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H. R. HEINTZEN

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BOTTLE COOLER

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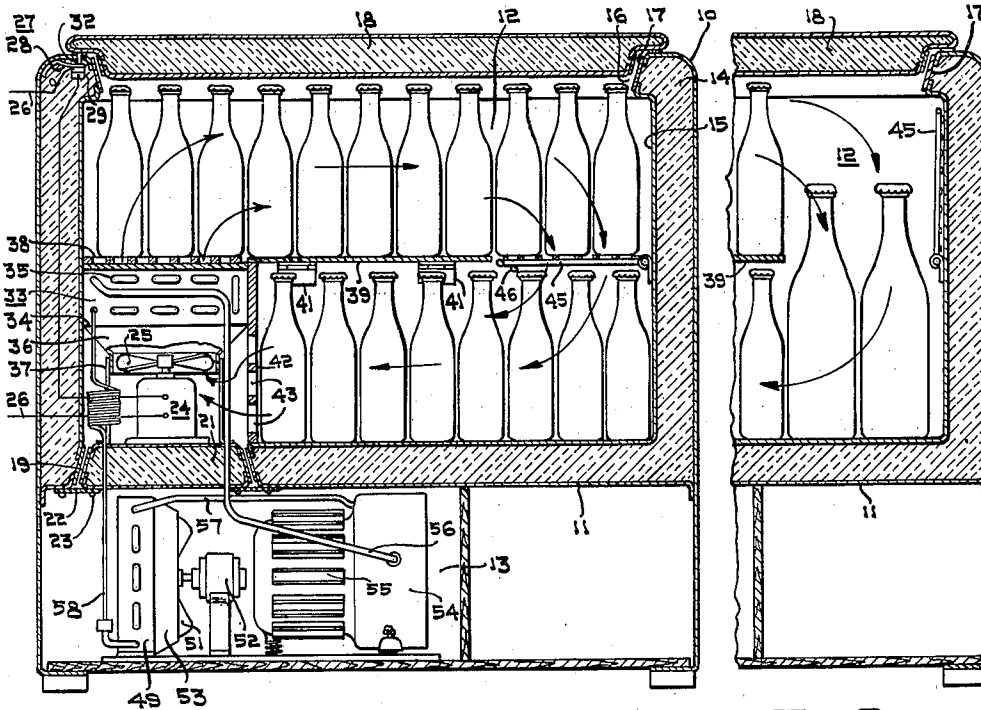


FIG. 1.

FIG. 2.

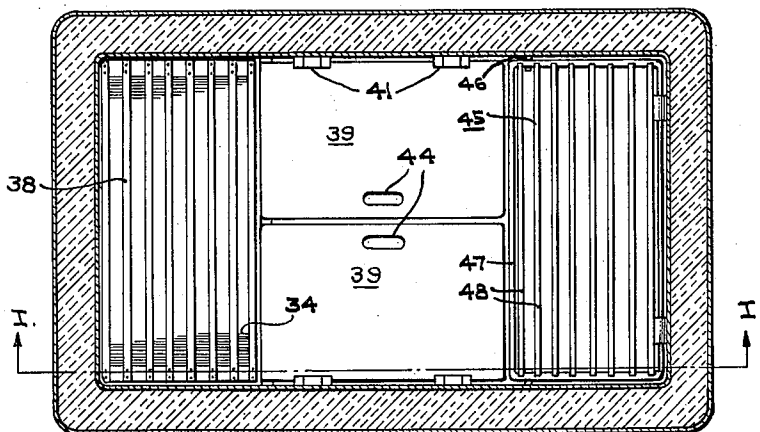


FIG. 3.

WITNESSES:

E. H. Lutz
C. L. Wheeler

INVENTOR
HARRY R. HEINTZEN.

BY *H. Steiger*
ATTORNEY

UNITED STATES PATENT OFFICE

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BOTTLE COOLER

Harry R. Heintzen, Philadelphia, Pa., assignor to
Westinghouse Electric & Manufacturing Com-
pany, East Pittsburgh, Pa., a corporation of
Pennsylvania

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6 Claims. (Cl. 62-102)

This invention relates to refrigerators and more particularly to refrigerators of the forced convection type employing air ducts. Refrigerators of this type have heretofore employed air ducts which occupied valuable space in the refrigerator and thereby reduced the space available for the articles to be refrigerated.

One object of this invention is to provide a refrigerator of the forced convection type in which the space-occupying air ducts are eliminated.

Another object of the invention is to provide a refrigerator of the type described in which the air ducts are adapted for storing the articles to be refrigerated.

A further object is to provide a compact cooler for bottled beverages which cooler is economical to manufacture and which is readily serviced in the field.

Another object is to provide a refrigerator of the type described in which the loss of chilled air when opening the door is reduced.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawing forming a part of this application in which the invention is applied to a bottle cooler and in which:

Fig. 1 is a vertical section of the bottle cooler on the line I-I of Fig. 3, looking in the direction of the arrows;

Fig. 2 is a partial vertical section similar to Fig. 1 but with one shelf raised to accommodate larger bottles; and,

Fig. 3 is a plan view of the bottle cooler as it appears after the cover is removed.

