

June 6, 1933.

L. C. SMITH

1,913,345

APPARATUS FOR COOLING BEVERAGES

Filed March 29, 1932

2 Sheets-Sheet 1

Fig. 1

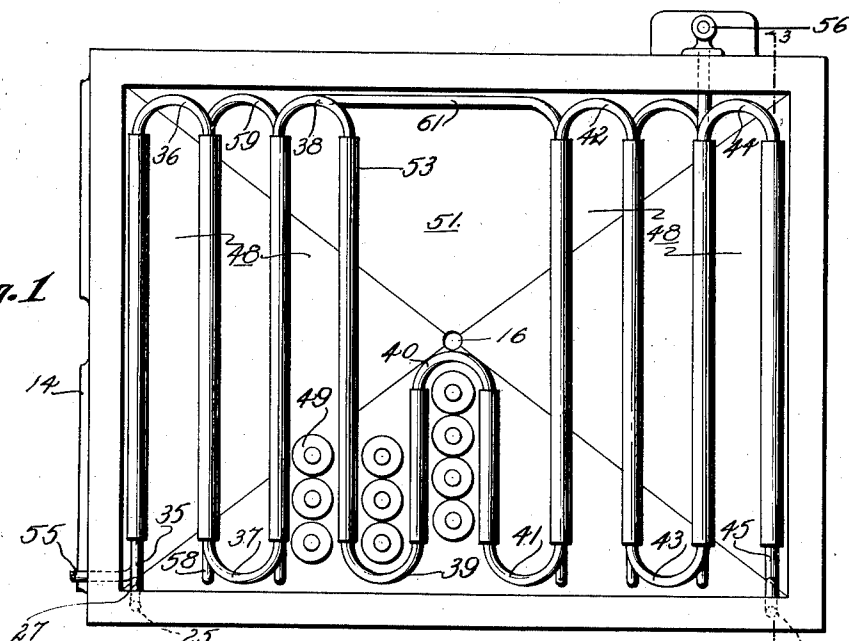
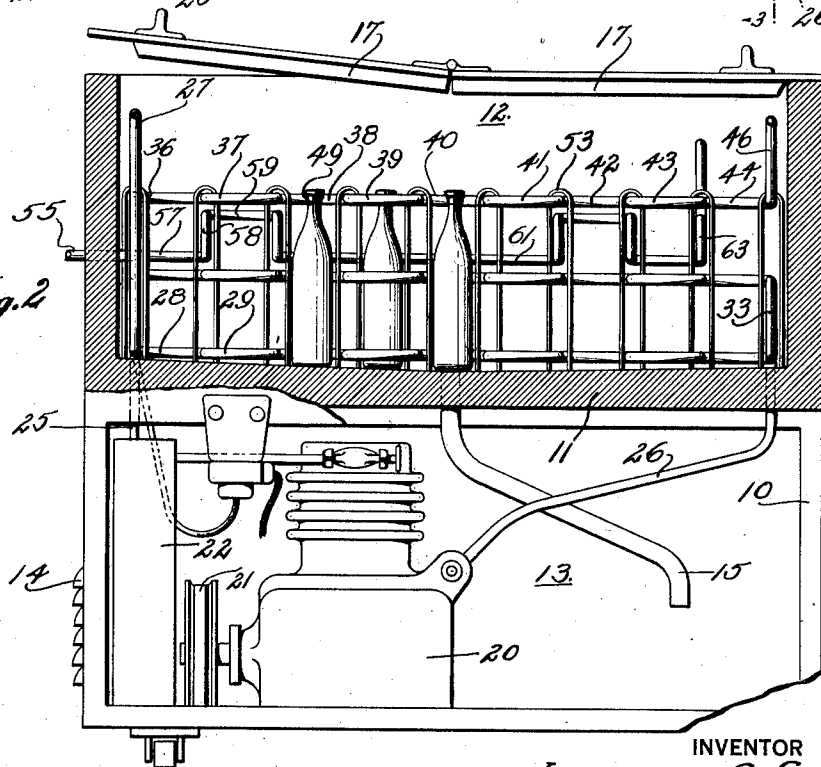


Fig. 2



INVENTOR  
LAWRENCE C. SMITH  
BY *Albert R. Henry*  
ATTORNEY

June 6, 1933.

