Aug. 24, 1943. L. M. KEIGHLEY 2,327,649

REFRIGERATING APPARATUS

Filed March 12, 1941 2 Sheets-Sheet 1

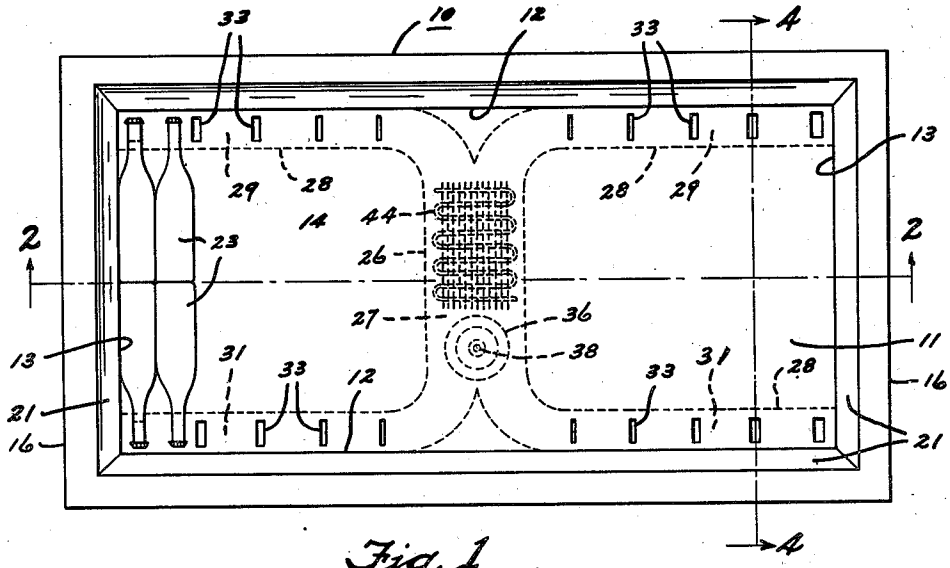


Fig. 1

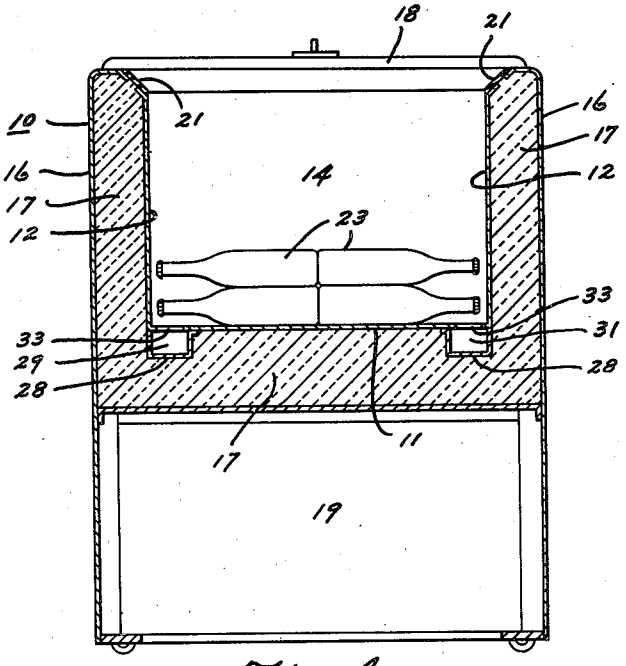


Fig. 4

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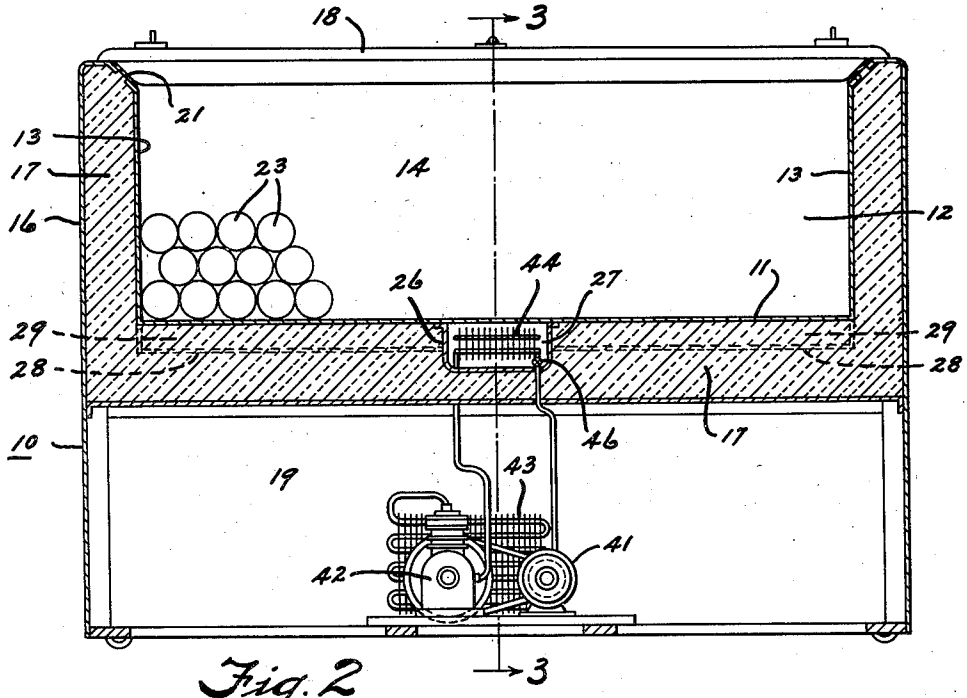


