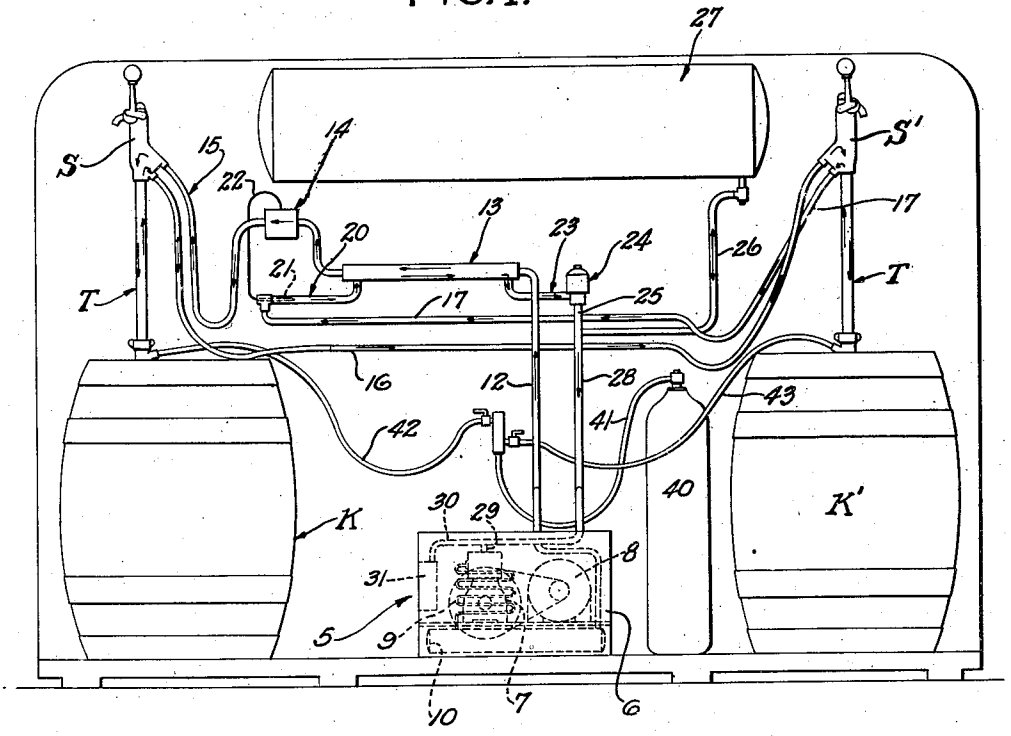
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COOLING SYSTEM

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FIG. 1.



INVENTOR.
Carl L. Daun

BY John W. Michael
ATTORNEY.

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FIG. 2.

