Aug. 10, 1948. L. WEISS 2,446,895

COOLING UNIT FOR BEVERAGE SERVING ASSEMBLIES

Filed May 29, 1944 2 Sheets-Sheet 1

FIG. 1.

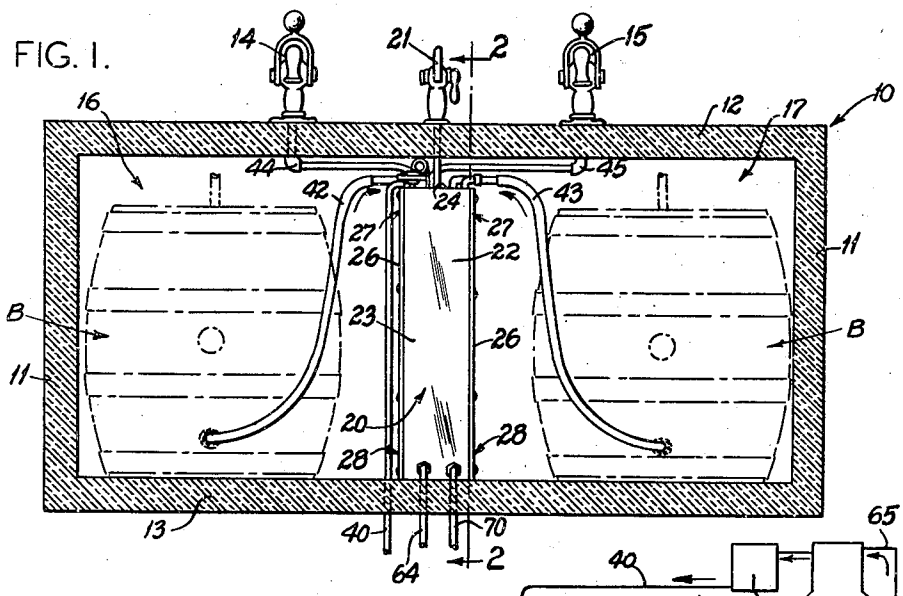
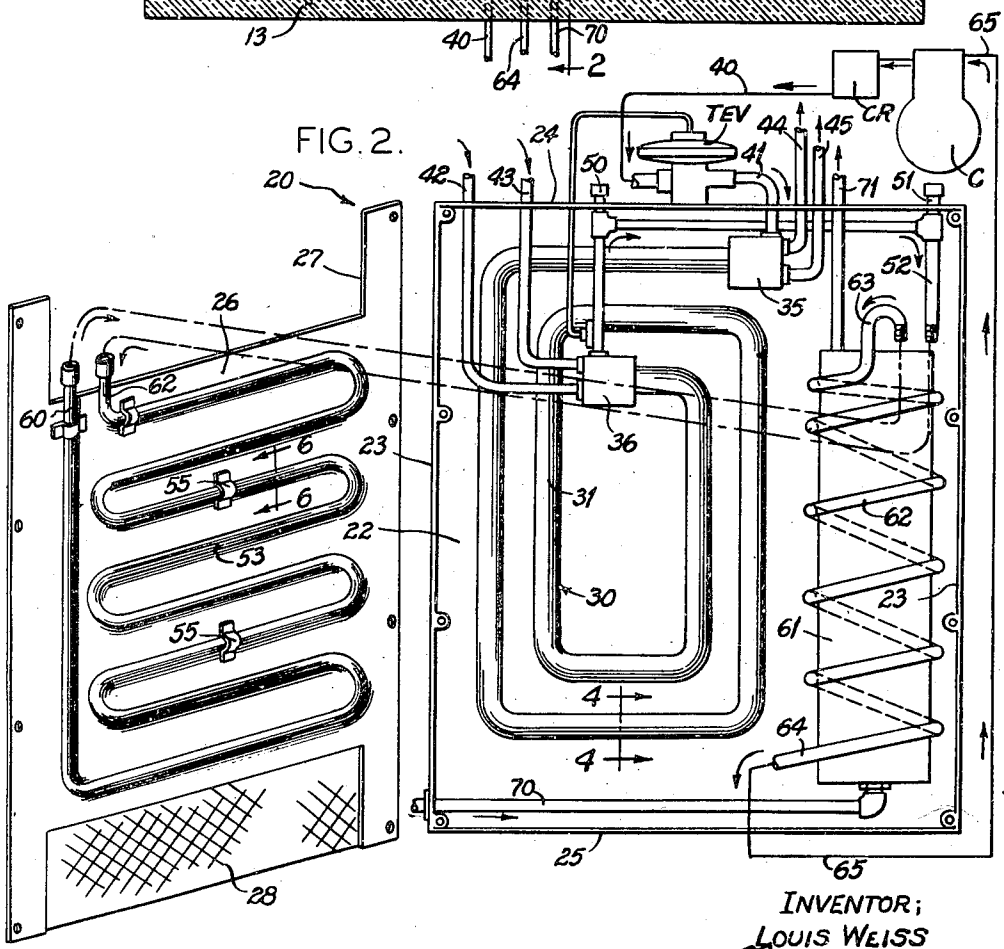


