cooling liquid in the dispenser, conduit means interconnecting the tank and dispenser, circulating means operably responsive to the temperature of cooling liquid in the dispenser to force relatively colder liquid from the tank to the dispenser, a shell encircling said tank and spaced therefrom, and fan means associated with the shell adapted to force air intermediate the tank and shell responsive to storage room temperature.

4. The combination with a storage room having a beverage container therein, a beverage dispenser disposed externally of the storage room, and a beverage supply line extending from the container to the dispenser, of a conduit communicating with the dispenser and extending therefrom a substantial distance into the storage room in encircling relation to the supply line, a cooling liquid supply tank in the storage room, means for maintaining the liquid in the supply tank below a predetermined temperature, means for transmitting cooling liquid from the supply tank to the conduit whereby the beverage supply line may be cooled prior to the cooling liquid entering the dispenser, return means including pump means for transmitting cooling liquid from the dispenser to the supply tank, a shell encircling the supply tank in spaced relation, and fan means operable responsive to storage room temperature for circulating air intermediate the supply tank and shell.

5. A cooling unit adapted to provide a supply of cooling liquid for a beverage dispenser and lower temperature within a beverage storage room, said unit comprising a tank adapted to contain cooling liquid, heat exchange means associated with the tank and adapted to maintain the liquid below a predetermined temperature, conduit means adapted to transmit the cooling liquid from the tank to the dispenser, guide means adapted to direct storage room air in heat exchange relation with the tank, and fan means directing storage room air through the guide means operably responsive to the storage room temperature.

6. The combination with a storage room having a beverage container therein, a beverage dispenser disposed externally of the storage room, and a beverage supply line extending from the container to the dispenser, of a conduit communicating with the dispenser and extending therefrom a substantial distance into the storage room in encircling relation to the supply line, a cooling liquid supply tank in the storage room, means for maintaining the liquid in the tank below a predetermined temperature, means for transmitting cooling liquid from the supply tank to the conduit whereby the beverage supply line may be cooled prior to the cooling liquid entering the dispenser, return means including pump means for transmitting cooling liquid from the dispenser to the supply tank, the pump means being operably responsive to cooling liquid temperature, guide means adapted to direct air in heat exchange relation to the tank, and fan means for directing air to the guide means.

7. A unit adapted to maintain air temperature in a room within which it is disposed below a pre-determined value to pre-cool a liquid thereby and to further cool said liquid at a point remote from the room by a cooling liquid, said unit comprising a tank adapted to contain liquid, heat exchange means associated with the tank adapted to maintain the cooling liquid therein below a pre-determined temperature, conduit means associated with the tank to transmit said cooling liquid to the remote point, a shell encircling the tank and co-axial therewith but spaced therefrom, high heat conductivity fins extending longitudinally of the tank interconnecting the tank and shell and fan means adapted to circulate air over the tank and intermediate the fins to cool the same.

MICHAEL A. MARTIN.