Aug. 5, 1941. B. A. HILL 2,251,736

COUNTER COOLER

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Fig. 1.

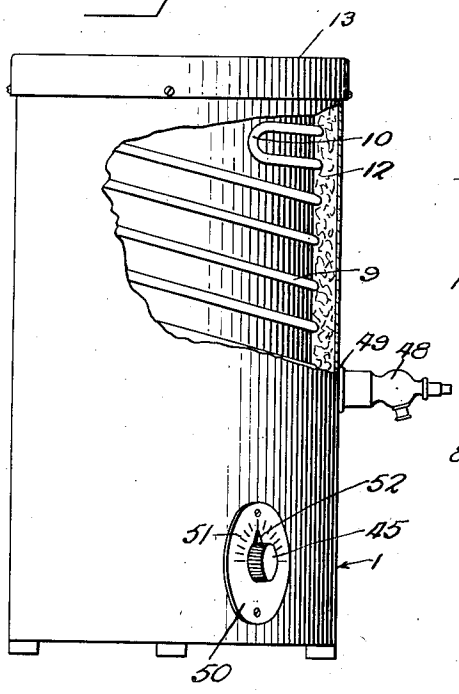


Fig. 2.

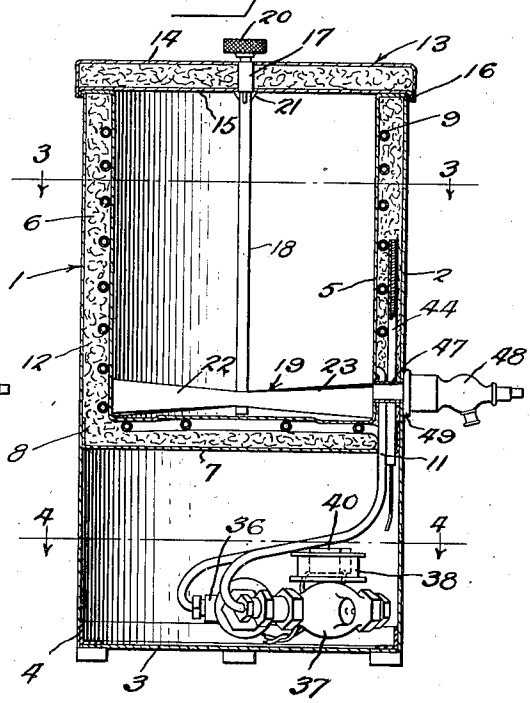
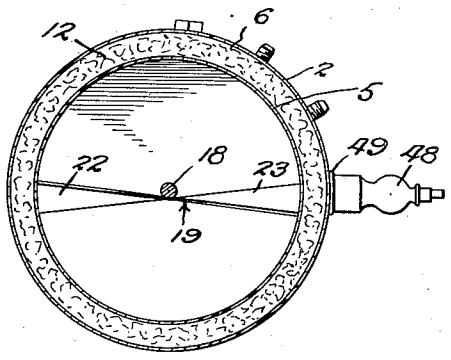


Fig. 3.



Inventor:

B. A. Hill

By Mason Fenwick & Lawrence

Attorneys

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Fig. 4.

