

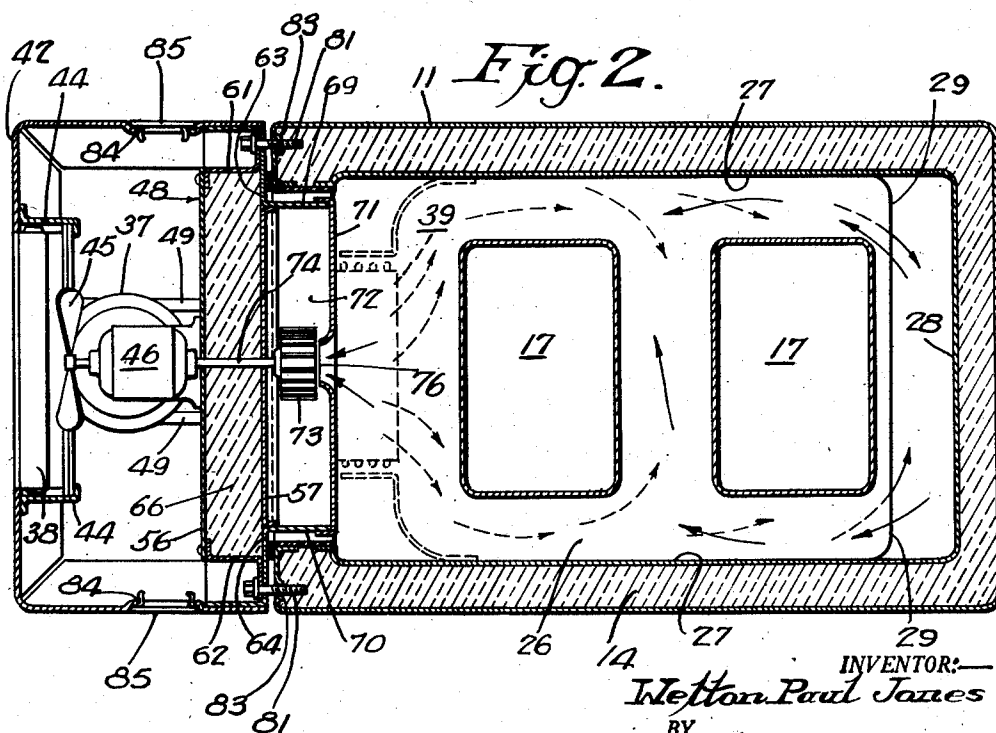
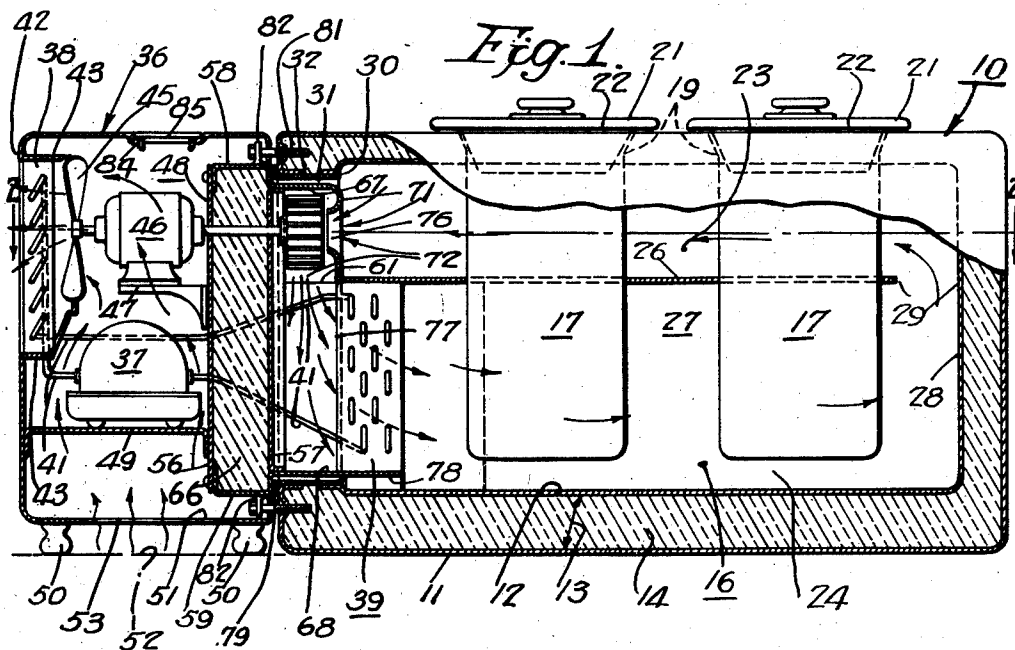
Sept. 3, 1946.

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2,407,159

REFRIGERATION APPARATUS

Filed Jan. 30, 1945



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UNITED STATES PATENT OFFICE

2,407,159

REFRIGERATION APPARATUS

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Application January 30, 1945, Serial No. 575,204

2 Claims. (Cl. 62—102)

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This invention relates to refrigeration and more particularly to refrigeration apparatus designed for the storage and dispensing of ice cream or other foodstuffs.

