

Aug. 12, 1941.

J L GIBSON

2,252,173

REFRIGERATING APPARATUS

Filed Jan. 27, 1938

5 Sheets-Sheet 1

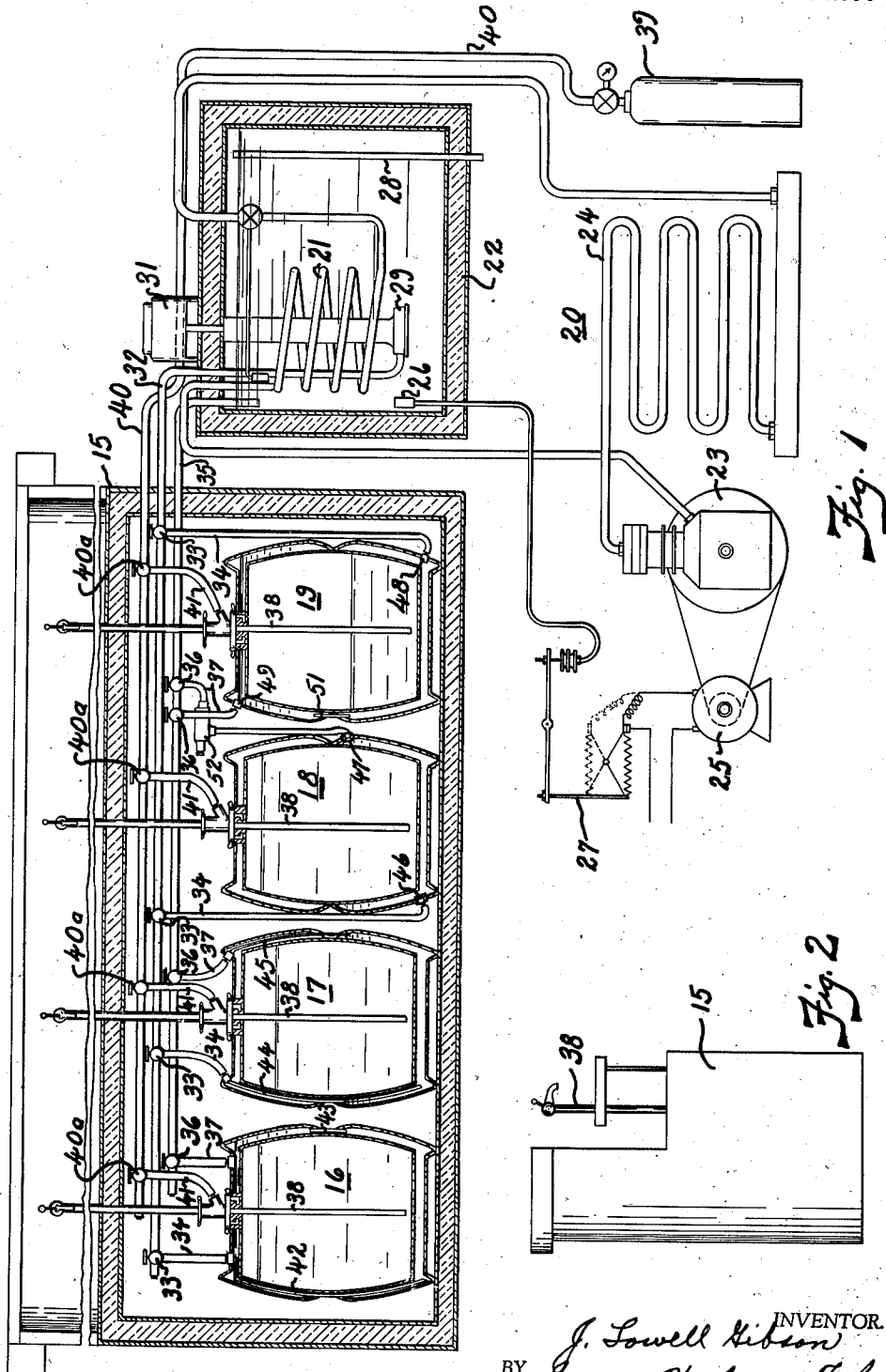


Fig. 1

Fig. 2

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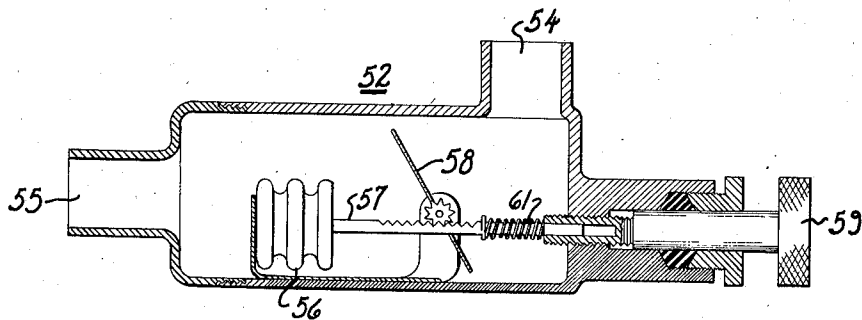
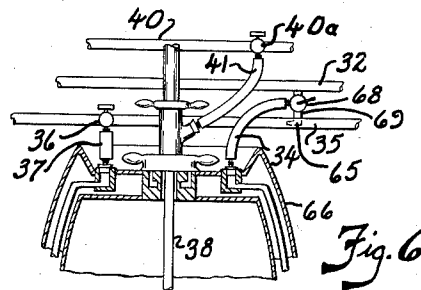
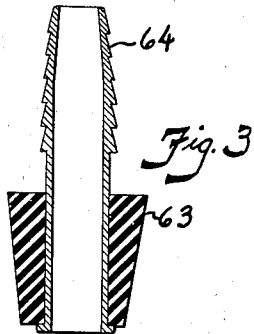
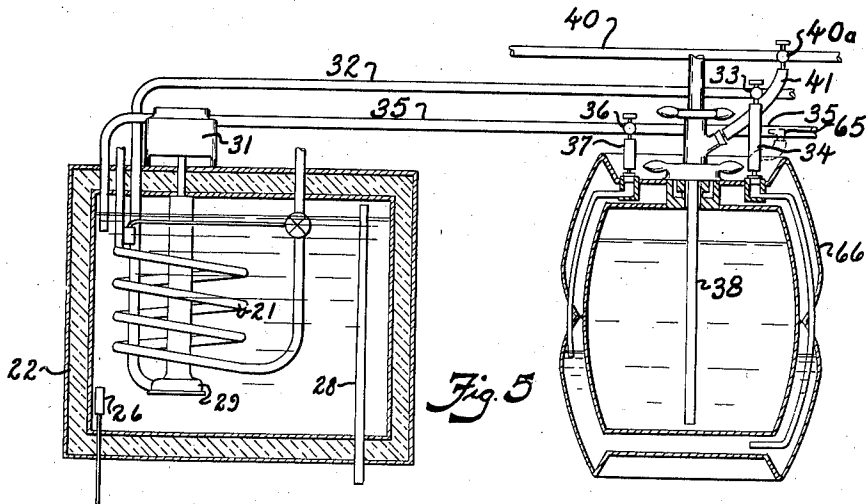
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REFRIGERATING APPARATUS