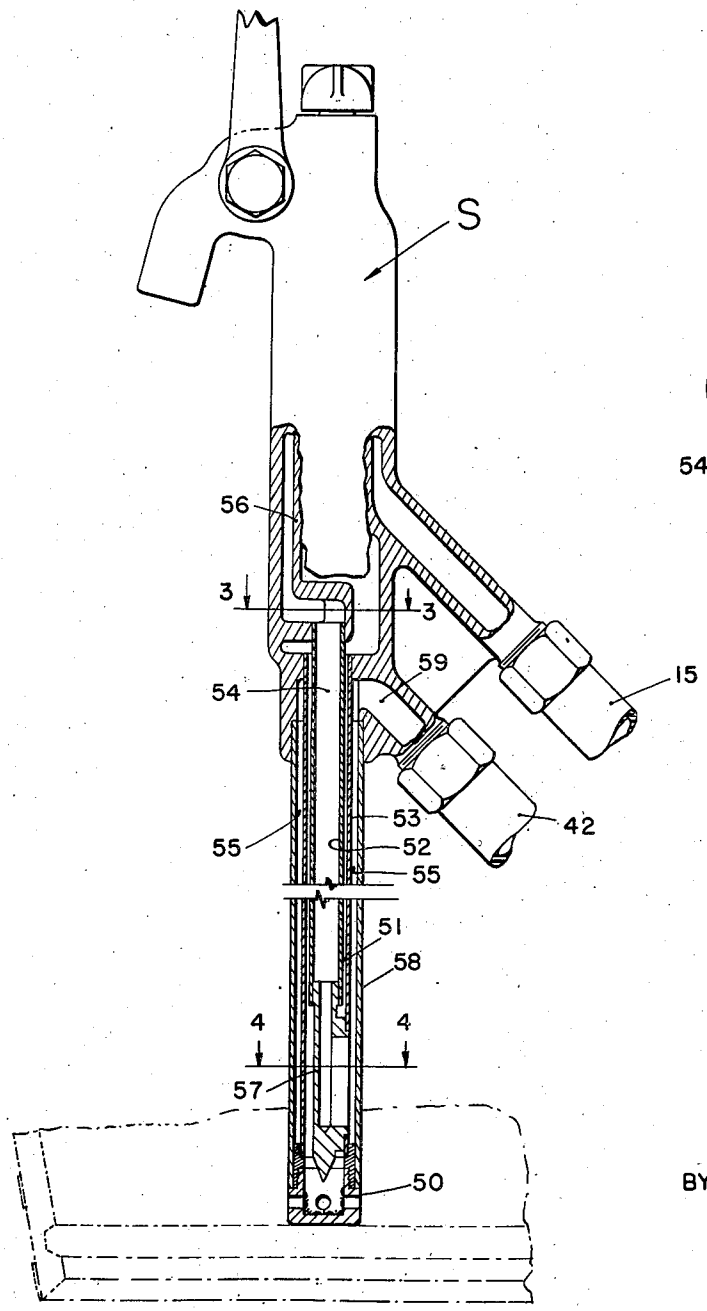


FIG. 3.

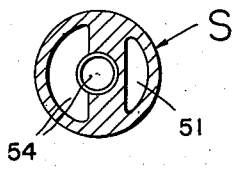
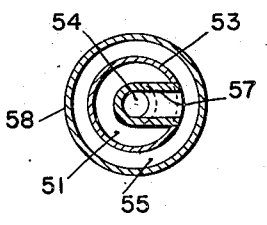


FIG. 4.



INVENTOR

CARL L. DAUN

BY John W. Michael

ATTORNEY

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2,367,340

COOLING SYSTEM

Carl L. Daun, Milwaukee, Wis., assignor to Chill-Quick Corporation, a corporation of Wisconsin

Application February 17, 1940, Serial No. 319,438

2 Claims. (Cl. 225—1)

This invention relates to a cooling and refrigerating system especially designed for use in cooling and dispensing carbonated beverages, such as beer, although also adapted for other advantageous uses and applications.

One of the objects of the present invention is to provide a cooling and refrigerating system of this character, which is simple and compact in construction, highly efficient and noiseless in operation, and easy and comparatively inexpensive to manufacture, and install and maintain.

The present invention proposes to combine in the cooling system one or more tap rods of the character described in my patent for a Dispensing device No. 2,302,008. Such tap rods are inserted through tap bushings in the head of the beer barrel or keg, and extend down through the beer to a low point in the barrel or keg. When the tap rods are constructed as described and claimed in said application, they not only have a passageway therethrough for the beer, but also have passageways therein and substantially throughout their length through which the refrigerant is circulated. The passageways for the refrigerant are in heat interchanging relation with the beer flowing through its passageway in the tap rod, and with the beer in the keg or barrel. Due to dimensional limitations the passageways in the tap rod through which the refrigerant flows are necessarily limited or restricted.

Another important object of the invention is to insure circulation of the refrigerant through the restricted passageways through the tap rod, and to accomplish this in such a way as to obtain a uniform and highly efficient cooling action.

A further object of the invention is to so constitute and organize the elements of the system as to minimize the frequency of operation of the cooling unit of the system. More specifically, the motor-driven compressor and the motor-driven fan for the cooling coils or condenser of the cooling unit are not continuously turned on and off but are required to operate only at rather widely spaced intervals.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts, which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a diagrammatic view in elevation showing an installation of a cooling and refrigerating system embodying the present invention adapted for cooling and dispensing beer;

Figure 2 is a fragmentary view partly in diagrammatic, vertical section and partly in side elevation showing the tap rod of the type adapted for use as an element to assist in embodying the present invention; and

Figures 3 and 4 are views in transverse cross section taken on lines 3—3 and 4—4, respectively, of Figure 2.