L. C. SMITH

1,913,345

APPARATUS FOR COOLING BEVERAGES

Filed March 29, 1932

2 Sheets-Sheet 2

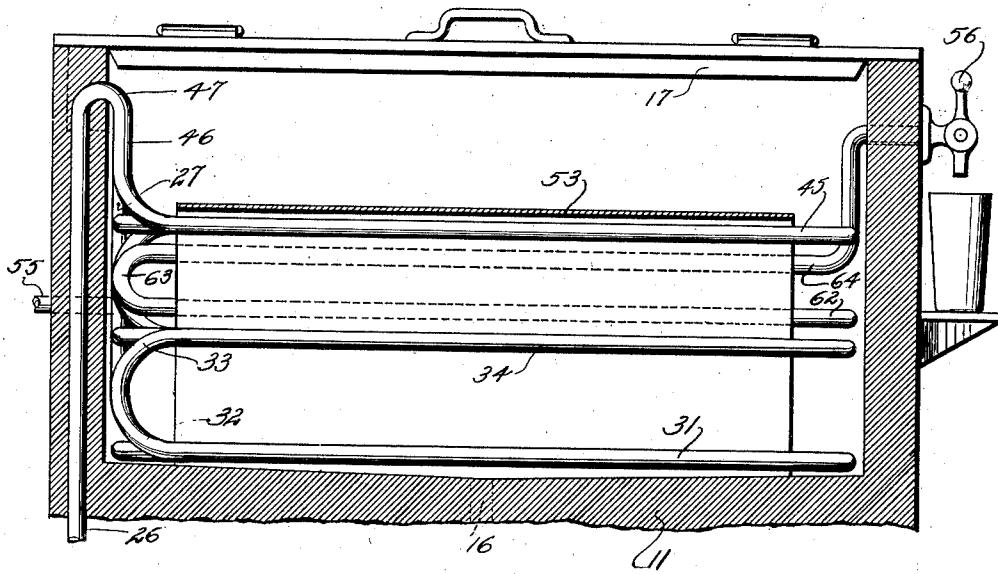


Fig. 3

LAWRENCE C. SMITH  
INVENTOR

BY *Allet R. Henry*  
ATTORNEY

## UNITED STATES PATENT OFFICE

LAWRENCE C. SMITH, OF BUFFALO, NEW YORK

## APPARATUS FOR COOLING BEVERAGES

Application filed March 29, 1932. Serial No. 601,749.

My invention relates to apparatus for cooling beverages, and it has particular reference to a refrigerated cabinet or container from which there may be dispensed or served packaged goods and bottled and bulk potable liquids.

It is desirable to serve various beverages or potable liquids such as water, carbonated drinks, and the like, at reduced temperatures, and, to facilitate such service, to provide a refrigerated cabinet in which the beverage may be stored and chilled prior to serving. Various forms of cabinets intended for this use have been heretofore devised to include a water bath in which the bottles are kept, and from which they are served in a wet condition, which is unsatisfactory from the viewpoint of the purchaser. In other forms, such as is shown in my prior application, Serial No. 502,553, filed December 15, 1930, the arrangement is such that dry compartments are provided for each bottle, so that, upon service, no water or other refrigerating liquid is present to drip on the customer, and the bottle and its contents are known to be properly chilled.

The present invention relates to an improved form of refrigerating cabinet, wherein bottled beverages are quickly and effectively chilled to the proper serving temperature without immersion in a wet bath, and wherein provision may also be made for dispensing bulk beverages, such as drinking water or carbonated liquids contained in a separate receptacle. In general, the invention has as its object the provision of an improved beverage cooling apparatus, which is efficient from both the viewpoints of refrigerating capacity and facility in service. The inventive principles involved, by means of which this object is attained, will be made apparent from the following description of a typical embodiment, illustrated in the accompanying drawings, wherein:

Fig. 1 is a plan view of a cabinet, showing refrigerating coils positioned therein, with a number of bottles between certain convolutions of the coils;

Fig. 2 is a view, partly in section and part-

ly in elevation, of the cabinet and parts of the refrigerating equipment; and

Fig. 3 is a view on the line 3—3 of Fig. 1, drawn on a somewhat larger scale.