Fig. 2

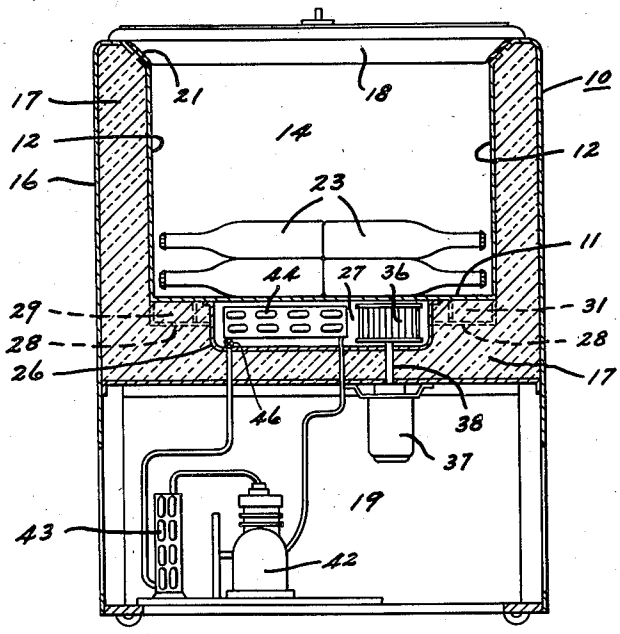


Fig. 3

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REFRIGERATING APPARATUS

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Application March 12, 1941, Serial No. 382,977

5 Claims. (Cl. 62—102)

This invention relates to refrigeration and particularly to bottled beverage storage and refrigerating apparatuses.

Bottled beverage cooling apparatuses, particularly of the dry storage type, usually include a horizontally elongated compartment in which the bottles are placed and cold air circulated thereover for cooling the contents thereof. It has heretofore been difficult to provide a rapid and uniform circulation of cold air over the bottles in such apparatuses. For example, if air is circulated from one end to the other end of a horizontally elongated bottle storage and cooling compartment, it results in the bottles at one end of the compartment being colder than bottles at the other end thereof. This ordinarily requires the dispensing of bottled beverages from one end of an elongated storage compartment in order to insure that the beverage being served is sufficiently cooled. Furthermore, bottled beverage storing and cooling apparatuses of the type described, usually have sheet metal air circulating ducts or baffles disposed in the bottle storage compartment. Sheet metal baffles or ducts within a bottle storage compartment, in addition to occupying valuable space therein, also becomes deformed and damaged by the bottles and this deformation of the baffles or ducts impairs the circulation of air therethrough. I contemplate the provision of means for rapidly and uniformly cooling bottled beverages stored in an elongated compartment without locating conduits or duct forming partitions or baffles within the compartment.

An object of my invention is to provide an improved air circulation within a dry bottled beverage storage compartment.

Another object of my invention is to provide a bottled beverage storing and cooling apparatus with a novel air circulating duct system which is located entirely on the outside of the bottle compartment and associated with the bottom wall thereof.

A further object of my invention is to provide an improved duct system associated with the bottom of a horizontally elongated bottled beverage storing and cooling compartment which system is arranged to cause air circulated therethrough to flow transversely across the compartment in a plurality of streams along the length thereof.