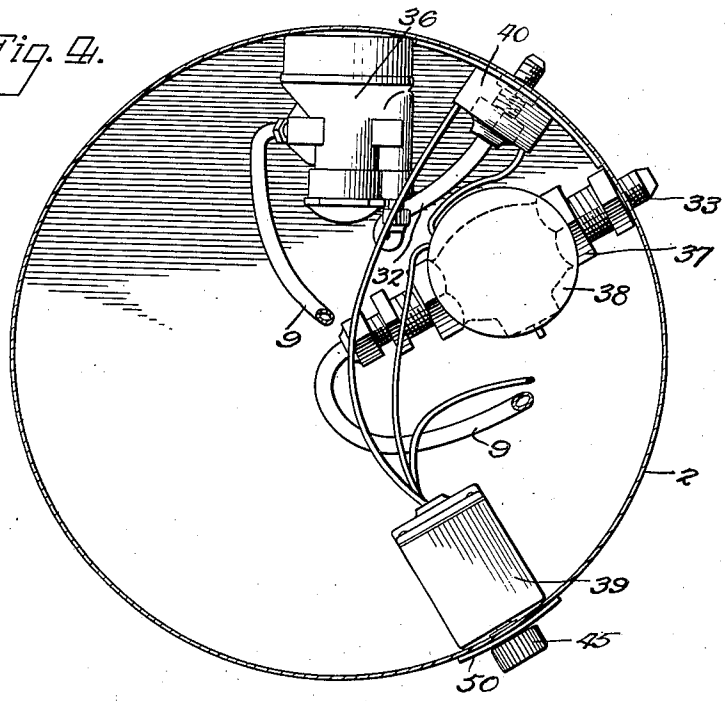
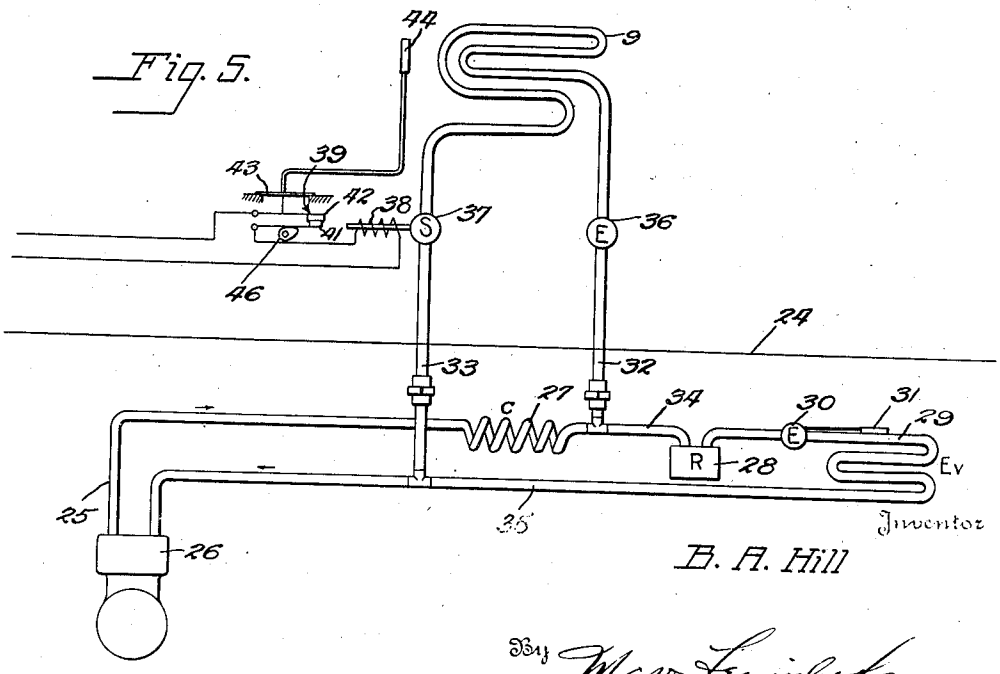


Fig. 5.



Inventor

B. A. Hill

By Mason Fenwick & Lawrence

Attorneys

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UNITED STATES PATENT OFFICE

2,251,736

COUNTER COOLER

Budd Aller Hill, Dallas, Tex., assignor to Counter Cooler Company, Dallas, Tex., a corporation of Texas

Application February 9, 1940, Serial No. 318,187

4 Claims. (Cl. 62—141)

This invention relates to refrigerated dispensers for liquid beverages, which from its preferred location may be called a counter cooler.

One of the objects of the invention is to provide a counter cooler which includes an evaporator coil adapted to be connected in multiple with the liquid and suction limbs of any mechanical refrigeration system, and having an automatic temperature control independently of that of the refrigeration system whereby the normal operation of the refrigeration system is not disturbed by the presence and functioning of the counter cooler.

Another object of the invention is the provision of a cooler of the type described adapted to be connected into any mechanical refrigeration system regardless of the nature of the refrigerant employed in said system, without the necessity of making any adjustment of the refrigerating controls of the cooler.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings throughout the several figures of which the same characters of reference have been employed to designate identical parts:

Figure 1 is a side elevation of a counter cooler embodying the principles of the present invention, part being shown in vertical section;

Figure 2 is a vertical diametrical section;

Figure 3 is a section taken along the line 3—3 of Figure 2;

Figure 4 is taken along the line 4—4 of Figure 2;

Figure 5 is a diagrammatical lay-out of the evaporator and controls of the cooler shown in conjunction with a conventional compressor type mechanical refrigeration system.

Referring now in detail to the several figures, the numeral 1 represents the cooler as a whole. In the illustrated embodiment, the cooler comprises an external, cylindrical shell 2 preferably of sheet metal which at its lower end telescopes over a bottom composed of a circular disc 3 to which a peripheral hoop 4 of angular cross section is secured. If desired, the cylindrical shell may be secured to the bottom but it is preferably slidably removable therefrom so that access may be had to mechanism which is enclosed within the lower part of the shell 2 as will presently appear.

Within the shell 2 and extending from the top thereof to an intermediate point therein is the liquid holding vessel 5 which is preferably seamless and of less diameter than the shell 2 so as to provide an annular space 6 between said shell and vessel. Beneath the vessel 5 and in spaced relation thereto is a transverse partition 7 which may have an upstanding peripheral flange 8 contacting the inner wall of the shell and which may be secured in any suitable manner thereto as by spot welding.