Referring first to Figs. 1 and 2, the cabinet comprises a rectangular frame 10 having a substantially continuous deck 11 disposed at about the midportion thereof, dividing the entire apparatus into an upper box portion 12, in which the refrigerating effects are obtained, and a lower portion 13, in which is mounted the apparatus for handling the refrigerant. The frame 10 is formed of light structural iron, and the deck 11, as well as the side walls of the upper portion 12, are formed of spaced sheet metal plates, between which is disposed suitable insulating material, such as felt, aerated plaster, or the like. The details of construction here involved are well understood, and hence need no further description. It may be added that the outer surfaces of the lower portion of the box are covered with sheet metal plates of ornamental appearance, and at least one wall is provided with louvres 14 at its lower portion, to admit air to the refrigerant condensing coil. The top portion of the deck 11 is pitched from its edges to the center of the compartment 12, so that any condensed moisture may drain out through a centrally located pipe 15, communicating with the box 12 through an aperture 16 disposed in the deck 11.

The top of the compartment 12 is covered by a pair of mutually hinged lids 17 formed to engage the top marginal edges of the side walls, so that, in service, access may be had to either side of the compartment 12, without exposing the other side.

The refrigerant supply mechanism is mounted in the lower portion 13 of the apparatus. The refrigerating plant may be of any suitable type, and is here shown as a compressor-condenser-evaporator system, including a compressor 20 driven through a belt 21 by an electric motor (not shown), by means of which warm gaseous refrigerant is compressed and delivered to a condenser 22, and from which it is delivered to a pipe coil or evaporator mounted in the compartment

12. As systems and apparatus of this nature are well known in the art, and a variety of types may be employed in the present invention, further description is deemed unnecessary, except to say that the mechanism delivers working refrigerant to the compartment 12, through an intake pipe 25 in response to the demands for refrigeration, and withdraws expended or vaporized refrigerant through a pipe 26, for return to the compressor 20.

Features of the invention, other than those found in the general combination of parts described above, reside in the disposal of the refrigerant coils in the box 12, between the intake and discharge pipes 25 and 26. It will be understood, of course, that, in response to the demands for cooling effects in the compartment 12, liquid or vaporized refrigerant is admitted, through suitable controlling valves, thermostats, or the like, to the coil in the box. Expansion of the refrigerant, and a cooling effect, is obtained as the refrigerant moves from its inlet to its outlet, so that potable liquid, contained in or flowing through the cabinet, is brought to a suitable low temperature.

As shown in the various figures of the drawings, the expansion coil, in which evaporation and expansion of the refrigerant occurs, is in the general form of serpentine and superimposed convolutions of a continuous pipe, one end of which is attached to the intake pipe 25, and the other end of which terminates in the outlet pipe 26. The specific method of disposing the coil may be described or traced as follows. Beginning with the pipe 25, which passes through the insulation in the rear wall of the compartment 12, the coil passes downwardly, as indicated by the numeral 27, to a point adjacent the lower deck 11, and thence is turned at a right angle to follow the lower deck 11 to a point adjacent the side wall opposite the pipe 25. Here the pipe makes a return bend 28, in the plane of the deck 11, to follow the first described length of pipe lying in the deck, and, upon approaching the rear wall of the box, again makes a return bend, as indicated at 29. In this fashion, the coil follows a serpentine path along the bottom of the compartment 12, winding from side wall to side wall, with the successive convolutions definitely spaced, for reasons hereinafter set forth.

Arriving at the opposite end of the box as indicated by the numeral 31 (Fig. 3), the coil now is bent upwardly through a right angle 32, to follow the rear wall of the box, and is then again bent through another right angle 33, to direct the coil into a horizontal direction, and in the vertical plane passing through the bend 31, or, in other words, parallel to the end wall of the compartment 12. The coil now passes, in the elevated plane, over the several convolutions first formed, lying in

the plane of the deck 11, and so eventually arrives at a point adjacent the pipe 27. At this point, the pipe is again bent upwardly and then back on itself, to form a third tier of convolutions, which may be traced in Fig. 1 and Fig. 2 by the reference numerals 35 to 45 inclusive. There is thus repeated, in an elevated plane, the path of the lower convolutions, and the pipe is now bent upwardly, as indicated by the numeral 46, and thence downwardly through an angle 47, to pass through the insulation in the side wall of the box, and thence to communicate with the discharge or outlet pipe 26.

