April 5, 1966 R. M. JEPSON 3,243,965

COOLING CABINET

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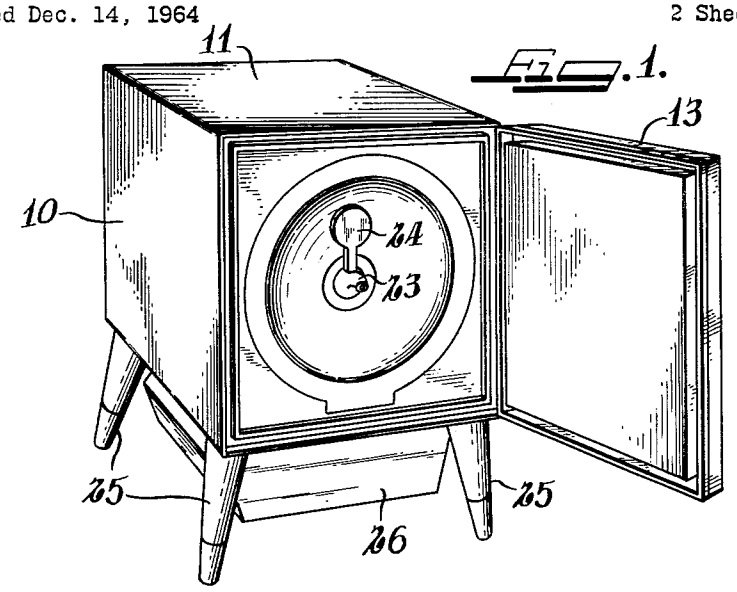


FIG. 1.

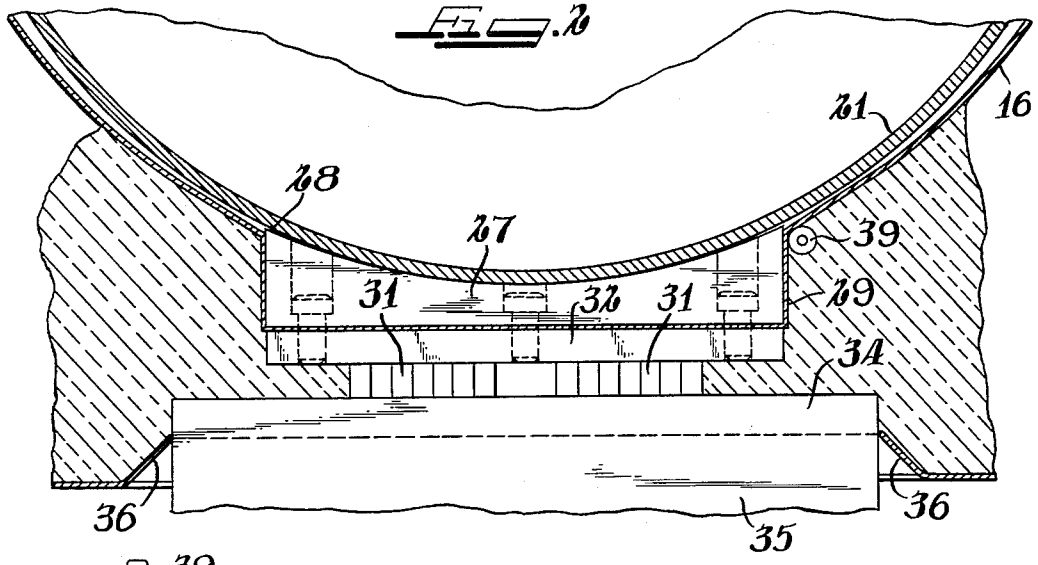


FIG. 2.

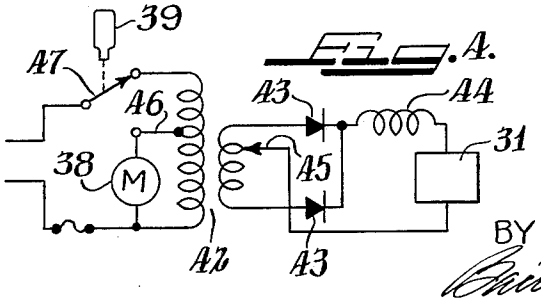


FIG. 4.

