Sept. 17, 1940. G. B. READ 2,215,192

COOLER APPARATUS

Original Filed Nov. 11, 1935 2 Sheets-Sheet 1

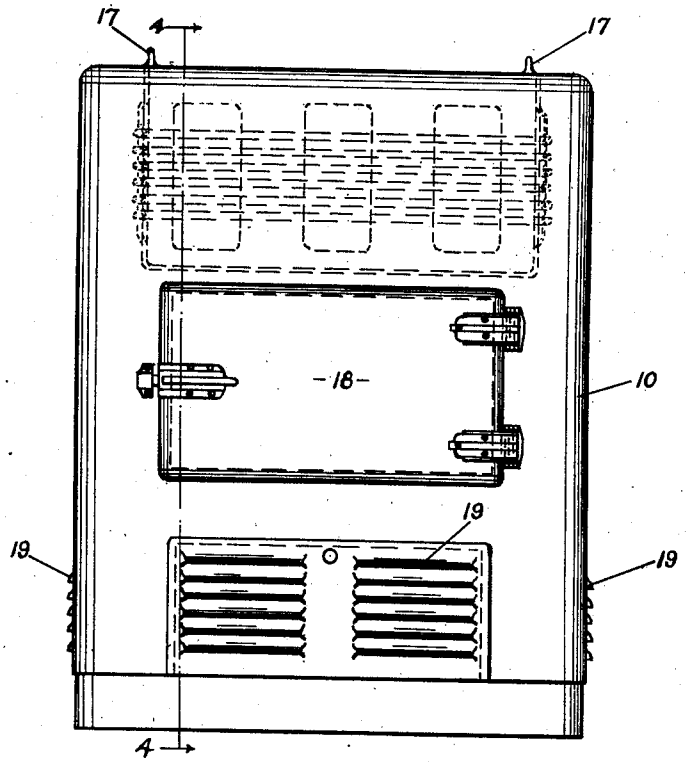


FIG. 1.

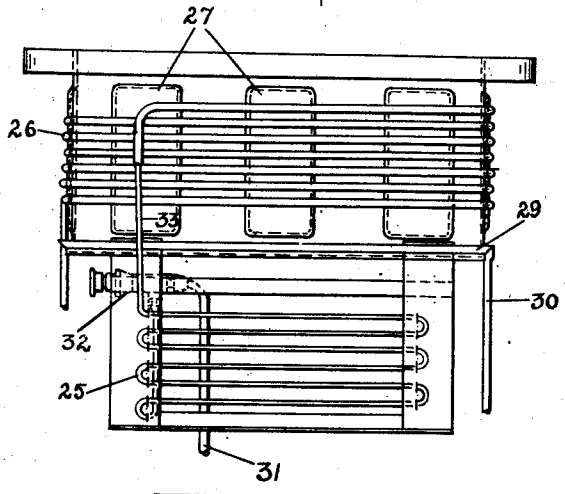


FIG. 2.

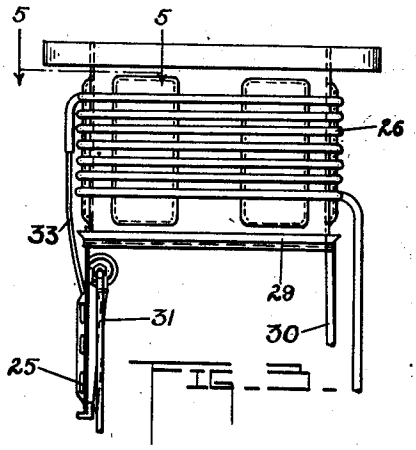


FIG. 3.