An evaporator coil 9 is wound about the outside of the vessel 5 in close metallic contact therewith so as to provide efficient heat interchange between said coil and the wall of said vessel. The coil is preferably in the form of a loop as shown at 10 in Figure 1, both ends of the coil being arranged adjacent one another as shown at 11 in Figure 2 and passing through an aperture in the partition 7 to the mechanical controls below said partition.

The annular space 6 and the space between the bottom of the vessel 5 and the partition 7 are packed with an insulation mass 12 such as rock wool. The vessel 5 is provided with a lateral discharge nipple 47 extending laterally at a point close to the bottom which is preferably welded to the outside of the vessel and which extends through the shell 2, the extending portion being threaded. A push button cock 48 is screwed to this nipple, preferably having a flange 49 which presses snugly against the shell 2 when the cock is in place. The push button cock is removable to facilitate cleansing the apparatus.

The cooler is provided with a cover 13 having spaced upper and lower walls 14 and 15, the space between said walls being likewise filled with insulating material. The cover is preferably formed with a downwardly extending flange 16 formed by the meeting edges of the upper and lower walls of said cover, said flange forming a rim which prevents displacement of the cover.

In the illustrated embodiment of the invention, the cover 13 is perforated at its center, receiving a bearing 17 through which passes the rotatable stem 18 of an agitator 19. A knurled knob 20 is secured at the upper end of the stem 18, the latter being upset as shown at 21 immediately below the bearing 17 making the agitator unitary with the cover, rotatable but not reciprocable with respect thereto.

The agitator 19 preferably comprises a pair of diametrically extended blades 22 and 23 oppositely inclined so that they have a conveyor effect when rotated. Certain beverages such as orange juice may contain suspended matter such as the orange cells which gradually settle to the bottom of the cooler. By occasional rotation of the agitator, the sedimentary material is stirred

and at the same time lifted by the blades 22 and 23, being again put into suspension.

Figure 5 shows that the evaporator coil 9 of the counter cooler is to be coupled in multiple or shunt relation to the liquid and suction sides of an existing refrigerating system. In this figure the line 24 represents the counter upon which the cooler is set, there being a refrigeration system, represented in general by the reference character 25 somewhere below the counter, even in the basement. It is assumed that this refrigeration system has certain work to do and that it will not be practical or expedient for it to be so modified as to materially reduce its efficiency, or in any way to change its mode of functioning or operation. Figure 5 shows that the refrigeration system comprises a compressor 26, condensor 27, receiver for the liquid refrigerant 28 and an evaporator 29 served by an expansion valve 30, thermostatically controlled by the bulb 31 which may respond to the temperature of the evaporator 29.

The opposite ends of the evaporator coil 9 of the cooler 32 and 33 are coupled in any suitable manner respectively to the gas limb 34 and suction limb 35 of the refrigeration system. An expansion valve 36 admits liquid refrigerant to the evaporator coil 9. This is not a thermostatically controlled expansion valve but one which is set to deliver a quantity of refrigerant to the evaporator coil responsive to pressure variations in said coil. A thermostatically controlled expansion valve is not employed for any one setting of such a valve is good only for the refrigerant for which it is set. It is the purpose of the present invention that it may be used with any refrigeration system irrespective of the nature of the refrigerant employed without the necessity of setting the expansion valve for a particular refrigerant and this can only be accomplished when the expansion valve is divorced from any thermostatic control.

In the present invention the thermostatic control of the refrigerant is transferred to the suction end 33 of the evaporator coil. A valve 37 is intercalated in the suction end preferably controlled by a solenoid 38 through the intermediary of a thermostatically controlled switch 39. The energization circuit for the solenoid terminates in the plug connector 40 which may in any suitable manner be plugged into a house service line. Figure 5 shows that the thermostatic switch may consist essentially of two contacts 41 and 42, the first named of which is in direct connection with one end of the solenoid and the second named of which is connected to the line and movable under the influence of means such as the diaphragm cell 43 in communication with the thermostatic bulb 44. When the bulb 44 warms responsive to the rise in temperature in the evaporator coil 9, pressure is generated in the volatile liquid in said bulb which causes the diaphragm cell to force the contact 42 against the contact 41 as shown in Figure 5, closing the circuit through the solenoid, opening the valve 37, permitting the compressor of the refrigeration system to create vacuum in the evaporator coil which pulls refrigerant of the said coil from the expansion valve 36. When the bulb 44 cools responsive to lowering of the temperature in the evaporator coil 9, the diaphragm cell 43 contracts separating the contact 42 from the contact 41, breaking the solenoid circuit, permitting the valve 37 to close, causing a build-up of pressure in the evaporator coil 9 which reduces or cuts off the admission of liquid refrigerant through the expansion valve 36.