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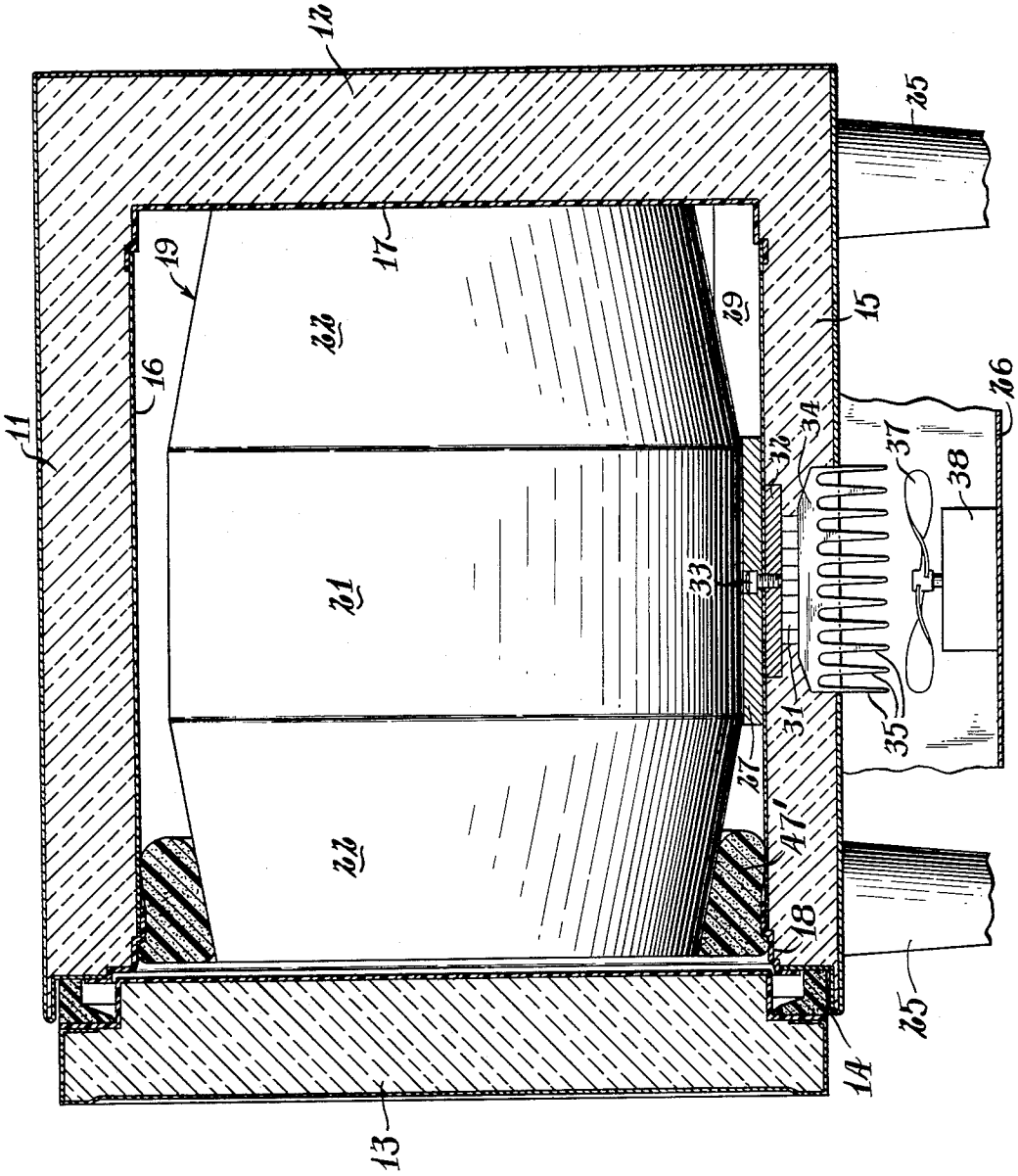


FIG. 3.

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COOLING CABINET

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8 Claims. (Cl. 62—3)

This invention relates to cooling cabinets and more particularly to a self-contained cooling cabinet for liquids in separate containers.

The practice of marketing potable beverages in relatively large containers has recently attracted a great deal of interest in the market. Various plans for selling milk in containers holding approximately two to three gallons have been proposed and have been placed in practice. It has also been proposed recently to sell beer in metal containers holding about two to three gallons and provided with a tap through which the beer can be dispensed.