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5 Sheets-Sheet 2



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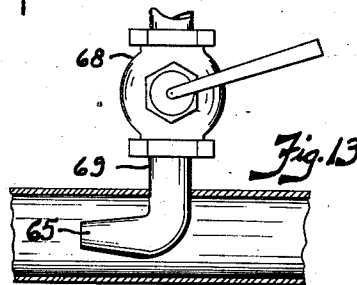
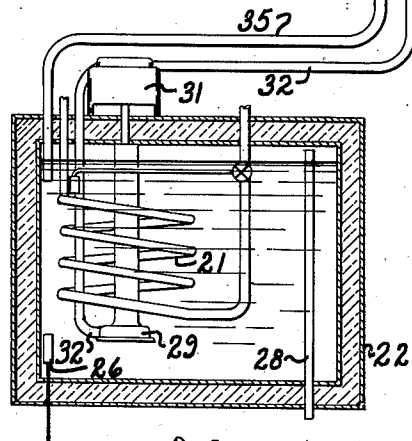
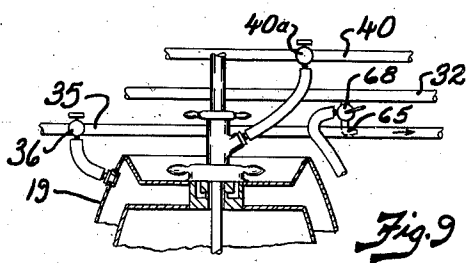
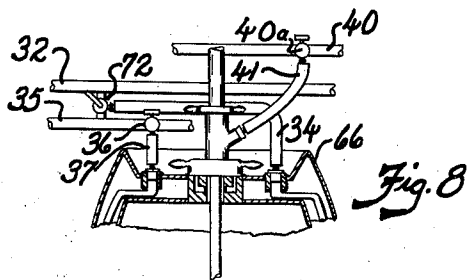
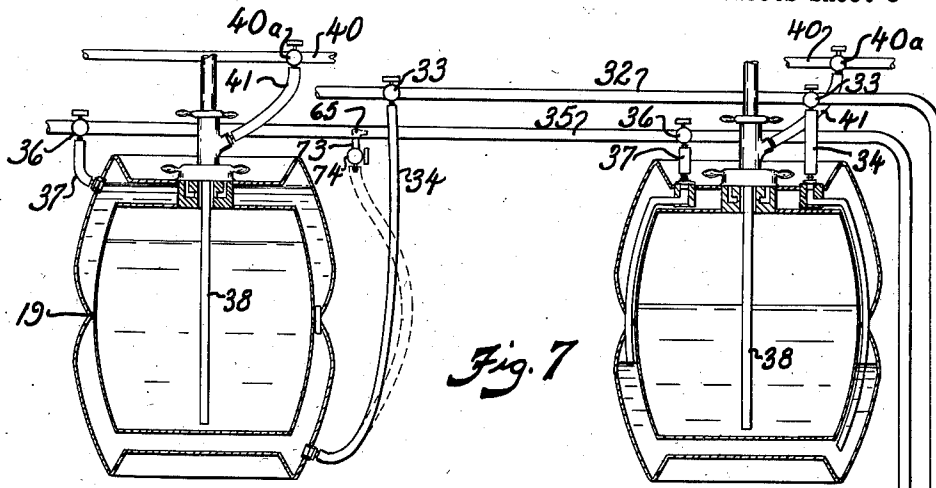
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REFRIGERATING APPARATUS