By this formation of the expansion coil, there is formed a self sustaining structure, in which the various superimposed convolutions or lengths of pipe, passing from one side of the box to the other define a number of bottle receiving compartments 48, in which may be positioned, in an upright manner, bottles or like beverage receptacles 49. It will be noted that the coil is so formed as to divide the major portion of the compartment 12 into bottle receiving aisles or chambers, but that some of the convolutions, as indicated by the numeral 40 in Fig. 1, are shortened, to provide a bulk compartment 51 in which may be stored various other articles adapted to be dispensed from the cabinet. It will also be observed that the successively elevated planes of the convolutions, above the deck 11, are so disposed as to embrace the bottle over its entire height.

In order to make more effective the cooling of bottles placed between successive rows of pipe bends, U-shaped sheet metal panels 53, having a height approximately equal to that of the superimposed pipe turns, are placed over the vertically arranged rows of pipes, as illustrated in the various figures. These panels fit closely against the various pipes which they embrace, and thus serve to keep them in proper vertical alignment. The illustrated spacing of the plates from the pipes, as shown in the drawings, is intended to avoid confusion in the views, but it will be understood that in practice, a snug and somewhat resilient fit is made, so that maximum thermal contact between the pipes and the plates may be obtained. In actual practice, moreover, the plates may be scored or indented just below the pipes, to insure contact, and, if desired, a few drops of solder may be applied at appropriate places, so that the plates will not work loose. The thermal contact thereby obtained enhances the efficiency of refrigeration, and eliminates any tendency for the creation of relatively cold or warm zones along the aisles 48.

The distance between the walls of the plates 53, defining the aisles 48, should be equal approximately to the transverse diameter of the bottle or other receptacle in-

tended to be cooled. In this fashion, the plates are made to contact with the bottle at opposed points, so that efficient cooling may be readily effected. Of course, the sizes of bottles will vary, and absolute contact may not always be had, as is indicated, for example, in the drawings. For bottles of varying sizes, such as pints and quarts, the distances between the various vertical rows of pipes may be made variable. In general, however, it is intended that the plates should contact with the pipe bends, and the bottles should contact with the plates.

It will be readily appreciated that, while one manner of forming the successive pipe convolutions has been described in detail, other methods of bending, within the purview of the invention, may be resorted to. Thus, if the refrigerating effect gradually diminishes throughout the length of the pipe, the aisle to the extreme right in Fig. 1 might not produce as intense a cooling effect as the aisle on the extreme right. In this type, a warm bottle would be placed in a right hand aisle, and subsequently moved to a left hand aisle, wherein it would be maintained at the desired reduced temperature, without overcooling. Likewise, by providing two or four rows of pipe convolutions, the temperature and refrigerating rate may be made uniform in every part of the box. These variants, and others of like nature, are deemed to be within the purview of the invention.

As thus far described, the apparatus may be readily utilized for the cooling of bottled beverages, or packages of material, such as ice cream, which may be stored in the compartment 51 until served. Means are additionally provided, however, for conducting a stream of liquid, such as water, through the cabinet, in proximity to the refrigerating pipes, so that the apparatus may be employed for dispensing cooled bulk, as well as bottled beverages.

The bulk liquid cooling system comprises a pipe line 55, entering the box on one end thereof, and following to a certain extent the refrigerating pipe to a point on an opposite side of the box, at which it is connected to a faucet 56. Specifically, this pipe, upon entering the compartment 12, follows, in the space enclosed by the plates 53, the pipe bend 35, and then, following the angle 36 of the refrigerating coil, turns through a bend 57 (Fig. 2), in a horizontal plane and toward the rear of the box. Arriving at the rear wall, the liquid pipe bends upwardly as indicated by the numeral 58, then reverses on itself, and passes under the next refrigerating pipe by means of a return bend 59. Here the bends, somewhat akin to hair pin bends, are repeated, and then, by means of a long bend 61, the liquid pipe is carried to the left hand side of the box, where the

convolutions between adjacent superimposed rows of refrigerant pipe sections are repeated, until the pipe passes through a final hair pin bend 62, 63, 64, and then through the cabinet wall and to the faucet 56.