The liquid containers either for milk or beer, or other beverages are normally intended to be placed in the usual household refrigerator with the contents being withdrawn as desired through a suitable faucet or tap. It has been found, however, that many household refrigerators will not accept containers of this type and even where they will, crowding of the refrigerator storage space is extremely apt to result. It therefore becomes desirable to provide a separate cooling cabinet to receive relatively large containers of the type referred to. Use of a separate cabinet is also desirable to enable the containers and the liquid therein to be maintained accurately at the desired temperature, either higher or lower than that in the food storage compartment of a household refrigerator, and without the fluctuations in temperature which inevitably result from frequent opening and closing of the door of a household refrigerator.

It is accordingly an object of the present invention to provide a cooling cabinet of the general character referred to above which will maintain a liquid container cooled within the desired temperature range, which is easy to load and unload and which occupies a minimum amount of space.

Another object is to provide a cooling cabinet in which the liquid container is cooled by being supported on a saddle which is in turn cooled to cool the container and its contents.

According to a feature of the invention, the container is formed with a cylindrical wall portion and the saddle is formed with a cylindrical seat of a slightly larger radius than the cylindrical wall portion of the container and on which it rests. This construction leaves narrow spaces at the sides of the seat which will quickly fill with condensate thereby to insure efficient heat transfer between the seat and container throughout the entire area of the seat.

Still another object is to provide a cooling cabinet in which the saddle is cooled by a thermoelectric cooling unit secured to the saddle and projecting through an opening in the bottom of the cabinet.

According to a feature of the invention, the cooling unit includes a thermoelectric module secured in heat transferring relation to the saddle and having a finned plate secured to the module with the fins thereon projecting through an opening in the bottom of the cabinet and exposed to atmosphere. Preferably a fan is provided to circulate air over the fins to remove the heat efficiently therefrom.

According to another feature of the invention a thermostatic control is provided which controls the voltage applied to the thermoelectric module thereby to control the rate of heat transfer and which preferably also controls the fan speed.

According to a specific object and feature of the invention, the container is tapered at its ends and a filler ring of resilient spongy material is provided fitting between the exposed reduced end of the container and the open end of the cabinet to fill the space therebetween. This ring reduces the exposed area of the container when the cabinet door is opened to minimize heat loss and also tends to soak up and hold condensate to prevent dripping or spilling.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a cooling cabinet embodying the invention with a container therein;

FIG. 2 is a partial vertical section transverse to the axis of the container;

FIG. 3 is an axial section with the container shown in elevation; and

FIG. 4 is a wiring diagram illustrating the control.

The cabinet, as shown in FIG. 1, is of generally rectangular outline with insulated side walls **10**, an insulated top wall **11**, an insulated back wall **12** and an open front. The front may be closed by an insulated door **13** hinged at one vertical edge to the cabinet and swingable between open and closed positions. As shown in FIG. 3, a sealing ring **14** of relatively soft resilient material is carried by the door adjacent to its periphery to seal against the end of the cabinet walls. The bottom of the cabinet is closed by an insulated wall **15**, as seen in FIG. 3, which is formed with an opening therein, as described more fully hereinafter.

The innner wall of the cabinet, as shown at **16**, is of cylindrical circular section spaced from the outer cabinet walls to receive insulation therebetween. The inner cabinet wall may conveniently be formed of a plastic material and is closed at one end by a cap **17** which may also be of plastic although sheet metal could be used for both the inner wall and the cap, as desired. At the open end of the cabinet, a molded ring **18**, preferably of plastic material, fits within the end of the inner liner **16** and closes the space between it and the cabinet outer wall, as shown. The cabinet is adapted to receive a liquid container which is preferably formed of metal, such as aluminum, having a good heat conductivity and which is of a size substantially to fill the cabinet but to be received comfortably therein.

As seen in FIG. 3, the container, indicated generally at **19**, has a central section **21** of a circular cylindrical shape and conically tapered end portions **22**. At one end the container is provided with a faucet or tap **23**, as shown in FIG. 1, provided with an operating handle **24** through which liquid in the container may be dispensed.