FIG. 2.



INVENTOR;
LOUIS WEISS
BY Robert B. Terry
ATTORNEY

Aug. 10, 1948. L. WEISS 2,446,895

COOLING UNIT FOR BEVERAGE SERVING ASSEMBLIES

Filed May 29, 1944 2 Sheets-Sheet 2

FIG. 3.

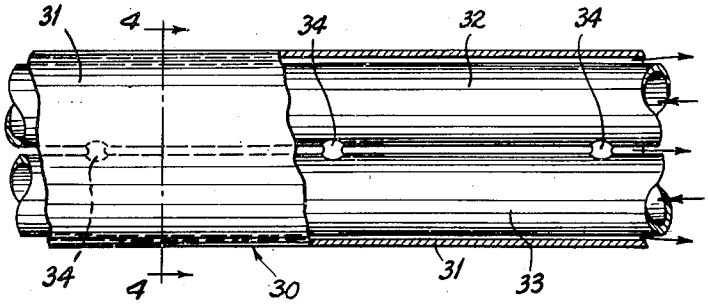


FIG. 4.

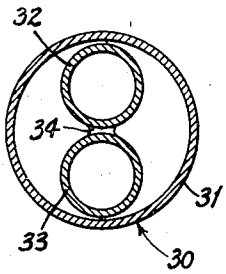


FIG. 5.

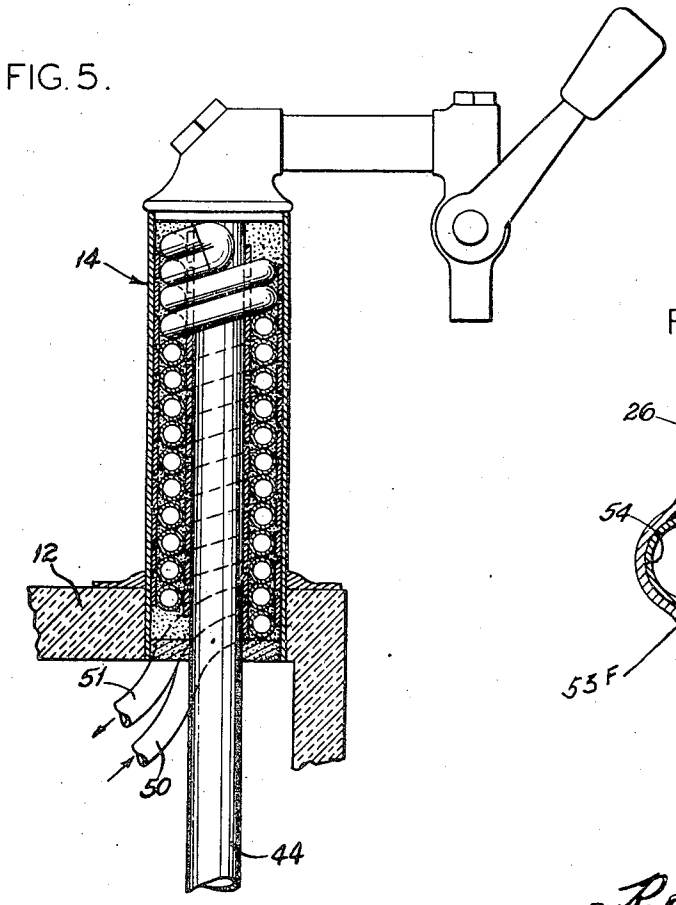
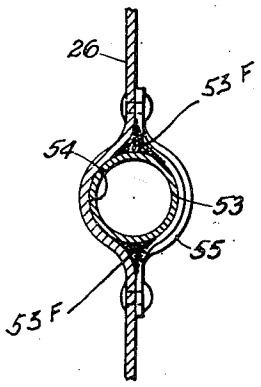