Referring now more particularly to the drawing, the reference numeral 10 represents the outer shell of the cabinet of the cooler. A horizontal partition 11 is secured to the shell 10 which partition divides the cabinet into an upper refrigerated chamber 12 and a lower machine compartment 13. The upper refrigerated chamber 12 is lined with heat insulating material 14 and is provided with an inner liner 15. An access opening 16 is provided in the upper wall of the refrigerated chamber, the edges of which opening are lined with a strip 17 of heat insulating material which unites the outer shell 10 and the inner liner 15. The opening is normally closed by an insulated lid or closure 18 of the same general construction as the walls of the refrigerated chamber 12. A second and smaller opening 19 is provided in the bottom of the insulated chamber 12 and in which open-

ing a removable section 21 is secured by a metal strip 22 and bolts 23. The edges of the lower opening and the removable section are constructed in the same general manner as the edges of the upper opening 16 and its lid 18.

A motor 24 which drives a fan 25 is secured on the removable section 21. The motor 24 receives its power through the wires 26 indicated schematically in the drawing. A switch 27 is connected in series with the motor 24 which switch 27 comprises a spring 28, contacts 29, and an actuating rod 32 which presses the contacts 29 together against the action of the spring 28 when the lid 18 is closed. On raising the lid 18, the spring 28 raises the upper contact 29 thereby stopping the motor 24. This arrangement prevents the fan 25 from blowing the chilled air out of the refrigerator when the lid 18 is raised.

An evaporator or cooling unit 33 is positioned above the fan 25. This evaporator comprises a series of parallel and spaced-apart plates 34 through which a refrigerant carrying tube 35 is passed back and forth. The evaporator 33 is supported above the fan 25 by means of a shroud 36 which directs the air circulated by the fan 25 through the evaporator 33. The shroud 36, in turn, is supported on the removable section 21 by upright bars 37.

The evaporator 33 supports a grid 38 comprising parallel and spaced bars which run transversely to the plates 34 of the evaporator. This grid 38 supports the bottles to be cooled and provides transverse air passages above the plates 34 of the evaporator 33 so that a section of the evaporator 33 cannot become obstructed by a row of bottles.

Adjacent the grid 38 are two shelves 39 supported by hinges 41 in the side walls of the refrigerated chamber 12. The hinges 41 permit the shelves 39 to be swung upwardly against the respective sides of the refrigerated chamber 12 to which they are secured so that access may be had to the bottles below the shelves 39. The shelves 39 when in the horizontal position rest at one of their shorter edges on a vertical partition 42 in the chamber 12. The lower portion of this partition is provided with openings 43 through which the air in the cabinet passes to the fan 25. The shelves 39 are imperforate except for the hand holes 44 by means of which the shelves 39 may be grasped to raise them.

A third shelf 45 is hingedly supported upon an end wall of the chamber 12 in the same manner and in the same horizontal plane as the shelves 39. The shelf 45, when in the horizon-

tal position, rests on pegs 46 in the side walls of the refrigerated chamber 12. The shelf 45 comprises a wire frame 47 and spaced rods 48 welded to the end members of the frame 47 so that the shelf 45 offers substantially no obstruction to the air circulating through the chamber 12. The grid 33, the shelves 39 and 45, and the bottom of the chamber 12 with the exception of the portion occupied by the fan 25 and the evaporator 33 are adapted for supporting bottles.

The operation of the refrigerator as thus far described is as follows:

The fan 25 draws the air through the openings 43 in the partition 42 and propels it through the shroud 36, the evaporator 33, the grid 33 on the evaporator, across the bottles on the grid 33 and on the shelves 39 and 45, through the shelf 45 to the lower portion of the chamber 12 and across the bottles stored therein. When the lid 18 of the bottle cooler is raised, the electric current to the motor 24 is interrupted by the opening of the switch 27 so that no refrigerated air is blown from the chamber 12.

It will be observed that the imperforated shelves 25 39 act as an air baffle about which the chilled air circulates. The air is thus directed in a positive manner across the bottles to be cooled without the aid of space-occupying air ducts. It will also be observed that the bottles themselves form the greatest obstruction to the flow of air. The power of the fan 25 is therefore expended mainly in wiping the air over the surface of the bottles. Since the rate of cooling an article is dependent upon the speed at which the cooling fluid brushes over the surface of the article, it is apparent that the energy of the fan 25 is employed mainly in effecting cooling of the bottles and is not wasted in forcing air through empty and constricted ducts. This is of additional importance when it is considered that all the energy supplied to the motor 24 of the fan 25 is eventually transformed into heat which must again be abstracted from the cabinet by the cooling unit.

Fig. 2 shows how a limited number of tall bottles may be stored in the refrigerated chamber 12. In this case the shelf 45 is raised and lies flat against the end wall of the chamber 12.