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5 Sheets-Sheet 3



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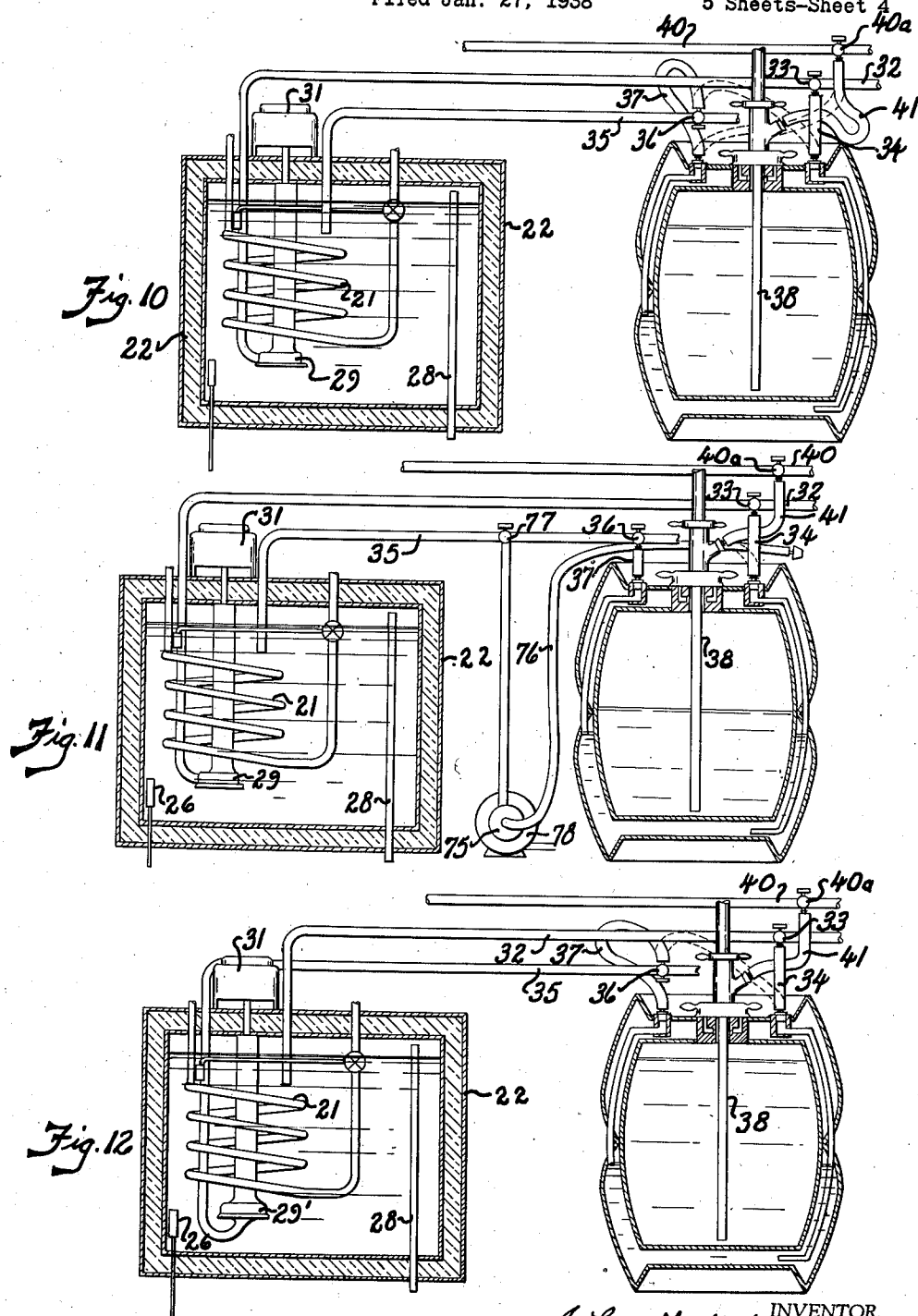
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REFRIGERATING APPARATUS