FIG. 6.



INVENTOR:
LOUIS WEISS
BY Robert B. Terry
ATTORNEY

Patented Aug. 10, 1948

2,446,895

UNITED STATES PATENT OFFICE

2,446,895

COOLING UNIT FOR BEVERAGE SERVING ASSEMBLIES

Louis Weiss, University City, Mo.

Application May 29, 1944, Serial No. 537,931

4 Claims. (Cl. 62—141)

1

This invention relates to improvements in cooling units for beverage serving assemblies, and more particularly to a compact, easily serviced cooling unit for use in multiple-tap, beverage dispensing cabinets or the like.

The present improvements are related to, yet differ in many respects from the subject matter of Letters Patent No. 2,316,376 issued to this applicant April 13, 1943. In many of the beverage cooling or chilling arrangements prevalently in use, and wherein a refrigeration system is employed which cares for two or more beverage supply lines and taps, it is quite difficult under certain conditions to assure substantial equality of temperature of the beverage as drawn from each of the different taps, and to attain this result in spite of the introduction at times, of a fresh, perhaps warm container such as a barrel of the beverage, without an unwarranted length of time for bringing the body of the supply beverage down to a suitable drinking temperature. An even more serious difficulty has prevailed in systems for the purpose in discussion, wherein there is provided a separate refrigerant expansion valve for each of the beverage lines, supply containers, or draft taps. It has been found impossible, without frequent readjustment of the various refrigerant flow controls, to assure an approach to uniformity of temperature of the beverage issuing from the several draft taps. The subject matter of the earlier patent, above numbered, is admirably adapted for quickly chilling a beverage, such as beer, as same is drawn from the dispensing tap, but occasional difficulty in effecting a comparable regulation of the different expansion valves, has frequently been experienced. Accordingly it is to obviate these inequalities and the resulting wide variations in beverage temperature, that the present improvements are particularly and objectively directed.

A further important object of the invention is attained in an assembly of the general type referred to, in which substantial lengths of a plurality of the beverage lines just ahead of the draft taps therefor, are equally subjected to the chilling effect of an evaporating refrigerant, all in such manner as to avoid excessive lengths of the beverage lines just ahead of the draft taps.

A further important object of the invention is to obviate difficulties due to differential regulation of different refrigerant flow circuits in a beverage serving assembly having more than one draft tap, whereby there is avoided all hazard, either of freezing up any of the beverage lines, or of serving from any of the lines, a beverage

2

which is too warm. These results are objectively attained by effecting a substantially identical refrigeration effect on each of a plurality of the draft lines.

A still further important object of the invention is attained in an improved, more compact assembly of evaporator and coil elements which may be fabricated, and quickly installed in a beverage cabinet, for example as a package unit, thus greatly simplifying substitution of one of the improved units, for existing older assemblies, and further enabling a quick and easy substitution of an operative assembly of coils and valve for one requiring service attention.