A still further and more specific object of my invention is to provide an air circulating duct system for a horizontally elongated bottled beverage storage compartment which is arranged to supply a plurality of relatively short streams of cold air transversely through the compartment, over and around bottled goods stored therein so as to reduce the path of flow of the air and render its temperature and consequently the temperature within said compartment more uniform.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a top view of a refrigerating apparatus constructed in accordance with my invention, with the door to the bottle storage compartment removed;

Fig. 2 is a vertical sectional view of the refrigerating apparatus taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view of the refrigerating apparatus taken on the line 3—3 of Fig. 2, showing the cooling element containing chamber of a duct system associated with the apparatus; and

Fig. 4 is a sectional view of the refrigerating apparatus taken on the line 4—4 of Fig. 1, showing spaced apart conduits of the duct system associated with the apparatus.

Referring to the drawings, for illustrating my invention, I have shown in Fig. 1 thereof, a dry bottled beverage storage and refrigerating apparatus comprising a horizontally elongated, generally rectangularly-shaped cabinet 10. Cabinet 10 includes a bottom 11, side 12 and end metal walls 13, forming a horizontally elongated open-top compartment 14 therein. The cabinet also includes outer finished metal panels or walls 16 and any suitable insulating material 17 (see Fig. 2) disposed between the compartment lining walls 11, 12 and 13, and the outer walls 16. A door or doors 18 normally close the open top of compartment 14 and afford access to the interior thereof. The outer walls 16 of cabinet 10 depend beyond the bottom wall 11, of the insulated compartment 14, to provide the cabinet with a machine compartment 19 below compartment 14 for the reception of a motor-compressor unit of a refrigerating system. The metal liner walls of compartment 14 are spaced from the metal top of cabinet 10 by an insulating breaker or molding strip 21, as is conventional and well known to those familiar with the refrigerator cabinet art.

The means for cooling and circulating air within cabinet 10, in order to chill bottled beverages, indicated by the numeral 23, within compartment 14 thereof, includes means associated with the

bottom wall 11, of compartment 14 which means forms a duct system within the cabinet. The duct system forming means comprises a horizontally disposed sheet metal structure secured to and cooperating with the metal bottom wall 11 of compartment 14, to provide air circulating passages therebelow. The sheet metal duct forming structure includes walls 26 forming a chamber 27, which extends transversely across the bottom of compartment 14 intermediate the end walls 13 thereof. The sheet metal duct forming structure also includes walls 28 extending longitudinally of the cabinet along the compartment bottom wall 11 to form a conduit 29 adjacent one side wall 12, of the compartment 14, and a conduit 31 horizontally spaced from the conduit 29 and disposed adjacent the other side wall of compartment 14 (see Fig. 4). The central portion of conduit 29 is connected with one end of chamber 27 and the central portion of conduit 31 is connected with the other or opposite end of chamber 27. Walls 28, of conduits 29 and 31, may be curved at their juncture with walls 26 of chamber 27, so as not to impede circulation of air through the air duct system. Bottle storage compartment bottom wall 11 has a plurality of spaced apart apertures 33 therein providing the ducts or conduits 29 and 31, with a plurality of spaced apart openings communicating with the interior of compartment 14 along the longitudinal side walls 12 thereof. The apertures 33 may be of any suitable contour or design and are disclosed as rectangularly-shaped openings which are progressively wider than one another from a point adjacent an end of chamber 27 to a point adjacent the ends of the ducts or conduits 29 and 31. A fan or blower 36 is located within the duct system forming means and is preferably disposed within the chamber 27. An electric motor 37 is located within the machine compartment 19 of cabinet 10 and has a shaft 38, projecting through the insulation 17 and a wall 26 of chamber 27, connected to the fan or blower 36 for operating same. A closed refrigerating system is associated with the apparatus and comprises a motor 41, operatively connected to a compressor 42, a condenser 43 and a finned-type evaporator 44. The motor, compressor and condenser constitute a refrigerant compressing and liquefying unit mounted within the machine compartment 19 of cabinet 10, and the evaporating portion of the refrigerating system comprises the evaporator 44 which is disposed within the transverse chamber 27 of the duct forming means. Suitable pipes or refrigerant conveying conduits extend from the compressor 42 to the condenser 43, from the condenser 43 to the evaporator 44, and from the evaporator 44 to the compressor 42 to form a closed refrigerant circuit as is conventional in the art. An expansion valve or the like device 46 is interposed in the conduit leading from the condenser 43 to the evaporator 44 for controlling the flow of refrigerant, cooled and liquefied in the condenser 43, in any suitable or conventional manner, into the evaporator. A control switch (not shown) for the refrigerating system may be employed to start and stop motor 41 and consequently compressor 42, and this switch may be actuated in response to the temperature of or refrigerating effect produced by the evaporator 44. The electric motor 37 may operate the fan or blower 36 intermittently, if desired, but is preferably operated continuously during use of the apparatus.