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5 Sheets-Sheet 4



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REFRIGERATING APPARATUS

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5 Sheets-Sheet 5

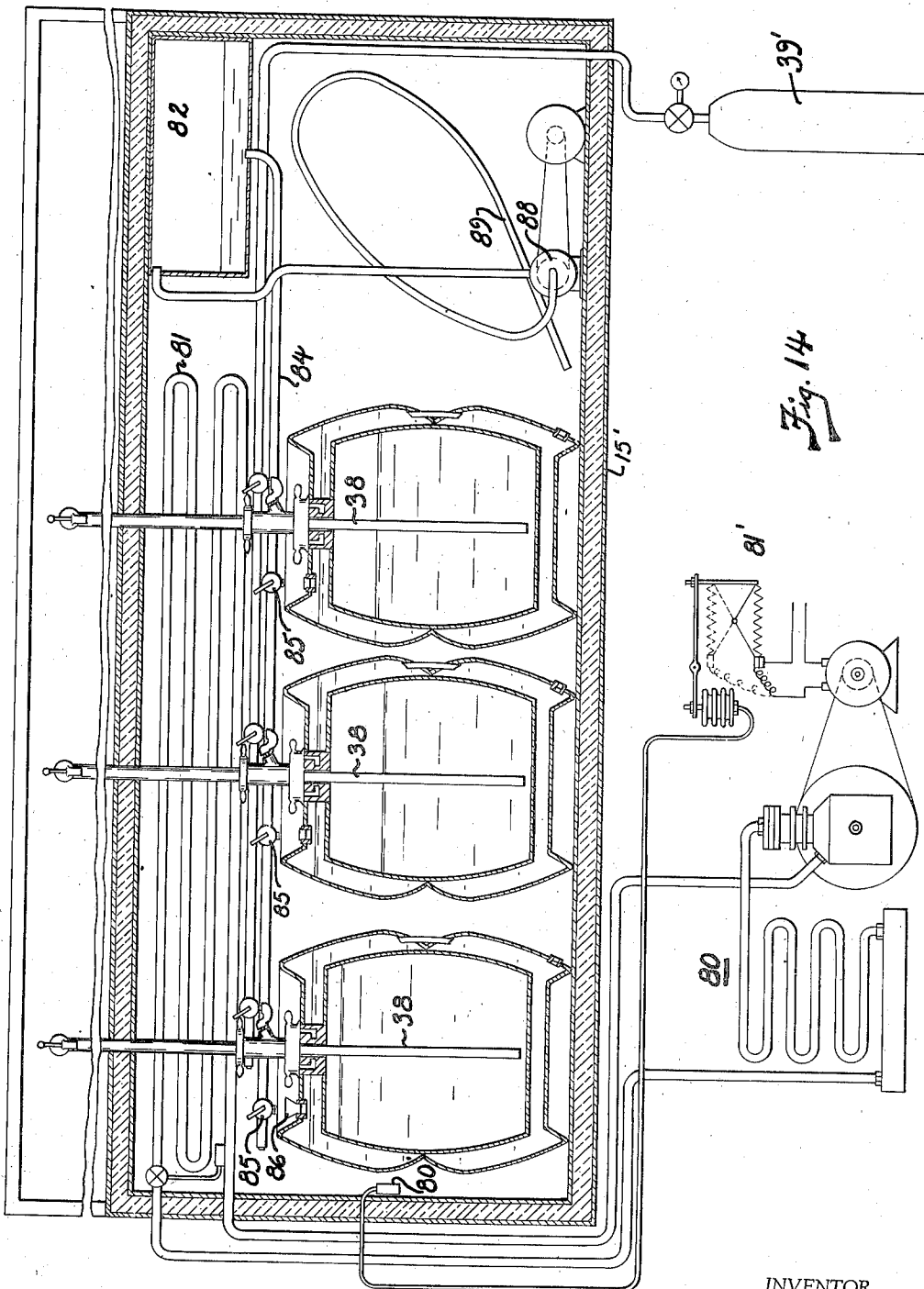


Fig. 14

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UNITED STATES PATENT OFFICE

2,252,173

REFRIGERATING APPARATUS

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Application January 27, 1938, Serial No. 187,235

11 Claims. (Cl. 62-141)

This invention relates to refrigeration, more particularly to the cooling of beer and other beverages.

An object of this invention is to provide a method of and apparatus for transporting and dispensing beer, which enables an efficient cooling system to be set up at the dispensers place of business, and enables the brewer to place the beer in containers which are not likely to be damaged during the handling of the containers while being transported between the brewery and the dispensers place of business.

A more specific object of this invention is to provide an insulated bar cabinet in which kegs of beer may be placed and wherein they can be efficiently cooled. In cooling the barrels, preferably water or other cooling fluid is circulated through a double shell which forms the barrel, and the water is removed while the barrels are being transported, so that the empty water space forms an air insulating space and tends to maintain the beer in a cold condition while being transported from the brewery to the dispensers place of business.