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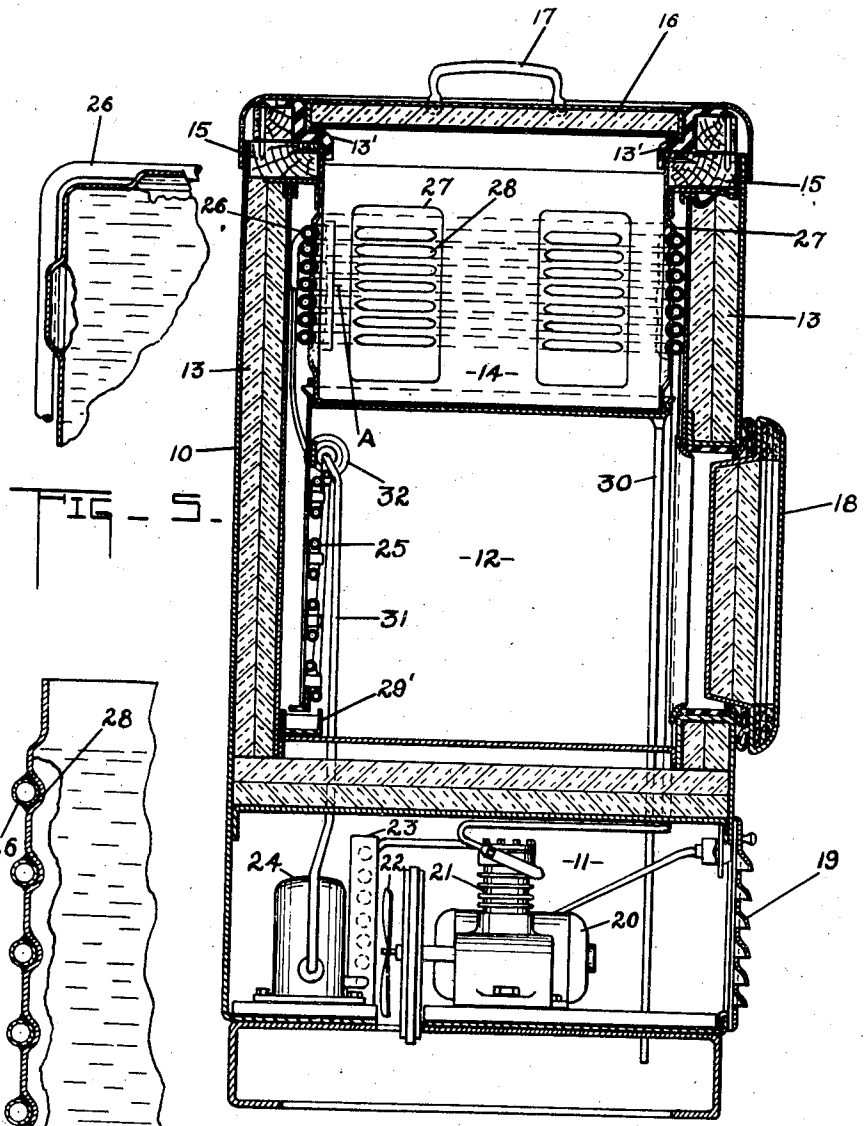


FIG - 5 -

FIG - 4 -

FIG - 6 -

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UNITED STATES PATENT OFFICE

2,215,192

COOLER APPARATUS

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Application November 11, 1935, Serial No. 49,130
Renewed July 13, 1937

8 Claims. (Cl. 62—141)

This invention refers to a bottle cooler of the immersion or wet type such as used by dispensers of bottled drinks.

The principal object of the invention is the provision of an immersion bottle cooler that will maintain a low temperature of the cooling water and form small pieces of ice in embossed recesses of the tank, so as to maintain its full storage capacity, said small pieces of ice being easily detached from the tank to assist the general cooling of the contents.

Another object is to provide a dry storage compartment under the tank and cooled generally by said tank but assisted by additional expansion coils in the storage compartment to make it an effective refrigerator.

Additional objects and advantages will appear in the following description and accompanying drawings in which:

Fig. 1 is a front elevational view of a cabinet containing the elements of my invention;

Fig. 2 is a side elevational view showing elements of my invention as the same are arranged for practical use;

Fig. 3 is an elevational view of the device as the same would appear when seen from the right in Fig. 3;

Fig. 4 is a sectional elevational view taken on line 4—4 in Fig. 1;

Fig. 5 is an enlarged fragmental sectional plan view taken approximately from line 5—5 in Fig. 3; and

Fig. 6 is an enlarged fragmental sectional detail view of the portion included in the bracket designated A, in Fig. 4.

In carrying out my invention I utilize a cabinet 10, which may have any exterior appearance found desirable.

Fig. 4 illustrates that the interior of the cabinet is divided into two main portions, a lower portion 11 adapted to house a compressor unit and an upper chamber 12 surrounded by insulated walls 13.