Cabinets for this purpose are conventionally of the horizontal top-access type, with cooling means formed, at least in part, integrally with the cabinet structure. Several disadvantages are associated with this type of construction, of which the difficulty of servicing of the unit is the most important.

Like all mechanical refrigeration systems, those used for cooling this type of refrigerator cabinet are subject to failure which however infrequent is still serious because of the large quantity of perishable food that may be involved. Obviously, when such failures occur immediate service attention is imperative if spoilage of the stored food is to be prevented. Such immediate service may be unavailable, or if available, the failure may be of a character rendering the immediate repairs required to restore the unit to operation impossible.

The present invention has for its principal object, therefore, the provision of an improved apparatus for storing and dispensing ice cream or other foodstuffs, which will be free from the aforesaid disadvantages.

Another object of the invention is to provide an improved portable cooling unit for refrigerators.

The invention further contemplates provision for refrigeration apparatus of the horizontal top-access type of portable cooling means adapted for quick replacement in the event of system failure.

To this end the invention also contemplates a horizontal top-access cabinet having a portable cooling unit comprising the usual compressor, condenser and evaporator in series flow circuit all contained in a separate housing secured in convenient releasable manner to one end of the said cabinet and constructed and arranged so that the said evaporator lies in effect substantially within said cabinet. In accordance with the principles of the present invention, a blower is arranged in association with the cooling unit in a manner to circulate air within the cabinet and into intimate heat exchange contact with the said evaporator to maintain the temperature of the cabinet at a level adequate for preservation of the particular type of foodstuff stored therein.

More particularly the cooling unit of the present invention is constructed and arranged so as to be readily detachable from the main cabinet structure in a manner for quick and easy replacement by another and operable unit in the event of a system failure.

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A preferred embodiment of the invention has been illustrated in the attached drawing, wherein:

Figure 1 is a partial longitudinal sectional and side elevational view of refrigeration apparatus embodying the invention; and

Figure 2 is a horizontal sectional view of the apparatus taken substantially on the line 2—2 thereof.

With reference to the drawing, the embodiment of the invention therein illustrated comprises an elongated generally rectangular cabinet structure 10 constructed in accordance with methods well-known in the refrigerator art.

More specifically, the cabinet structure includes an outer shell 11 and an inner liner 12, the liner being supported within the shell in thermally spaced relation therewith, as indicated at 13, and the space 13 being filled with a suitable insulating material 14 of known type.

Depending within the interior space 16, defined by liner 12, are a plurality of containers 17 for holding the ice cream or other refrigerated foodstuff. While only two containers have been shown, it should be understood that in practicing the invention any desired number may be employed. The containers 17 are secured to the top wall 18 of the cabinet structure 10 in conventional manner, as at 19, the details of the securing means being omitted as unnecessary to a complete understanding of the invention. The top-access openings of the containers may be closed by suitable covers 21 provided preferably with conventional sealing gaskets 22.

In the structure disclosed, the liner defined space 16 is divided into upper and lower air passages or channels, 23 and 24 respectively, by a horizontal baffle member 26 which, as more clearly shown in Figure 2, has its longitudinal side edges secured to the side walls 27 of the liner in suitable manner as, for example, by welding. It is to be noted that one end of the baffle 26, the right, as viewed in the drawing, terminates in spaced relation with the end wall 28 of the liner, as indicated at 29, thereby affording open communication between the air channels 23 and 24 at that end of space 16. The opposite end wall 30 of the cabinet is provided with an opening 31 completely surrounded by an insulating molding or breaker-strip 32 which bridges the gap between the edges of the outer shell and the inner liner required for a thermal break between said shell and liner.

In accordance with the present invention a second cabinet or housing structure 36 is provided for the cooling unit which includes a compressor

37, condenser 38 and evaporator 39 all connected in series flow circuit as by conduits 41. The condenser is supported in the upper portion of the wall 42 of housing 36 between opposed inwardly turned portions 43 of the wall and has its side edges enclosed between opposed members 44, see Figure 2. The condenser is cooled by an electric motor-driven fan 45, the said motor 46 being supported on a bracket 47 secured to the opposite wall 48 of housing 36. The compressor 37 is mounted on a pair of spaced supporting members 49, 49, the ends of which are secured to the said opposite walls in suitable manner, as by welding.

It is to be noted that the housing 36 is provided with a plurality of short legs 50 which afford a space between the bottom wall 51 of the housing and the floor 52 upon which the cabinet rests. The bottom wall 51 of the cabinet is provided with an opening 53 which permits free circulation of air from beneath the housing upwardly around the compressor and through the condenser when fan 45 is being actuated by the motor 46 in response to a demand for additional refrigeration.

The wall 48 comprises in effect a closure member for the opening 31 in the end wall 30 of the main cabinet structure 10. As illustrated, this wall 48 is formed by spaced inner and outer panel members, 56 and 57 respectively, which are joined about their peripheries by top and bottom members 58 and 59, see Figure 1, and side members 61, 62, 63 and 64, which form a box-like structure, said structure being filled with suitable insulating material indicated by the numeral 66. It will be noted that the members 58, 59, 63 and 64 have portions 67, 68, 69 and 70 respectively, which extend into the opening 31 to a depth substantially equal to the thickness of the cabinet wall.