The water which is to be placed in the double shell may be circulated continuously from a source of cold water supply, or a certain quantity of, preferably pre-cooled, water, or other conducting material, may be inserted in the double shell to provide a good conductor between a source of refrigeration in the cabinet.

Another object of this invention, where it involves the circulation of cold water or other medium from a water cooler through the jackets of the barrels, is to provide means for salvaging the cold water contained in the jacket of a barrel which has been emptied of beer, so that this pre-cooled water may then be placed in the fresh barrels which have been delivered from the brewery.

Another object of this invention is to provide means whereby the condensate which collects in the bottom of the cabinet may be disposed of in a convenient manner.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a diagrammatic representation, partly in cross section, showing a system wherein cold water is circulated through the double shell of barrels to and from a water cooler;

Fig. 2 is an end view on a reduced scale of the bar shown in Fig. 1;

Fig. 3 is a cross sectional view showing the construction of one of the hose attaching fixtures;

Fig. 4 is a cross sectional view of a thermostatic flow control means;

Fig. 5 is a fragmentary view partly in cross section diagrammatically showing one arrangement for salvaging the cooling fluid from the cooling jacket of an empty keg;

Fig. 6 is a fragmentary view partly in cross section diagrammatically showing another arrangement for salvaging the cooling fluid from the cooling jacket of an empty keg;

Figs. 7, 8 and 9 are fragmentary views showing various modified arrangements for connecting the cooling fluid lines to the cooling jackets of the beverage containers;

Figs. 10, 11 and 12 are similar to Fig. 5 only showing modified arrangements for salvaging the cooling fluid;

Fig. 13 is a detailed view of a Venturi pump; and

Fig. 14 is a diagrammatic representation partly in cross section showing an insulated bar cabinet and a modified arrangement for cooling the beverage containers.

My invention is particularly applicable to the refrigeration of beer and other beverages which are dispensed to the consumer directly from refillable shipping containers. In the embodiment shown in Figs. 1 and 2, an insulated bar cabinet 15 is provided in which the kegs or containers such as 16, 17, 18 and 19 of the type having built-in cooling jackets are placed during storage and dispensing. In order to cool the beverage in the containers I have provided a refrigerating system, generally designated by the reference character 20, which comprises an evaporator 21 mounted within an insulated tank 22 containing water or any other suitable cooling fluid, a compressor 23, a condenser 24 and a motor 25 for operating the compressor. In order to maintain the temperature of the cooling fluid in the insulated tank 22 at a substantially constant temperature, I have provided a thermostat 26 within the tank 22 which controls the switch 27 in the electrical supply line leading to the compressor motor; the arrangement being such that, when the temperature in the tank is below a predetermined value, the compressor stops operating and as the temperature exceeds a predetermined value the compressor will be operated. An overflow pipe 28 is provided in the

tank so as to permit any excess water to escape and so as to permit air to enter the upper part of the tank. Mounted within the tank is a pump 29 which is used for circulating the cooling water or other medium to and from the cooling jackets of the beverage containers. The pump 29 is driven by means of a motor 31 mounted on top of the water tank. This pump forces water into the pipe line 32 which leads into the bar cabinet and which is provided with a plurality of branch lines equipped with valves 33. These branch lines are provided with hose sections 34 which are adapted to be connected with the inlets to the cooling jackets of the barrels. A return line 35 provided with a plurality of branch lines 37 connectible to the outlets of the cooling jackets and having valves 38 is provided for normally conveying the cooling fluid back to the cooling tank 22.

Although the kegs are of novel design, it is to be understood that other types of containers may be used and that the system may be designed for the cooling of a single keg or any number of kegs, one or more of which may be on tap. The system is especially designed for dispensing beers and ales but is equally well adapted for dispensing other types of beverages. As shown in Fig. 1, tap rods 38 of any conventional design are provided for drawing the beer in the usual manner. Gas under pressure is supplied from the tank 39 to the line 40 which is provided with branch lines 41 leading to the tap rods 38. A valve 40a is provided for each branch line.

The barrels which have been used in illustrating my invention have a double walled construction such that a cooling medium may be circulated through the space between the walls of the barrel. As constructed, each barrel is provided with two separate jacket sections; that is, an upper jacket and a lower jacket. The barrel 16, however, is provided with a connector 43 which permits the cooling water to pass from the lower jacket into the upper jacket. The barrel 16 has a cooling water inlet adjacent the top of the barrel and this inlet is connected with a pipe line 42 which conveys the cooling water to the bottom of the lower jacket. The outlet for the cooling water is likewise provided at the top of the barrel with the result that the water is required to travel the full length of the barrel before returning to the storage tank where it is further cooled for reuse. In the barrel 17 a little different arrangement is provided in that the cooling water inlet and outlet are both located in the top of the barrel, but no means are provided for supplying a cooling fluid to the upper jacket since the inlet and outlets are both provided with pipes 44 and 45 respectively which communicate with the lower jacket only. The barrel 18 is of a still different construction in that the inlet 46 is placed adjacent the bottom of the barrel and the outlet 47 is placed adjacent the top of the lower jacket. The barrel 19 is also of a different construction in that the inlet 48 is provided adjacent the bottom of the lower jacket and the outlet 49 is placed adjacent the top of the upper jacket and a connecting pipe 51 is provided between the upper and lower jackets.