It will be observed that there are fewer turns of liquid pipe than of refrigerant pipe, and, while varying numbers of turns may be employed, it has been found that the proportion indicated is suitable for ordinary uses. It will also be observed that the turns of the refrigerant pipe and of the liquid pipe are so formed that the liquid pipe may be positioned with respect to the refrigerant expansion coil by first forming the various bends, and then sliding the one unit in between the convolutions of the other to effect the desired assembly. By virtue of the close juxtapositioning of the pipes, quick cooling is obtained, and the heat transfer takes place through a quiet zone or region, not subject to heavy air drafts, provided by the U-shaped panels 53.

It is contemplated that the pipes will be formed and mutually assembled without interlocking connections, to facilitate assembly, and that the entire assembly will then be dropped into the compartment 12. The upright walls of the box may be readily provided with holes for receiving the sections of piping disposed therein, and, since the pipes are made of light metal, no difficulty is experienced in pulling the ends of the pipes through the apertures formed to receive them.

From the foregoing description, it will be apparent that the invention provides a simple and effective cabinet for cooling and dispensing packaged and bottled goods, as well as bulk liquids. The various features of construction and arrangement expressly described are, of course, subject to modification and variation, and hence it will be understood that it is not intended to limit the invention solely to the embodiment shown, but to include within its scope other forms within the purview of the following claims.

I claim:

1. A beverage cooler comprising a cabinet, an expansion coil in said cabinet, said expansion coil including sections of refrigerant pipe lying in common vertical planes, metallic plates embracing the said sections, said sections being regularly spaced to provide deep bottle receiving compartments, and a bulk liquid pipe formed with convolutions interposed with certain of the refrigerant pipe sections, said liquid pipe convolutions also being embraced by said metallic plates.

2. A beverage cooler comprising an insulated cabinet, a refrigerant expansion coil disposed in said cabinet, said coil being formed with convolutions lying in spaced vertical planes to divide the cabinet into a plurality of compartments, there being a

plurality of convolutions in each of said vertical planes, whereby a deep refrigerating zone is created, metallic plates embracing in thermal contact said convolutions in each vertical plane, the plate of one set of said convolutions being spaced from an adjacent plate the diameter of a bottle, whereby bottles placed in said zones may be cooled by conduction, and a bulk liquid pipe formed with convolutions adapted to lie within the plates embracing the refrigerant convolutions, whereby cooling of liquid flowing through said pipe may be effected in a zone shielded from drafts of air, means associated with the cabinet for circulating refrigerant through said refrigerant coil, and means for admitting and withdrawing potable liquid to and from said bulk liquid pipe.

3. A bottled beverage cooler comprising an insulated cabinet provided with inner and outer walls and insulating material between said walls, a convoluted refrigerant coil disposed within said cabinet, said coil being formed with a plurality of continuous pipe sections extending from side to side of said cabinet and disposed in a common plane and with an additional series of pipe sections disposed above the first named sections in regular order to provide a self sustaining coil defining a plurality of spaced aisles, and U-shaped plates positioned over the sections of pipe lying in common vertical planes and in intimate thermal contact with the pipe sections in said vertical planes.

4. A bottled beverage cooler comprising an insulated cabinet and a convoluted refrigerant coil disposed within said cabinet, said coil being formed with a plurality of spaced continuous pipe sections extending from side of side of said cabinet in a common horizontal plane and with additional sections disposed in regular order above said first named sections to define a self-sustaining structure having pipe sections in a plurality of vertical and horizontal planes, and U-shaped plates disposed over the pipe sections in each vertical plane and extending from side to side of said cabinet, said plates being indented adjacent the pipe sections to hold the plates snugly on said pipes and in intimate thermal contact therewith.

LAWRENCE C. SMITH.