A still further object of the invention is attained in an improved air cooling provision for the cabinet space, including the supply containers such as barrels, of a beverage to be dispensed, and such that the improved unit provides of itself a directed circulation of ambient air, with quick and efficient cooling thereof.

An important additional objective is attained in an improved refrigeration circuit including a better control of pressure drop through portions of the evaporator elements; improved provisions for obviating liquid surge effects and prevention of movement of liquid particles or slugs, back to a compressor, as in a compressor-condenser-evaporator type of system.

An additional and important objective is attained in an improved mounting of space cooling coil in the unit, particularly in improved provisions for facilitating heat transfer between a coil element and a plate element of the space cooling section of the system, as in a refrigerated cabinet or the like.

The foregoing and numerous other objects will more clearly appear from the following detailed description of a presently preferred embodiment of the invention, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a side view of a refrigerated draft cabinet with one wall removed, showing certain other walls in section, and illustrating a preferred arrangement of cooling unit, barrel and taps;

Fig. 2 is a front view of the evaporator or cooling unit, with a front or side closure removed, to show an arrangement of parts within the unit, and showig diagrammatically and for completeness, some of the refrigerant circuit elements and lines, this view being taken along line 2—2 of Fig. 1, omitting the walls of the outer cabinet;

Fig. 3 is a fragmentary, enlarged portion of a

multiple tube evaporator section, partly broken away for clearness of internal structure, and with certain tube wall portions shown in section;

Fig. 4 is a transverse sectional view of the multiple tube section of Fig. 3, as taken along line 4—4 thereof;

Fig. 5 is an elevation, partly in section, of a form of refrigerated draft tap assembly, preferred for use in the combination illustrated, and

Fig. 6 is a sectional view through a tube element and adjacent plate of the space-cooling coil and assembly.

As representing a typical installation, there is utilized a draft cabinet 10 provided with insulated wall portions 11, a top 12, and floor or bottom closure 13. For simplicity the cabinet is shown as provided with two beverage dispensing faucets or taps 14 and 15, and the space interiorly of the cabinet 10 is substantially equally divided, in a two tap assembly, into compartments 16 and 17 adapted to receive and chill the beverage supply containers such as barrels B.

The spaces 16 and 17 in the cabinet are at least partly partitioned from each other by the package unit of coils, etc., indicated at 20. It is preferred also to provide in accessible position on the top of the cabinet 12, a water dispensing tap 21. The cabinet and faucets per se may, if desired, be of conventional type and hence, apart from combinations to be described, do not constitute any part of the present improvements.

Referring now with more particularity to the contents of, and arrangement of elements in and on the package unit 20 as a part thereof, this structure includes a preferably metal casing 22 comprised of side walls 23, a top closure 24, bottom 25 and a plate element 26 removably attachable to the walls 23, 24 and 25 or some thereof, in such manner that it is easily removable for service access to the interior of the package unit. The plate 26 is recessed or foreshortened at its top to constitute an air inlet opening 27, and a grilled air outlet opening along its lower margin, indicated at 28.

Within the casing 22 is disposed a substantial length of a multiple-tubing section indicated generally at 30, and consisting, as will best appear from Figs. 3 and 4, of an outer tube 31 which may be of a relatively thin wall copper and interiorly of which extends a plurality, shown as a pair, of beverage tubes 32 and 33. The arrangement and proportion of diameters, where two of the internal tubes 32 and 33 are employed, may be substantially as shown, the inner tubes being, similarly to the outer, formed of a reasonably flexible metal, such as tin-copper. As a preference also the two or more inner tubes are joined to each other to facilitate heat transfer therebetween, as by spaced soldered connections 34. It is preferred to space the solder connections at frequent regular intervals along the inner tubes of the multiple tubing section, rather than to unite them by a continuous line of solder, as the spot connections conduce to better resilience of the multiple tube assembly.