In order to cool or chill the bottled beverages 23, stored within compartment 14 of cabinet 10, the refrigerating system is operated to cause evaporator 44 to produce a refrigerating effect within the chamber 27 of the duct forming means or structure. Operation of fan or blower 36, by motor 37, causes air to be drawn from one side of the elongated compartment 14 along the length thereof, through the plurality of spaced apart openings 33 in compartment bottom wall 11 into conduit 31 and into the chamber 27. The air, upon entering chamber 27, is forced by the blower 36 between the fins of evaporator 44 and over the coils thereof to reduce its temperature and this air is then circulated outwardly of chamber 27 into the conduit 29 through the openings 33 thereof, into the bottle storage compartment 14. The bottles 23 are preferably horizontally disposed and arranged one on top of another in two rows extending longitudinally within the elongated compartment 14. The necks of the bottles 23, of each row thereof, are adjacent the side walls 12 of compartment 14 and this arrangement provides ample space for the flow of air upwardly into compartment 14 from the conduit 29. The larger or bottom portion of the bottles 23 afford some resistance to the flow of cold air thereover and through the spaces between the bottles and this resistance diverts some of the cold air upwardly within compartment 14 to insure cooling of the uppermost bottles. In other words, the more bottles that are stacked upon each other the more the air will flow upwardly within compartment 14 to thus insure cooling of all the bottled beverages regardless of the height of the stack of bottles. Air flows transversely and entirely across the horizontally elongated storage compartment 14 in a plurality of divided streams along the length thereof, over and around the bottled beverages 23, stored therein, to cool the contents of the bottles. Heat extracted from the bottled beverages is carried by the air drawn into the warm air or return conduit 31 back to the cooling chamber 27 where the heat is given off to the cooling element or evaporator 44 of the refrigerating system and dissipated to the air exteriorily of compartment 14. The plurality of relatively short paths or streams of air flowing transversely across the elongated bottle storage compartment permits the air to be maintained at a more uniform temperature and insures uniform cooling of the bottles throughout the length of the elongated compartment. Any suitable or desirable drain arrangement can be provided for conveying moisture, which may find its way into the air ducts or passages, away from the apparatus.

From the foregoing, it will be seen that I have provided an improved bottled beverage storing and cooling apparatus wherein the bottle storage compartment thereof is uniformly cooled from one end to the other end thereof. In my improved apparatus bottled beverages may be served from any portion of the storage compartment with the assurance that bottles removed from one portion of the compartment will be cooled to the same low temperature as bottles removed from another portion of the compartment provided, of course, that all of the bottles have been in the compartment over the same period of time. The provision of outlets and inlets for the conduits of the duct system which are of increased size toward the ends of the conduits insures even circulation and even distribution of the cold air within the storage com-

partment to thereby effectively and rapidly cool bottles placed therein. By the air duct system or arrangement disclosed, I obviate the necessity of placing conduits, baffles or partitions within the bottle compartment of bottled beverage coolers since the system or arrangement is in its entirety associated with and located below the bottom wall of the horizontally elongated compartment.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A dry bottled beverage storing and refrigerating apparatus comprising in combination, a cabinet having a bottom, side and end walls forming an elongated open top compartment therein, a door or doors normally closing the open top of said compartment, means cooperating with the bottom of said compartment and forming a duct system within said cabinet, said duct system including a chamber extending transversely across the bottom of said elongated compartment within the area defined by the vertical projection of said compartment side and end walls, said duct system including a first conduit extending longitudinally of the cabinet along the bottom of said compartment, said first conduit communicating with said compartment and being connected to one end of said chamber, said duct system also including a second conduit extending longitudinally of the cabinet along the bottom of said compartment in spaced apart relation to said first conduit, said second conduit communicating with said compartment and being connected to the other end of said chamber, a cooling element of a refrigerating system disposed in said duct system forming means, means adapted to circulate air through said duct system forming means, and means for operating said circulating means to cause same to circulate air from said compartment through one of said conduits into said chamber and for forcing the air out of said chamber through the other conduit into said compartment whereby the air flows transversely across said elongated compartment.