The cabinet is preferably supported on short legs **25**, as shown in FIG. 1, which space its bottom wall above a supporting surface so that the faucet or trap will be at a convenient distance above the supporting surface. This construction also provides room for a housing **26** to be mounted beneath the cabinet to receive a power unit and a motor driven fan for effecting the cooling as well as having ample room beneath the unit to permit wiping up of any spillage.

According to the present invention, a container **19** within the cabinet is supported on a saddle **27** formed of metal having good heat conducting properties and provided with an upper partially cylindrical surface. As best seen in FIG. 2, the cylindrical upper surface of the saddle is of a slightly larger radius than the cylindrical wall portion **21** of the container so that the container wall will bottom against the saddle in the central portion thereof and will leave narrow tapered openings **28** between the saddle and container wall portion at the sides of the

saddle. This construction insures that the container will seat fully in the saddle with no possibility of its being supported merely along lines at the edges of the saddle to leave an air space in the central part of the saddle which would interfere with effective heat transfer. The small spaces 28 will quickly be filled with condensate as the unit is operated so that there will at all times be an efficient heat conducting contact between the container wall and the saddle throughout the full saddle area.

It will also be noted from FIG. 2 that the inner liner 16 is offset at the bottom portion thereof to define a generally rectangular channel 29 in which the saddle is received. The vertical side edges of the channel 29 are made slightly shorter than the vertical side edges of the saddle so that the edge portions of the saddle will project radially inward of the inner liner 16 a short distance. This feature insures that the container cannot rest on the inner liner and particularly at the edges where the channel 29 joins the cylindrical upper portion of the liner to interfere with good heat transferring contact between the saddle and the container.

The saddle is cooled by one or more thermoelectric modules 31, two modules being shown in FIG. 2. Each of these modules is of a more or less conventional construction and may take the form more particularly disclosed and claimed in my co-pending application Serial No. 146,796. The upper or cold surface of each module is secured to a plate 32 which is in turn fastened to the under surface of the channel 29 in registration with the saddle, as best seen in FIG. 3. The plate and saddle may be secured together by screws 33 which are preferably recessed into the saddle as shown.

The lower surface of the modules is secured to a heat transfer plate 34 which is provided with a plurality of relatively deep downwardly extending fins 35. The bottom wall of the cabinet is formed with an opening of a size to permit the fins 35 to project partially therethrough, as seen in both FIGS. 2 and 4. Preferably tongues 36 are cut out from the bottom outer wall of the cabinet and are bent up, as seen in FIG. 2, to engage the plate 34 at the roots of the fins 35. This construction enables maximum fin area to be provided for maximum cooling while minimizing the overall depth of the cooling unit. Preferably a fan 37 driven by an electric motor 38 is mounted in the casing 26 beneath the fins to circulate air thereover for efficient heat transfer, it being understood that the casing 26 is formed with one or more perforated walls through which air can circulate for cooling.

The rate of cooling may be regulated thermostatically by a thermostat, such as bulb 39, mounted adjacent to the juncture of the side walls of channel 29 with the cylindrical liner 16, as shown in FIG. 2. The bulb 39 may control a switch 47, as shown in FIG. 4, which operates both to adjust the cooling rate of the thermoelectric modules 31 and to vary the speed of the fan motor 38.

As shown in FIG. 4, the thermoelectric modules and the fan are both powered from a transformer 42 whose primary may be supplied from the usual 115 volt A.C. outlet. The secondary of the transformer is connected at its ends through recifiers 43 and a choke coil 44 with one side of the modules 31. The other side of the modules is connected to a center tap 45 on the transformer secondary. The motor 38 may be a variable speed A.C. motor connected between one side of the transformer primary and a tap 46 on the transformer primary. A switch 47 controlled by the thermostat 39 connects one side of the power supply either to the tap 46 or to the end of the primary.

When maximum cooling is required the switch 47 will be moved by the thermostat 39 into contact with the tap 46 to provide maximum voltage on the modules and full line voltage on the fan motor. At this time, the modules will function at maximum effectiveness to cool the saddle 27 and the motor 38 will also be operated at maximum speed to circulate air over the fins 35 thereby to dissipate the heat. As the temperature reaches the desired control point, the switch 47 will be moved to the position shown in FIG. 4 in engagement with the end of the primary to reduce the voltage applied to the modules and simultaneously to reduce the fan motor voltage from, for example, 117 volts to about 75 volts. Therefore, the rate of heat transfer effected by the modules will be reduced and simultaneously the fan speed will be reduced to reduce the cooling rate and the fan noises. By properly proportioning the parts the cooling rate at this time may be adjusted to be just sufficient to maintain the desired temperature in the cabinet.