In certain installations it may be desirable to maintain the temperature in certain of the kegs lower than in other of the kegs. In order to do this, I have provided a temperature responsive flow control valve 52 for controlling the flow of cooling fluid in response to the temperature of the return water. The construction of this valve is shown more fully in Fig. 4. The water return-

ing from the cooling jacket enters the valve at 54 and leaves at 55. A temperature responsive bellows 56 is provided which may be filled with an expansible gas or liquid, expansion and contraction of which causes reciprocation of the rack 57 which, in turn, causes rotation of the butterfly valve 58 which controls the amount of fluid flowing through the valve. Valves of this type are especially desirable in such installations where both beer and ale are served, in that it makes it possible to maintain the beer at one temperature and the ale at another temperature. As shown in Fig. 4, an adjusting screw 59 is provided which adjusts the tension on the spring 61.

In Fig. 3 I have shown a convenient hose connection which comprises a rubber stopper 63 provided with a hose attaching member 64. With this arrangement it is a very simple matter to connect and disconnect the hoses with the inlets and outlets to the various kegs.

In a system of the type shown it is desirable to salvage the water from the cooling jackets before returning the kegs to be refilled. There are several advantages in salvaging this water. In the first place, the water is already colder than any make-up water normally available. In the second place, it is desirable to have a system in which the repeated addition of make-up water is unnecessary. Another advantage is that it is much easier to transfer the barrels when the cooling jacket is empty. Numerous novel arrangements have been illustrated for salvaging the cooling water from the empty kegs. In order to simplify the description, like reference characters have been used to designate similar parts; that is, in each modification the cold water storage tank has been designated by the reference character 22 and the pipe for conveying the cooling fluid to the bar cabinet has, in each instance, been designated by the reference character 32 and the return pipe by the reference character 35. The valves leading to the kegs from the line 32 have been designated by the reference character 33, and the valves in the line between the keg and the return line 35 have been designated by the reference character 36 throughout all views.

In the arrangement shown in Fig. 5, the cooling fluid may be salvaged by closing the valves 33 and 36, disconnecting the hose 37 from the barrel, disconnecting the hose 34 from the valve 33 and connecting it to the Venturi pump 65 which is constructed according to the showing in Fig. 13 and has its outlet arranged in the pipe line 35 with the result that water circulated through the line 35 will draw the cooling water out of the cooling jacket of the barrel 66. After having emptied the cooling water from the jacket of the barrel 66, a new barrel may be substituted for the barrel 66. In the arrangement shown in Fig. 6, a two-way valve 68 has been substituted for the usual valve 33. This two-way valve has one branch connected to the supply line 32 and has another branch connected to the outlet 69 of the Venturi pump 65, the nozzle of which is placed in the return line 35. In order to salvage the cooling water from a barrel by means of the arrangement shown in Fig. 6, the valve 36 is closed, the hose 37 is disconnected from the barrel, and the valve 68 is turned so as to connect the hose 34 with the Venturi pump 65.

In Figs. 7, 8 and 9, I have shown slightly modified arrangements which may be used in installations where the storage tank 22 is mounted in the

basement or any other location below the lower level of the kegs.

In Fig. 7 I have shown a barrel similar to barrel 19 shown in Fig. 1 from which the cooling water may be salvaged by closing the valves 33 and 36, disconnecting the line 37 from the keg, disconnecting the line 34 from the valve 33 and connecting it to the Venturi member 65. A valve 74 is attached to the venturi 65 at 73, whereby the venturi can be rendered completely inoperative when not in use for salvaging the cooling fluid. In the same figure, I have shown a keg similar to keg 17 in Fig. 1 from which the cooling fluid may be salvaged by closing the valve 36, stopping the pump 29, disconnecting the hose 37, and letting the water siphon back into storage tank 22 through the line 32.

In the arrangement shown in Fig. 8 the valve 33 disclosed in the first modification is dispensed with and a two-way valve 72 is provided which makes it possible to connect the cooling water outlet with either the supply line 32 or the return line 35. For cooling purposes the two-way valve 72 is set so as to connect the cooling jacket inlet with the supply line 32. In this arrangement, when it is desired to salvage the water from the cooling jacket of the keg, the pump is stopped, the valve 36 is closed, the valve 72 is adjusted to connect hose 34 with return line 35, and the hose 37 is disconnected from the keg with the result that the water will siphon out of the cooling jacket.