The installation shown in the drawings is designed for cooling beer in and dispensing beer from two kegs, designated at K and K'. Each keg is provided with its own tap rod, designated generally at T and T', the tap rods having dispensing spouts or faucets S and S' at their upper ends. The tap rods T and T' are of identical construction, and are of the refrigerated type, in that they not only have passage through which the beer flows to the dispensing faucet or nozzle, but also have passages therein and therethrough for the refrigerant, which is in heat interchanging relation with the beer being dispensed and with the beer in the keg. The specific construction of these tap rods is fully shown and described and claimed in my application for "Method and means for cooling liquids," filed October 8, 1939, Serial No. 299,933, and reference is made to the said application to supplement the disclosure of the present case. As illustrated in Figures 2, 3, and 4, however, it will be seen that such a tap rod is provided at its lower end with an inlet tip **50**, the interior of which communicates with a beer passage **51** formed between the tubes **52** and **53**. The passages for the refrigerant are designated at **54** and **55**, the refrigerant passages **54** being defined not only by the interior of the tubes **52**, but also by suitable wall structure **56** in the body of the faucet so that its passages are in communication with the refrigerant pipe line **15** at its upper end. The lower end of the passage **54** connects by means of the cross-over **57** with the outer refrigerant passage **55**, which is defined by the intermediate tube **53** and the outer casing or tube **58** of the tap rod. The upper end of this outer refrigerant passage **55** is extended through the lower ported or hollow portion **59** of the faucet so as to communicate with the refrigerant pipe line **42**. The particular details of the construction of the tap rod are of no importance in connection with the present invention save that this type of tap rod is such that it is adapted to be insertable through a standard tap bushing in the head of the beer barrel, that it has a discharge conduit therethrough for the beer, and has passageways extending through the rod for substantially the full length thereof and in heat

interchanging relation with said beer conduit and that the passageways, due to the small outside diameter of the tap rod and its short length, have a very small total volume in which the refrigerant may vaporize.

The refrigerating system embodying the present invention includes a cooling unit, designated generally at 5, which may have a suitable housing 6 enclosing a compressor 7, driven by an electric motor 8. Also embodied in the cooling unit is a suitable form of condenser which usually takes the form of a cooling coil, diagrammatically shown at 9, and completed by a conventional compressor motor driven cooling fan (not shown). The refrigerant, which may be Freon, or any of the liquids in common use and suitable for the purpose, after being compressed in the compressor and cooled in the cooling coils or condenser, is delivered in liquid form to the tank or receiver 10. From the tank or receiver 10, a pipe line 12 leads through the conventional heat interchanger 13 to an expansion valve 14 of any suitable construction. A pipe line 15 connects the expansion valve 14 to the inlet side of the refrigerating conduit or passage through the tap rod faucet, structure S, T. The discharge side of the conduit or passageway through the rod faucet S, T connects with a pipe line 16, which, in turn, leads to the inlet side of the refrigerant conduit or passageway through the faucet rod structure S', T'. A pipe line or conduit 17 leads from the discharge side of a refrigerating passage or conduit of the faucet rod structure S', T' through the other pathway through the heat exchanger 13. Thus the two refrigerated tap rods T and T' are connected up in series with the compressor. Due to this connection the refrigerant must flow through both taps. There need be only one expansion valve and regulator valve incorporated in the system. In such a system the warmer barrel will get the full benefit of the heat-absorbing power of the refrigerant. If the tap rods were connected in parallel, the refrigerant would tend to flow only through the rod inserted in the cooler barrel, and hence the warmer barrel would not be cooled.

The point where the pipe line 17 communicates with the heat exchanger 13 corresponds, generally speaking, to the suction side of the evaporator coil of the system. For this reason it is especially constituted in any suitable way, as diagrammatically illustrated at 20, to receive the thermo bulb 21 connected by means of the capillary tube 22 to the expansion valve 14 in the usual manner. It is not essential to the operation of the thermal bulb that it be inserted in the pipe line at 20. It may be clamped in surface-to-surface contact with the pipe line and still be operative particularly if adjustments are made in the superheat factor of the bulb as is customarily known to those skilled in the art of refrigeration.