In order to minimize heat loss when the cabinet door is open and to prevent dripping or spillage of condensate from the cabinet an annular ring 47', preferably formed of sponge rubber or like material, is provided to fill the space between the tapered end of the container and the open end of the cabinet, as shown in FIG. 3. This ring may be a slightly wedge-shaped section and is preferably normally slightly larger than the space between the container end and the cabinet liner so that it must be pressed into position, as shown. When in position, this ring will close the space between the container end wall and the cabinet liner so that the area of the container exposed to atmosphere when the door 13 is open will be minimized. Also, the ring being of a porous material will tend to soak up and hold condensate to minimize dripping or spillage when the cabinet door is opened. Instead of a full ring as shown, spongy absorbent material could be placed only in the channel 29 to catch and retain condensate and spillage.

While one embodiment of the invention has been shown and described herein, it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention reference being had for this purpose to the appended claims.

What is claimed is:

1. A cooling cabinet for liquid containers comprising a cabinet structure having insulated walls defining a space to receive a liquid container having a cylindrical wall and open at one end for insertion and removal of a liquid contained, a saddle in the bottom of the cabinet formed of heat conducting material and forming a seat to receive and support a liquid container in heat conducting relationship therewith, and a heat transfer device secured to the bottom of the saddle and projecting through the bottom of the cabinet into heat transfer relationship with the surrounding atmosphere, the saddle having an upper cylindrical surface of slightly greater radius that the radius of the cylindrical container wall to be supported thereon.

2. A cooling cabinet in combination with a liquid container having a cylindrcal metal heat conducting wall, the cabinet comprising an inner wall cylindrical throughout most of its circumference and offset at its bottom to define an axially extending recess, the inner wall being open at one end for insertion and removal of a liquid container, a metal heat conducting saddle secured in the recess having an inner cylindrically curved seat to receive the cylindrical wall, the seat being formed on a radius slightly greater than the radius of the cylindrical container wall, and cooling means connected to the seat to cool it.

3. A cooling cabinet in combination with a liquid container having a cylindrical metal heat conducting wall, the cabinet comprising an inner wall cylindrical throughout most of its circumference and offset at its bottom to define an axially extending recess, the inner wall being open at one end for insertion and removal of a liquid container, a metal heat conducting saddle secured in the recess having an inner cylindrically curved seat to receive the cylindrical wall, the seat being formed on a radius slightly greater than the radius of the cylindrical container wall, the cabinet having an outer wall spaced from the inner wall, the outer wall having an opening

therein registering with the saddle, a heat transfer unit including a first plate secured to the outer surface of the saddle, a thermoelectric module having one side secured to the first plate, and a second finned plate secured to the other side of the module with fins thereon exposed to atmosphere through the opening in the outer wall.

4. The cooling cabinet of claim 3 in which the fins on the second plate terminate within the outline of the outer wall and the outer wall is bent inwardly at the ends of the second plate in line with the root ends of the fins and including a fan to circulate air over the fins.

5. The cooling cabinet of claim 4 including a power source for the module and the fan and thermostatic control means responsive to the temperature in the cabinet controlling the power source thereby to control the effective cooling rate of the module and the speed of the fan.

6. The cooling cabinet of claim 2 in which the side portions of the saddle project radially inward of the inner wall to insure that the container will be supported solely on the saddle.

7. A cooling cabinet in combination with a liquid container having metal heat conducting walls cylindrical in the central part of the container and tapering to reduced ends, the cabinet including an inner wall cylindrical

throughout most of its circumference and offset at its bottom to define a recess, the inner wall being closed at one end and open at its other end for insertion and removal of a container, a saddle of heat conducting material in the recess having an inner cylindrically curved seat to receive the cylindrical central part of the container, cooling means connected to the saddle to cool it, and a ring of compressible water absorbent material fitting in the open end of the inner wall and around the adjacent reduced end of the container and closing the space therebetween.

8. The cooling container of claim 7 including a door to close the open end of the cabinet.

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