In the upper portion of chamber 12 I disposed a tank 14 adapted to contain water. The tank is preferably supported or suspended by means of its upper edges being attached to structural members 15 which, as clearly shown in Fig. 4, rest upon the upper edges of the wall structure 13.

The cabinet is provided with an opening lying over tank 14, and this opening is closed by means of a cover member 16, which is provided with handles 17, the cover being constructed to provide suitable insulation and resting upon shoulder portions 13' formed in the cabinet structure.

Tank 14 is so dimensioned as to occupy only a portion the height of chamber 12, and that portion of the chamber lying below the tank thus becomes an open area to which access is had by means of a door 18 hinged to the front of the cabinet. The plan dimensions of the tank are made smaller than the interior dimensions of chamber 12. There is thus provided an open area between the tank and walls of the cabinet which permits free circulation of air from the open area of the chamber up and around the tank.

Suitable ventilating louvers 19 are provided in the base portion of the cabinet to permit circulation of air around the compressor unit.

The compressor unit comprises a conventional motor 20, compressor 21, a fan 22, radiator 23, and reservoir 24. The motor 20 has connection with the power source and the operation of the unit is automatically controlled by means of conventional switching devices which are operated responsively to temperatures within chamber 12. Control devices of the type mentioned are thought sufficiently well known to obviate detailed description.

The heat absorption devices of my cooler consist of a coil 25 disposed vertically in the open portion of chamber 12 and a coil 26 surrounding the tank 14. It will be noted, especially in Figs. 2 to 5, that the walls of tank 14 are so formed as to have a series of recesses 27, which are spaced apart on the vertical walls of the tank as shown in the several views.

The recesses are offset from the inside of the tank in such a manner as to form a series of outset portions on the exterior surface of the tank and the back walls of the recesses are provided with series of horizontal indentations or trough portions 28. These trough portions are adapted to receive and partially embed the pipes of coil 26 in the manner shown best in Figs. 5 and 6. The pipes may, or may not, be soldered, or otherwise attached in the troughs. The arrangement obviously provides relatively large areas of metallic contact between the walls of the pipes and metal of the tank wall.

The recesses 27 are spaced apart on the tank walls as above noted and are so dimensioned that the pipes, lying in the troughs 28, are spaced slightly away from the tank walls in the spaces between the recesses.

Due to the metallic contact noted, heat is more efficiently conducted in the areas adjacent the troughs 28. Ice will obviously be formed more or less rapidly in these areas, whereas in

the spaces between the recesses heat is less efficiently conducted and the formation of ice will be less rapid. By suitable adjustment of refrigerant expansion I am enabled to regulate the formation of ice so as to confine it substantially to the area of recesses 27. The usual formation is roughly indicated in Figs. 5 and 6.

It will be noted that the ice occupies the area of the recesses and protrudes little, if any, into the tank. Thus, the full area of the tank is available for storage of beverages and the like and at the same time numerous surfaces of ice are exposed to the water to promote proper cooling thereof.

The interior surfaces around troughs 28 and about the edges of recesses 27 are all rounded in such a manner that no anchorage is provided, so that the ice formed in the recesses is easily removed, or quickly disengages itself when the temperature in coil 26 rises above the freezing point. The ice thus removed is obviously in the form of small pieces which quickly float away and are melted in the water.

Surrounding the bottom of tank 14 is a trough 29 having connection with a drain pipe 30 which provides means for collecting water forming on the exterior of the tank. A frost pan 29' is disposed below the coil 25 for the purpose of collecting water draining from the coil.

In Fig. 4 it is shown that the reservoir 24 of the compressor unit is connected by means of a pipe 31, through a control valve 32 with the coil 25 and that coil 25, Fig. 2, is connected with coil 26 through a pipe 33, the return line from coil 26 being connected with the compressor unit in the usual way.

It is to be noted that coil 25 is made up from tubing having a comparatively small cross section area, the length being made suitable for the purpose of providing proper expansion and heat absorption area to cool chamber 12, and that coil 26 is made from tubing having a relatively larger cross section area, its length being made so as to provide suitable expansion and heat absorption area for proper cooling of the water in tank 14.