The bottle cooler may be used as follows: when sales are light, only the top compartment is used, the bottles being dispensed from the end containing the cooling unit and the remaining bottles moved to the left as viewed in Fig. 1 to provide room for the insertion of warm bottles at the right hand end. The bottles in the lower compartment form a reserve supply for periods of heavy dispensing. When such periods occur, the bottles in the upper compartment will not be sufficiently refrigerated during the course of their journey towards the cooling unit. The bottles in the upper compartment are then interchanged with those in the lower compartment so that the warmer bottles will have an additional time to cool in the lower compartment.

A refrigerant liquefying unit is positioned in the machine compartment. This unit comprises a condenser 49, a fan 51 driven by the motor 52 and partially enclosed in a shroud 53 and a casing 54 provided with fins 55 enclosing a motor-compressor unit. The casing 54 is connected by a suction tube 56 to the evaporator 33 and to the condenser 49 by a pressure tube 57. The condenser is connected to the evaporator through the capillary impedance tube 58. Both tubes 56 and 58 pass through the removable section 21 so that by removing the bolts 23 and the strips 22 the

entire refrigerating unit including the evaporator 33, the motor 24 and fan 25, and the refrigerant liquefying unit may be removed from the cabinet without disconnecting either of the tubes 56 and 58.

It will be apparent from the above that the invention provides a refrigerator utilizing forced circulation of air positively directed over the articles to be cooled but in which no space is wasted by air ducts. The structure is also such that the cabinet and the refrigerating unit may be manufactured separately and united whenever convenient. The refrigerating unit may also be replaced in the field in case of trouble. The invention also provides a novel method for preventing a waste of refrigerated air when the lid is opened.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In a refrigerator, the combination of an insulated chamber having a bottom, side walls, and a removable top, a cooling unit in said chamber, said cooling unit having air passages, a shelf adjacent said cooling unit and spaced from the top and bottom of said chamber to define a food storage space above and below said shelf, said shelf including a movable portion to afford access to the food storage space below said shelf, fan means for circulating the air through the passages in the cooling unit, said cooling unit and shelf being so arranged that said air circulates from said cooling unit, around said shelf and returns to said cooling unit.

2. In a refrigerator, the combination of an insulated chamber having a bottom, side walls, and a removable top, a cooling unit in said chamber, said cooling unit having air passages therein; a shelf adjacent said cooling unit and spaced from the top and bottom of said chamber to define a food storage space above and below said shelf, said shelf comprising a hinged portion adapted to swing upwardly to permit access to the food storage space below said shelf, fan means for circulating the air in said chamber through the passages in the cooling unit, said chamber and shelf being so arranged that said air circulates around the shelf.

3. In a dry bottle cooler, the combination of an insulated chamber having a bottom, side walls, and a removable top, a cooling unit in said chamber, said cooling unit having air passages therein, a shelf adjacent said cooling unit and spaced from the top and the bottom of said chamber to define a bottle storage space above and below said shelf, said shelf comprising a hinged portion adapted to swing upwardly to permit access to the bottle storage space normally below said shelf, fan means for circulating the air in said chamber through the passages in the cooling unit, said cooling unit and shelf being so arranged that said air passes over the shelf and returns underneath said shelf to said cooling unit.

4. In a dry bottle cooler, an insulated chamber having a removable top, a bottom, side walls, and end walls, a cooling unit having air passages in said chamber, said cooling unit being adjacent an

end wall but spaced from the top of said chamber to define a bottle storage space above said cooling unit, a substantially imperforate shelf extending from said cooling unit into and spaced from the top and bottom of said chamber to define a bottle storage space above and below said shelf, said shelf also being spaced from the end wall of said chamber opposite said cooling unit, said shelf comprising a portion hinged to and adapted to swing upwardly against a side wall of said chamber to permit access to the bottle storage space below said shelf, a perforated shelf hinged to and adapted to swing upwardly against the end wall opposite the cooling unit, and a fan for circulating the air in said chamber through the air passages of said cooling unit, over said substantially imperforate shelf, through said perforated shelf, and underneath said imperforate shelf to said cooling unit.

5. In a refrigerator, the combination of an insulated chamber having a bottom and a top, an access opening in said top, a cover for said opening, means for cooling said chamber, a shelf spaced from the top and bottom of said chamber

to define a food storage space above and below said shelf, said shelf including a movable portion to afford access to the food storage space below said shelf, and fan means for circulating the air in said chamber, said chamber, cooling unit, fan, and shelf being arranged so that said air circulates around said shelf and in contact with said cooling unit.

6. In a refrigerator, the combination of an insulated chamber having a bottom, side walls, and a top, an access opening in said top, a cover for said opening, means for cooling said chamber, a substantially imperforate shelf spaced from the top and bottom of said chamber to define a food storage space above and below said shelf, said shelf being spaced also from two opposite side walls of said chamber to provide a passage for circulating the air of said chamber around said shelf, said shelf including a movable portion to afford access to the food storage space below said shelf, and fan means for circulating said air through said passage and in contact with said cooling means.

HARRY R. HEINTZEN.