In a cooler of this type, actual freezing never takes place so that a temperature lower than 34° F. is never required. As a matter of fact, the optimum low temperature will ordinarily be some degrees above the freezing point. Regulation of the temperature may be secured by means such as the knob 45 shown in Figure 4 which may rotate a cam 46, shown in Figure 5 which bears against the contact 41 raising or lowering it so as to accelerate or delay the point at which the contacts 41 and 42 will close and operate the valve 37 to admit refrigerant. The knob 45 is shown in Figure 1 in juxtaposition to a plate 50 secured to the shell 2 and having a temperature scale 51, the knob 45 carrying an index 52 which moves in juxtaposition to said scale.

It will be understood by those skilled in the art, from the above description, that the counter cooler of the present invention does not have to be manufactured or adjusted with reference to any particular refrigeration system, but that one single model is adapted to be installed in connection with any existing refrigeration system by the simple expedient of coupling it into the liquid and suction sides of said system and plugging in the electrical connection. It has a refrigerant control system which is altogether insensitive to differences in the nature of the refrigerant which it may encounter in the system to which it is connected and it has its own temperature control which is altogether independent of the temperature control of the refrigeration system and which does not disturb the temperature control of the refrigeration system. By being "parasitic" in its nature, that is by being of the "bleeder" type connected in shunt relation to the main refrigeration circuit, it has no modifying effect upon the functioning or operation of the main refrigeration system and only negligibly affects the efficiency of such system.

While I have in the above description disclosed what I believe to be a preferred and practical form of the invention, it will be understood to those skilled in the art that the details of construction as shown and described are by way of example and not to be construed as limiting the scope of the invention which is defined in the appended claims.

What is claimed is:

1. Counter cooler comprising a casing having an intermediate, transverse partition, a receptacle within the upper part of said casing of smaller diameter than said casing and spaced from the walls thereof and from said partition, an evaporator coil within said space wrapped about said receptacle in close heat exchanging relation thereto, the liquid and suction ends of said coil extending below said partition and being adapted to be coupled respectively to the liquid and suction limbs of any Carnot type refrigeration system, said casing below said partition defining a chamber for the operative controls of said cooler, including an expansion valve at the liquid end of said coil and a thermostatically controlled valve at the suction end whereby the admission of liquid refrigerant to said coil by said expansion valve is indirectly controlled, and a thermostatic bulb above said partition in heat exchanging relation to the suction end of said coil operatively connected to said thermostatically controlled valve.

2. Counter cooler comprising a casing having

an intermediate, transverse partition, a receptacle within the upper part of said casing of smaller diameter than said casing and spaced from the walls thereof and from said partition, an evaporator coil in said space wrapped about said receptacle in close heat exchanging relation thereto, the liquid and suction ends of said coil extending below said partition and being adapted to be coupled respectively to the liquid and suction limbs of any Carnot type refrigeration system, said casing below said partition defining a chamber for the operative controls of said cooler, including an expansion valve at the liquid end of said coil, a solenoid operated valve at the suction end whereby the admission of liquid refrigerant to said coil by said expansion valve is indirectly controlled, a switch in circuit with said solenoid, means for connecting said solenoid circuit to a source of current, a thermostatic bulb above said partition in heat exchanging relation to the suction end of said coil and operatively connected to said switch and means externally of said casing for adjusting said switch to operate at different temperatures.

3. Counter cooler comprising a casing having an intermediate, transverse partition, a receptacle within the upper part of said casing of smaller diameter than said casing and spaced from the walls thereof and from said partition, an evaporator coil in said space wrapped about said receptacle in close heat exchanging relation thereto, the liquid and suction ends of said coil extending below said partition and being adapted to be coupled respectively to the liquid and suction limbs of any Carnot type refrigeration system, said casing below said partition defining a chamber for the operative controls of said cooler, including an expansion valve at the liquid end of said coil and a thermostatically controlled valve at the suction end, whereby the admission of liquid refrigerant to said coil by said expansion valve is indirectly controlled, the space between said receptacle, casing and partition being filled with insulation material.

4. In a counter cooler comprising a casing having an intermediate transverse partition, a receptacle within the upper part of said casing of smaller diameter than said casing and spaced from the walls thereof and from said partition, and having a temperature controlled evaporator coil in said space wrapped about said receptacle in close heat exchanging relation thereto, the ends of which coil are adapted to be connected in shunt relation respectively to the liquid and suction limbs of a refrigeration system, a cover for said receptacle comprising walls forming between them a space, insulation material filling said space, a bushing passing through said cover, a stem rotatably but non-slidably mounted in said cover in unitary relation thereto having an operating knob at its outer end and an agitator at its inner end, said stem being of such length as to place said agitator adjacent the bottom of said receptacle when said cover is in place.

BUDD ALLER HILL.