2. A dry bottled beverage storing and refrigerating apparatus comprising in combination, a cabinet having a bottom, side and end walls forming an elongated open top compartment therein, a door or doors normally closing the open top of said compartment, means cooperating with the bottom of said compartment and forming a duct system within said cabinet, said duct system including a chamber extending transversely across the bottom of said elongated compartment intermediate the ends thereof, said duct system including a first conduit extending along the bottom of said compartment adjacent one of the side walls thereof, said first conduit communicating with said compartment and having its central portion connected to one end of said chamber, said duct system also including a second conduit extending along the bottom of said compartment adjacent the other side wall thereof, said second conduit communicating with said compartment and having its central portion connected to the other end of said chamber, a cooling element of a refrigerating system disposed in said chamber, means disposed in said chamber and adapted to circulate air through said duct system forming means, and means for operating said circulating means to cause same to circulate air from said compartment through one of said conduits into said chamber and for forcing the air out of said chamber through the other conduit into said compartment whereby the air flows transversely across said elongated compartment.

3. A dry bottled beverage storing and refrigerating apparatus comprising in combination, a cabinet having a bottom, side and end walls forming an elongated open top compartment therein, a door or doors normally closing the open top of said compartment, means cooperating with the bottom wall of said compartment and forming a duct system within said cabinet, said duct system including a chamber extending transversely across the bottom of said compartment within the area defined by the vertical projection of said compartment side and end walls, said duct system including a first conduit connected to one end of said chamber and extending longitudinally along the bottom of said compartment, said duct system also including a second conduit connected to the other end of said chamber and extending longitudinally along the bottom of said compartment in spaced apart relation to said first conduit, said bottom wall of said compartment having a plurality of spaced apart apertures therein providing said conduits with openings communicating with the interior of said compartment, a cooling element of a refrigerating system disposed in said chamber, means adapted to circulate air through said duct system forming means, means for operating said circulating means to cause same to circulate air from said compartment through the openings in one of said conduits into said chamber and over the cooling element therein to cool the air, and said circulating means forcing the air cooled by said element out of said chamber into the other conduit and outwardly of the openings therein into said compartment whereby the cooled air flows transversely across said compartment in a plurality of streams along the length thereof.

4. A dry bottled beverage storing and refrigerating apparatus comprising in combination, a cabinet having a bottom, side and end walls forming an elongated open top compartment therein, a door or doors normally closing the open top of said compartment, means cooperating with the bottom wall of said compartment and forming a duct system within said cabinet, said duct system including a chamber extending transversely across the bottom of said compartment intermediate the ends thereof, said duct system including a first conduit extending longitudinally along the bottom wall of said compartment adjacent one of the side walls thereof and having its central portion connected to one end of said chamber, said duct system including a second conduit extending longitudinally along the bottom wall of said compartment adjacent the other side wall thereof and having its central portion connected to the other end of said chamber, said compartment bottom wall having a plurality of apertures therein providing said conduits with spaced apart openings communicating with the interior of said compartment, a cooling element of a refrigerating system disposed in said chamber, means adapted to circulate air through said duct system forming means, means for operating said circulating means to cause same to circulate air from said compartment through the openings in one of said conduits into said chamber and over the cooling

element therein to cool the air, and said circulating means forcing the air cooled by said element out of said chamber into the other conduit and outwardly of the openings therein into said compartment whereby the cooled air flows transversely across said elongated compartment in a plurality of streams along the length thereof.

5. A dry bottled beverage storing and refrigerating apparatus comprising in combination, a cabinet having a bottom, a top, side and end walls forming a horizontally elongated compartment therein, said cabinet having an opening therein providing access to said compartment, a door or doors normally closing said compartment access opening, means cooperating with the bottom wall of said horizontally elongated compartment and forming a duct system within said cabinet, said duct system including a chamber extending transversely across the bottom of said elongated compartment, said duct system including a first conduit extending longitudinally of the cabinet along the bottom of said horizontally elongated compartment, said first conduit communicating with said compartment and being connected to one end of said chamber, said duct system also including a second conduit extending longitudinally of the cabinet along the bottom of said horizontally elongated compartment in spaced apart relation to said first conduit, said second conduit communicating with said compartment and being connected to the other end of said chamber, said compartment bottom wall having a plurality of apertures therein providing said conduits with spaced apart openings communicating with the interior of said compartment, the apertures in said compartment bottom wall being of increased size relative to one another in a direction from said chamber toward one end of said compartment, a cooling element of a refrigerating system disposed in said chamber, air circulating means disposed in said chamber, and means for operating said air circulating means to cause same to circulate air from said compartment through one of said conduits into said chamber and over the cooling element therein and for forcing the air cooled by said element out of said chamber through the other conduit into said compartment whereby the air flows transversely across said horizontally elongated compartment.

LLOYD M. KEIGHLEY.