In Fig. 9 I have shown an arrangement corresponding to the arrangement shown in Fig. 6 in which a different type of barrel is used having inlets and outlets arranged as shown in the barrel 19 in Fig. 1. The arrangement shown in Figs. 6 and 9 is suitable for any location of the cooling water supply tank 22.

In the modification shown in Fig. 10 the supply of gas under pressure for displacing the beer from the keg is made use of in salvaging the cooling fluid from the cooling jacket of the keg. In this modification the cooling water is salvaged in the following manner: Valve 40a, in the gas line 40 leading from a gas pressure tank such as 39 shown in Fig. 1, is closed and valves 33 and 36 are also closed. The hose 34 is disconnected from the valve 33 and is connected to the valve 36 as shown in dotted lines. The hose 41 is disconnected from the tap rod and is connected to the cooling water outlet as shown in dotted lines. Thereupon, valves 36 and 40a are opened with the result that the pressure of the gas forces the cooling fluid from the jacket through the return line 35 into the storage tank 22. When the jacket is fully empty the valves 36 and 40a are closed and the connections are made to a new keg in the usual manner as shown in full lines in Fig. 10.

In installations of the type shown in Fig. 10 where the pressure in line 40 is sufficient, the hose connection 34 need not be changed over to the valve 36 since the pressure in line 40 is sufficient to overcome the pressure of the pump 29. Likewise, when the pump 29 is not in operation normal air pressure is sufficient so that the hose connection 34 need not be changed over to the valve 36.

Where it is not desired to utilize the gas for displacing the water nor utilizing a venturi or siphon means for salvaging the water a separate pump, such as pump 75 shown in Fig. 11, may be provided. With such an arrangement the water may be salvaged by closing the valves 33 and 36, 75

disconnecting the hoses 34 and 37, connecting the hose 76 to the normal inlet of the keg, opening the valve 77 and operating the pump motor 78 until the cooling water has been pumped out of the cooling jacket.

In all of the systems described thus far, the pump 29 has been utilized for pumping the water into the cooling jackets. In Fig. 12, I have shown a different modification in which a pump 29' has its suction side connected to the return line 35. In this modification the cooling water is pumped out of the cooling passages with the result that cooled water will flow into the cooling jacket whenever the pump 29' is operated and the valves 33 and 36 are open and the hose connections are made as shown in full lines in Fig. 12. In order to salvage the cooling fluid in this modification, the valves 33 and 36 are first closed and thereafter the hose 34 is disconnected from the valve 33 and is connected to the valve 36, and the valve 36 is opened so as to cause the cooling water to be pumped out of the cooling jacket.

As pointed out hereinabove, I have devised a system which is capable of maintaining the beverage at a proper temperature for dispensing, and I have shown various arrangements suitable for the various types of installations for salvaging the cooling fluid from the kegs prior to returning the kegs to the brewery.

In Fig. 14 I have shown another modification in which the cold water storage tank is eliminated and in which the refrigerating system 80 is provided with an evaporator 81 mounted directly within the insulated bar cabinet 15'. In this modification water is not continuously circulated through the jackets of the kegs but a supply tank 82 containing water or any other fluid which is a good conductor of heat is provided from which the fluid may be supplied to the usual cooling jacket of the keg. As shown in Fig. 14 a pipe line 84 extends substantially the full length of the cabinet and is provided with a plurality of faucets 85 which may be opened whenever it is desired to fill the cooling jackets with cold water or the like. No hose connections have been shown, as the faucets 85 may be arranged to discharge water directly into the inlet of the barrel. A funnel, such as 86, may be provided at the inlet to the cooling jacket or, if desired, a hose may be used as in the other modification. A pump 88 is provided which may be used for pumping the water from the jackets of the empty containers. This pump 88 is provided with a hose 89 which may be connected to the outlet of a cooling jacket whenever it is desired to salvage the water in the jacket. The refrigerating system 80 is controlled by means of a thermostatic bulb 80' which is mounted within the bar cabinet and which operates the switch 81' in a well-known manner for starting and stopping the refrigerating system in accordance with temperature conditions within the bar cabinet.

Condensate collecting in the bottom of bar cabinet 15 or 15' may be added to the water supply by withdrawing it in the same manner in which water is withdrawn from the cooling jackets. In the modification shown in Fig. 14, for example, the condensate may be pumped into tank 82 merely by placing the inlet of the hose 89 adjacent the bottom of the cabinet while the pump is in operation.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms

might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In a beverage cooling and dispensing system, a plurality of beverage containers from which beverage may be dispensed, a tap rod for each of said containers for withdrawing beverage therefrom, each of said containers having a fluid flow passage through which a cooling fluid may be circulated, means for supplying gas under pressure to said containers for displacing beverage therefrom, means for supplying cooling fluid to said passages, and means whereby said gas may be used in displacing cooling fluid from one of said passages.