At one or both ends of the multiple tube section 30 but in fluid connection solely with the refrigeration space thereof, is a chamber-forming container 35 at the inlet end, and a further such container 36 at the refrigerant outlet end of the multiple tubing section. The chambered element 35 serves the important purpose of maintaining a reserve supply of liquid refrigerant, at all times available to the tube 31. But for this provision, the system would not function properly, inasmuch as there is a time lag between expansion valve opening and the actual supply of refrigerant. Chambered element 36 serves the purpose of minimizing pressure drop which would otherwise be caused by the relatively small refrigerant space within tube 31.

It is assumed, as is usual, that the cabinet is provided externally, as in a basement below the serving level, with a compressor C (Fig. 2), a condenser-receiver CR, and other suitable equipment and lines to supply liquid refrigerant into a tube connection 40 directed to a thermostatic expansion valve TEV which of itself, is well known in the art and requires no detailed description. From the valve TEV a refrigerant line 41 is directed into the container 35, thence into the outer element 31 of the coil or other length of the multiple tube section.

The beverage flow circuit may consist merely of the requisite plurality of beverage supply lines 42 and 43 each of which leads from a Golden Gate fitting, for example, secured into the supply barrel, thence into the tubes 32 and 33 internally of and forming parts of the multiple tubing section 30, thence outwardly of section 30 through lines 44 and 45, one directed to each of the taps 14 and 15. It will have appeared from the arrangement shown that, due to the proximity of the inlet-outlet fitting constituted by container 35, to the taps, there are only short negligible lengths of unrefrigerated beer lines between the element 35 and the faucets.

In order to obviate any warming effect of the beverage after final reduction to temperature but prior to service thereof, it is not strictly essential but is highly preferable to utilize a refrigerated type of faucet for this purpose. One example of this provision, is shown by Fig. 5, wherein the faucet or tap assemblies 14 and 15 are each of the type disclosed and claimed in Patent #2,282,627 issued to this applicant May 12, 1942. In assemblies wherein faucets of this type are employed, the present unit 20 is provided with a refrigeration line connection, preferably at the top of the unit, a single such connection being indicated at 50 and divided as through a T or other multiple connection (not shown) to supply the plurality of tap cooling coils, each of which constitutes a section or portion of the second evaporator coil or section, and is wrapped about the terminal portion of the draft line 44 or 45 leading to the tap served thereby. Refrigerant return from the several tap coil sections is provided for by suitably accumulating the several return lines, then leading them into a connection back into the unit, and indicated at 51. The entrance connection 51 is preferably provided with a connecting tube 52 of adequate length to constitute the refrigerant supply line to a space cooling coil formed as a sinuous arrangement of tubing length and indicated at 53 (Fig. 2). The coil 53 is conveniently mounted on and hence supported by the plate member 26 on one side (or both sides if desired) of this plate. It is a preference for compactness, and to prevent damage to the coil, to secure the space cooling coil 53 to the inside surface of the closure plate 26.

A further improvement which consists in augmenting the heat absorption capacity of the coil 53, is found in the preferred practice of indenting the plate 26 to provide therein a seat of curved section, conforming say to half the tubing wall. The flexible metal tubing 53 is brought to lie snugly in the coil seat 54 (Fig. 6), and is secured to the