From the heat exchanger 13, that is from the low pressure side thereof, a pipe line 23 leads to a pressure regulator valve 24. The pressure regulator valve 24 is constituted and set to hold the selected pressure and temperature in the cooling system constituted of pipe line 15, faucet S, rod T structure, pipe line 16, faucet S', rod T' structure, pipe line 17, 20, and heat exchanger 13. When the selected pressure is exceeded, the regulator valve 24 automatically opens and allows the refrigerant to flow into a pipe line 25. The pipe line 25 has a branch 26, which leads into a storage or surge tank 27. This pipe line 25 also has a second branch 28, which is again subdivided into two sub-branches, one designated at 29 and one at 30, the sub-branch 29 leading into the compressor 7 and the sub-branch 30 leading into a pressure switch 31 which regulates the operation of the compressor motor 8.

With the construction thus far described, and the pressure regulator 24 set to hold the selected pressure or temperature in the system, as for example a pressure of thirty pounds, the regulator 24 will remain closed and hold this pressure in the system until the selected pressure is exceeded. Thereupon the regulator 24 will open and allow the refrigerant to flow into the pipe line 25, and into the pipe line 26 up into the tank 27. The refrigerant under pressure may also build up in the branch 28 and branches 29 and 30, but does not exert sufficient pressure on switch 31 to cause it to set the motor 8 into operation. However, when the pressure in the tank 27 builds up to a certain predetermined amount, an amount predetermined by the setting of the pressure switch 31, say for example twenty-five pounds, then the pressure switch 31 sets the motor 8 into operation, and the compressor will be effective to draw the refrigerant from the tank 27, compress it and pass it back through the cooling coils 9 to the tank or receiver 10, from whence it may be recirculated through the system. Once the compressor starts operating under the action of the compressor switch, it will continue to operate until the pressure in the tank is reduced to the value corresponding to that at which the pressure switch 31 is set to cut off.

The gas holder 40, and its flexible connecting lines 41, 42, and 43, of course, form no part of the cooling system per se, but are only the conventional means for keeping a head of gas on the surface of the beer in the kegs.

A cooling and dispensing system of this character insures circulation of the refrigerant through the passageways of the tap rod and obtains a uniform and highly efficient refrigerating action. Further advantage resides in the fact that the frequency of operation of the cooling unit of the system is minimized, or in other words instead of continuously going on and shutting off, the cooling unit is required to operate only at protracted intervals.

While the invention as shown is applied to a system wherein two tap rods are refrigerated, obviously its advantages may be realized in any system having one or more tap rods. Where only one tap rod is employed, then the pipe line 16 is coupled up with the connection 20 so as to deliver the refrigerant to the heat exchanger 13, and thence to the pressure-regulating valve 24.

While I have shown and described several constructions in which the invention may be advantageously embodied, it is to be understood that the constructions shown have been selected merely for the purpose of illustration or example, and that various changes in the size, shape, and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A cooling system for a plurality of beverage containers comprising a circulatory refrigerant passage for each container having an inlet and outlet opening, a cooling unit having its compression side connected to an expansion valve and its suction side connected to a pressure regulating valve, a refrigerant conduit extending from said expansion valve to an inlet opening of

one of said passages, a refrigerant conduit extending from said pressure regulator to an outlet opening of another of said passages, and refrigerant carrying connections extending from the outlet opening of said first passage to the inlet opening of said other passage.

2. A system for cooling and dispensing beverages comprising a plurality of containers for the beverage, each having a standard tap bushing, a tap rod inserted through and held by said bushings, said rods having a portion extending to a low point within said container, a discharge conduit for said beverage extending through said tap rod, a refrigerant passage within said tap rods extending from an inlet opening in said rod above said bushing into said portion and returning up to an outlet opening in said rod above said bushing, a cooling unit having its compression side connected to an expansion valve and its suction side connected to a pressure regulating valve, a refrigerant conduit extending from said expansion valve and permanently connected to an inlet opening of one of said rods, a refrigerant conduit extending from said pressure regulator and permanently connected to an outlet opening of another of said tap rods, and refrigerant carrying connections extending from the outlet opening of said first tap rod to the inlet opening of said other tap rod.

CARL L. DAUN.