2. In combination, a beverage container, a source of gas under pressure, means for supplying a cooling fluid in thermal exchange relationship with the contents of said container, means for displacing the contents of said container with gas from said source, and means for displacing said cooling fluid with gas from said source.

3. Apparatus for storing and dispensing a beverage which comprises an insulated cabinet, beverage containers therein, means for cooling said containers comprising means for circulating a cooling fluid in thermal exchange relationship with said containers, a high pressure gas supply, means whereby said gas from said supply displaces beverage in one of said containers during dispensing of said beverage, and means whereby gas from said supply may be used to displace a portion of the cooling fluid in thermal exchange with one of said containers.

4. In a cooling and dispensing system wherein a beverage container is provided with means forming a cooling fluid flow passage connected in closed circuit relation with a cooling fluid circulating between a source and said flow passage to cool the contents of said container; that method of removing the container when empty from said closed circuit which comprises, discontinuing the flow of cooling fluid to the flow passage of said container, discharging cooling fluid from the flow passage of said container into another portion of said closed circuit, and thereafter disconnecting the empty container from said closed circuit.

5. In a cooling and dispensing system wherein a plurality of beverage containers are each provided with means forming a cooling fluid flow passage connected in closed circuit relation with a cooling fluid circulating between a source and said flow passages to cool the contents of said containers; that method of removing an empty container from said closed circuit which comprises, discontinuing the flow of cooling fluid to the flow passage of the empty container, discharging cooling fluid from the flow passage of said empty container into the cooling fluid circulating between said source and the flow passage of another container, and thereafter disconnecting the empty container from said closed circuit.

6. In a beverage cooling and dispensing system, a plurality of beverage containers from which beverage may be dispensed, means associated with each of said containers for withdrawing beverage therefrom, each of said containers being provided with a cooling fluid flow passage connected in closed circuit relation with a source of cooling fluid, means for circulating cooling fluid from said source thereof through the flow passage of said containers, and means whereby

said circulating means may be utilized for removing cooling fluid from the flow passage of an emptied container to another portion of said closed circuit when the empty container is to be disconnected from the circuit.

7. In a beverage cooling and dispensing system, a plurality of beverage containers from which beverage may be dispensed, means associated with each of said containers for withdrawing beverage therefrom, each of said containers being provided with a cooling fluid flow passage connected in closed circuit relation with a source of cooling fluid, means for circulating cooling fluid from said source thereof through the flow passage of said containers, means for circulating gas under pressure to said containers for displacing beverage therefrom, and means whereby one of said circulating means may be utilized for removing cooling fluid from the flow passage of an emptied container to another portion of said closed circuit when the empty container is to be disconnected from the circuit.

8. In a beverage cooling and dispensing system, a plurality of beverage containers from which beverage may be dispensed, means associated with each of said containers for withdrawing beverage therefrom, each of said containers being provided with a cooling fluid flow passage connected in closed circuit relation with a source of cooling fluid, a pumping means in said closed circuit for circulating cooling fluid from said source thereof through the flow passage of said containers, and a second pumping means associated with said circuit for removing cooling fluid from the flow passage of an emptied container to another portion of said closed circuit when the empty container is to be disconnected from the circuit.

9. In a beverage cooling and dispensing system, a plurality of beverage containers from which beverage may be dispensed, means associated with each of said containers for withdrawing beverage therefrom, each of said containers being provided with a cooling fluid flow passage connected in closed circuit relation with a source of cooling fluid, a pumping means in said closed circuit for circulating cooling fluid from said source thereof through the flow passage of said containers, a second pumping means associated with said circuit for removing cooling fluid from the flow passage of an emptied container to another portion of said closed circuit when the empty container is to be disconnected from the circuit, and means whereby said second pumping means may be rendered effective by the pumping action of said first named pumping means.

10. In a beverage cooling and dispensing system, a beverage container from which beverage may be dispensed, means associated with said container for withdrawing beverage therefrom, said container being provided with a cooling fluid flow passage connected in closed circuit relation with a source of cooling fluid, means for circulating cooling fluid from said source thereof through the flow passage of said container, and means whereby the cooling fluid may be siphoned out of the flow passage of said container into another portion of said closed circuit when said container is to be disconnected from the circuit.

11. In a cooling and dispensing system wherein a plurality of beverage containers each have a cooling fluid flow passage formed integral therewith and which passages are connected in

closed circuit relation with a cooling fluid circulating between a source and said passages to cool the contents of said containers; that method of removing an empty container along with its flow passage from said closed circuit which comprises, discontinuing the flow of cooling fluid to the flow passage of said empty container while

5 continuing the flow of cooling fluid through the flow passage of another container, discharging cooling fluid from the flow passage of said empty container into another portion of said closed circuit, and thereafter disconnecting the empty container from said closed circuit.

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