plate 26 in any suitable manner as by a plurality of pipe clamps 55 or the like, welded or riveted to the plate 26 (see Fig. 6). It has been found greatly to augment the heat absorption properties of this assembly, to provide above and below the horizontal passes of tubing 53 and the ends thereof also if desired, a filler 53F along the tubing as shown by the section of Fig. 6. This filler is preferably of a type which consists essentially, and substantially in major proportion, of a finely powdered aluminum, in a bitumastic matrix such as asphaltum. Other powdered metals of highly conductive properties may be employed. A suitable material of the general type described is sold under the trade name of Permagum, and is produced by Presstite Engineering Company of St. Louis, Missouri. This filler serves to relieve the tube and plate assembly of voids between the tube and plate; it serves similarly to provide a continuous metallic path for heat conduction between the tube and the tube-seating parts of the plate. Tests have shown that the temperature of plate 26 with the unit in service, closely approximates the surface temperature of the adjacent parts of tube 53. It will now have appeared that with the unit assembled and in operation, the provision of the recessed or foreshortened portion 27 at the top, and the opening 28 at the bottom of plate 26, there is provided virtually a flue for air circulation inwardly at the top and outwardly at the bottom through these openings. Since in moderate size assemblies as in ordinary two-draw beer cabinets, the package unit 20 need be no more than a few inches in thickness, it will appear also that the coil 30 augments to some extent the cooling effect of coil 53 on the air current in traversing the unit for chilling the ambient air within the cabinet.

If desired, the outlet line from coil 53, indicated at 60, may be returned directly to the compressor C, but it is greatly preferred, for reasons hereinafter discussed, to provide in and as a part of the package unit 20 a water cooling tank 61 and hence also to provide a cooling coil for the contents of the water tank. This provision is exemplified in the present embodiment by a spiral, externally wrapped coil 62 provided with a refrigerant inlet connection 63 and an outlet connection 64, the latter being in the refrigerant circuit now completed by a return line 65 back to the suction side of compressor C. The package unit is further provided for completeness where the water tank 61 is included, with a water supply connection 70. Outlet of the cold water from tank 61 is cared for by a water line 71 directed to the water tap 21 heretofore described.

It will have appeared, particularly from Fig. 2, that with the multiple tube section 30 arranged to extend over the greater part of the inside height of the package unit approximately as shown, the overall height of the unit may be minimized, as is desirable for ease in effecting top connections within the cabinet and above the package unit, by locating the water tank 61 as an elongate vertically disposed container. But for economy of space and compactness of the whole package unit, it will be evident that the flow circuit and other features may prevail, even though the water tank 61 be located otherwise than as shown.

It will have been noted as a particular advantage in quickly and certainly chilling the beverage content of the several lines leading to the draft taps, that the flow of beverage through the several lines 42, 43, 32, 33, 44 and 45, is in a direction which is the opposite of that of refrigerant flow, hence, at least in the sense of flow in opposite directions of refrigerant and beverage, the arrangement constitutes a counterflow assembly, the refrigerant entering the multiple tube section in the zone from which the beverage lines emerge from the section.

Since the nature, construction, arrangement and purposes of the various elements of the unit have been more or less completely described in the course of description of parts, no extensive further description of operation is felt necessary, other than to note that, in case all of the several refrigerated units are employed, the preferred order of physical arrangement in the course of flow is to introduce the refrigerant through the thermostatic valve, first to the multiple tube section 30 for chilling the draft lines, thence, in series in the order named, into the several coils surrounding the terminal portions of the draft lines in the faucet assemblies, which thus collectively constitute a second evaporator or refrigerating coil or unit; the space cooling coil 53 being next in order and finally the water cooling coil 62 as a fourth major item in the direction of refrigerant flow. The improvement of expanding the refrigerant into the water tank coil 62 and in the space cooler coil 53, serves the important purpose of eliminating the use of a surge tank sometimes placed in the refrigerant line; the arrangement thus serves a multiple purpose; eliminating the use of a surge tank, and also effecting the cooling of the water in tank 61, and maintaining the desired temperature and circulation in the cabinet proper.

It will have appeared that the arrangement as described serves fully to attain each and all of the several objectives hereinabove particularly stated, as well as numerous others implied from the more detailed description. Although the invention has been described by making reference to a particularly desirable single embodiment, the detail of description is to be understood solely in an illustrative and not in a limiting sense, numerous variants being possible in the several elements of the assembly and in their combinations, without departing from the full intended scope of the claims hereunto appended.