It will now become apparent that compressed refrigerant passing from reservoir 24 first passes into coil 25, under control of valve 32, and therein expands to an extent limited by the total cubical area in the coil. Thence it passes into coil 26 which has considerably larger expansion area. Thus the refrigerant is expanded in two stages, the first stage taking place in coil 25, and the second stage taking place in coil 26. By selecting the proper sizes of pipe and arranging their length so as to provide expansion areas of suitable proportionate sizes I accomplish proper and satisfactory cooling of the open area below the tank and in the tank itself.

By the means described I have provided a cooler apparatus having the advantages of better distribution of cooling area, more perfect cooling effect, and simplicity.

Modifications of structure are obviously possible without alteration of the principle involved. I do not wish to be limited in structure or function except within the scope of the appended claims.

What I claim is:

1. A cooling cabinet device including in combination a cabinet, a chamber in the cabinet, a tank in the upper portion of the cabinet, a refrigerating system in the cabinet including an expansion coil surrounding the tank, the walls of said tank being provided with a plurality of recessed portions offset from the inner surfaces of the tank, the pipes of said coil being in metallic contact with the outer surface of said recessed portions and spaced away from the remaining portions of the walls whereby heat is absorbed more rapidly in the area of said recessed portions due to more efficient conduction and water in the tank is more rapidly formed into ice in said recessed portions.

2. A device of the class described including in combination a cabinet, an insulated chamber in the cabinet, a tank in the upper portion of the cabinet, a refrigerating system in the cabinet including an expansion coil surrounding the tank, the walls of the tank having a series of recesses formed therein, said recesses being offset from the interior surfaces of the walls and lying vertically with respect thereto, a series of indentations lying crosswise of said recesses and longitudinally of the pipes of said coil, the indentations providing recesses in the outer surface of the walls adapted to permit limited imbedding of the pipes in the outer surfaces of the recesses with increased area of metallic contact between said pipes whereby to promote more rapid absorption of heat and consequent formation of ice in the water, said formation of ice being substantially confined to the area of said recesses.

3. A bottle cooler having a water tank for the immersion of bottles, a food storage compartment disposed under said tank deriving heat absorption therefrom, an expansion coil in the food storage compartment and an expansion coil around the tank not contacting its surface except at certain embossed areas where effective thermal contact is made by the coils to cause the formation of relatively small easily removable pieces of ice.

4. A bottle cooler having a water tank for the immersion of bottles, a food storage compartment disposed under said tank deriving heat absorption therefrom, an expansion coil in the food storage compartment and an expansion coil around the tank contacting its surface on relatively small outwardly embossed areas of the tank where effective thermal contact is made by the coils to cause the formation of relatively small pieces of ice in said embossed recesses to maintain the effective storage capacity of the tank.

5. In a refrigerating bath, a sheet metal container having a series of spaced pocket-like depressions in the wall thereof, said depressions having a series of indentations to receive and fit an evaporator coil and refrigerating mechanism including an evaporator coil having portions arranged in contact with said pockets by their fit in said indentations and in heat transfer relation thereto and having other portions spaced from the remaining portions of said wall.

6. In a refrigerating bath, a sheet metal container having a series of spaced pocket-like depressions in the wall thereof, said depressions having a series of indentations to receive and fit an evaporator coil, refrigerating mechanism including an evaporator coil having portions arranged in contact with said indentations and in heat transfer relation with the pockets and having other portions spaced from the remaining portions of said wall and means for controlling said refrigerating mechanism whereby when ice is formed under incidental favorable conditions,

it forms within said pockets and under reverse conditions is melted free of said pockets.

7. The combination with a tank, of a refrigerating coil structure secured thereto, said tank including a wall structure made of sheet metal having spaced parallel portions pressed outwardly therefrom, said depressions having a series of indentations to receive and fit the refrigerating coil, and said coil extending transversely across said portions and secured thereto in heat transfer relation by contact with said indentations.

8. In a refrigerator, a cabinet having an upper compartment and a lower compartment, the upper compartment being provided with a tank arranged therein in such fashion as to provide a space between the walls of the tank and the walls of the cabinet and a space between the bottom of the tank and bottom of the upper compartment to permit free circulation of convection currents between said spaces, said tank wall being provided with a series of spaced channels and a refrigerating evaporator in the form of a coiled conduit in said space between the walls of the tank and cabinet and arranged to cooperate with the wall channels of the tank in such fashion as to cause spaced ice formations to be built up on the inner faces of the walls of the tank in the channels thereof when the tank contains water.

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