I claim as my invention:

1. A beverage line chilling evaporator assembly of a multiple-draw beverage cooler, said evaporator assembly including a length of flexible multiple tubing having an outer tube for refrigerant evaporation and a plurality of inner tubes each forming parts of the beverage lines of the multiple-draw beverage cooler, with end portions of the outer tube sealed about the inner tubes, the several said tubes being of flexible metal and of generally circular section, and the inner tubes being metallically united to each other in spaced zones along the lengths thereof within the outer tube, an enlarged refrigerant-receiving chambered casing in one end region of the outer tube, and an expansion valve near the refrigerant-receiving end of the outer tube.

2. A cooling unit for insertion in a draft cabinet for beer or the like, the unit including a combined space and beverage cooling coil of flexible multiple tubing in which an outer refrigerant tube contains and identically chills a plurality of beer line tubes therein, a second cabinet cooling coil connected in refrigerant flow relation with the outer tube of said combined space and beverage cooling coil, a water tank, and a tank cooling coil having a refrigerant flow connection with said second coil, a casing for the unit, serving to enclose the said coils and tank, the several coils

and tank having a generally vertical disposition in the casing, the latter being formed to serve as an air duct thereabout, and provided with top and bottom air openings, and an expansion valve and fluid connections for beverage and refrigerant, carried by the casing.

3. A cooling unit for insertion in a beverage draft cabinet or the like, the unit including a casing having a pair of closely spaced vertical wall elements, between which air may circulate for cooling, a coil of flexible multiple tubing arranged in substantially a vertical plane within the casing, the coil characterized by an outer refrigerant tube which contains and identically chills a plurality of beverage line tubes therein, a cabinet cooling coil arranged substantially in a vertical plane in the casing and being connected in refrigerant flow relation with said outer tube, a vertical water tank, and a tank cooling coil in the casing in refrigerant flow connection with said cabinet cooling coil, an expansion valve and fluid connections for beverage and refrigerant, carried by the casing, one of said wall elements of the casing being formed as a plate separable from the remainder of the casing for access to the interior thereof, and the cabinet cooling coil being carried by the plate, the casing being formed to provide a cooling air duct from top to bottom of the unit, along the plates and over each of the cooling coils.

4. In a cooling assembly for a multiple tap draft beverage cabinet, a plurality of faucets or taps from which the beverage is dispensed, a separate draft line each adapted as a connection from a supply container to one of the beverage faucets, a source of and a circulating and evaporator line for refrigerant, the circulating and evaporator line therefor including an arrangement connected in series relationship for refrigerant flow, in the order named, a first cooling section in the form of a tube surrounding an

equal major portion of each of the several beverage draft lines, a second cooling section characterized by tube portions closely externally wrapped about the terminal parts of each of the several draft lines near the respective faucets, thermostatically controlled refrigerant regulating means in the refrigerant line substantially immediately ahead of the first said cooling section and thermostatically responsive to temperature conditions in a zone of the refrigerant flow connection between said first and second said cooling sections, a third cooling section of said refrigerant line consisting of a cooling coil for the space in the cabinet or like enclosure, a water cooling tank within the cabinet, a supply line directed to said tank, a service tap for water carried by the cabinet and supplied from said tank, and a fourth cooling section of said refrigerant line consisting of a coil externally wrapped about said water tank, and a connection from the said fourth cooling section to the refrigerant source.

LOUIS WEISS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,952,278	Peak	Mar. 27, 1934
2,034,300	Kellogg	Mar. 17, 1936
2,124,110	Hall	July 19, 1938
2,136,813	Dolison	Nov. 15, 1938
2,153,335	Martin	Apr. 4, 1939
2,215,192	Read	Sept. 17, 1940
2,244,327	Brundage	June 3, 1941
2,247,388	Johnson	July 1, 1941
2,254,225	Kleist	Sept. 2, 1941
2,316,376	Weiss	Apr. 13, 1943
2,327,910	Levine	Aug. 24, 1943