The top member 58 also includes a downwardly turned portion 71 which substantially encloses the area bounded by closure panel 57 and portions 67, 68, 69 and 70, and forms this area into a vertical air space or chamber indicated at 72. The baffle 26 abuts the wall portion 71, as shown in Figure 1.

Within the upper portion of the air channel 72 is a blower rotor 73 which is driven by the motor 46 through a shaft 74 extending through the insulated closure member. It is to be understood that suitable bearings and fittings (not shown) will be provided for the shaft 74 in accordance with conventional mechanical practice.

The upper part of the said downwardly turned portion 71 of top member 58 is provided with an air inlet opening 76 in alignment with the centrifugal rotor 73. An opening 77 is also provided in the bottom part of the member 71 below the baffle 26 in which opening the evaporator 39 is positioned. An extension 78 of lower member 68 supports the evaporator which extends upwardly to the said baffle.

A peripheral gasket 79 is provided around the opening 31 and between the housing 36 and cabinet 10 so as to seal the joint therebetween. Means is also provided to properly align the housing and cabinet structures when assembled and to hold them against accidental relative displacement. While any of several well known means may be utilized for this purpose, the illustrated structure employs a plurality of machine screws 81 the shanks of which pass through a fixed portion of the housing 36, such as lugs 82 (Figure 1), or the shell (Figure 2), and is threaded into a fixed portion of cabinet 10, such as the shell 11, as indicated at 83. To facilitate removal of these screws, access openings 84 have been provided in the

housing, each provided with a spring clip closure member 85 of well known type.

A suitable electrical circuit (not shown), responsive to the temperature in space 16 of the cabinet 10 in accordance with well known refrigerator practice, may be provided to automatically control operation of the motor compressor 37 and of the motor 46.

In the use of the apparatus to cool the food stored in the containers 17 to the desired temperature, and to maintain said temperature, the apparatus is operated in response to said thermally responsive control circuit to produce a refrigerating effect in the evaporator 39 which then acts to absorb heat from the air within the space 16, said air being circulated over and in contact with the chilled surfaces of the evaporator. Circulation of the air is accomplished by the blower 73, the actuating motor 46 of which may be connected in series with the aforesaid control circuit so that when a demand for additional cooling develops, as evidenced by closing of the control circuit in response to increased temperature in the space 16, the motor 46 will be energized and through the blower will draw air from along the length of upper channel 23 and force it downwardly in chamber 41 and outwardly through the coils and fins of the evaporator. From the evaporator the cooled air passes along the length of lower compartment 24 and returns to the upper compartment through the space between the end of baffle 26 and wall 28 of space 16. This circulation continues until the atmosphere within space 16 is reduced to the desired temperature, at which time the aforesaid control circuit will open to shut off further operation of the apparatus. It is to be understood that while the air is circulating as described it swirls around the containers in intimate heat exchange contact with the walls thereof, and also with the walls of the said space 16. Thus the heat entering through the insulated wall of chamber 10 and the walls of containers 17 is picked up by the circulating air and passed to the evaporator and to the refrigerant circulating therethrough in the manner well understood in the art.

The motor 46 will also operate the fan 45 to cool the condenser and compressor by drawing air from the floor upwardly around the compressor and then forcing it outwardly through the condenser as described.

As previously pointed out such refrigerating systems are subject to occasional failure, at which times immediate service is imperative in order to prevent spoilage of the contents of containers 17. With the present invention the refrigerator may be restored to service by merely releasing the screws 81, removing the inoperative unit, and immediately replacing it with an operative unit which may be left in place permanently or until the inoperative unit has been repaired at a service plant adequately equipped to restore it to proper running condition.

I claim:

1. In refrigeration apparatus, a heat-insulated cabinet having an apertured wall, a food container within and in spaced relation with the walls of said cabinet, a partition in the cabinet forming adjoining communicating passages each embracing a portion of said container, portable cooling means detachably connected to said cabinet and having an insulated wall adapted to close said aperture, said portable means further comprising compressor, condenser and motor elements mounted at the outer side of said wall and an

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evaporator and an impeller mounted at the inner side of said wall, said impeller being operatively connected with the said motor, and said evaporator and impeller being arranged with respect to said partition so that operation of the impeller is effective to set up a circulation of air through the passages and over the surfaces of the evaporator.

2. In refrigeration apparatus, the combination with a heat-insulated cabinet having an apertured side wall and an apertured top wall of a food container depending within said cabinet through said top wall aperture, a horizontal partition dividing the interior of the cabinet into upper and lower passages respectively embracing

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the upper and lower portions of the container and communicating at the ends, portable cooling means detachably connected to said cabinet and having an insulated wall adapted to close said side wall aperture, said cooling means further comprising a compressor, a condenser and a motor at the outer side of said wall, and an evaporator and an impeller at the inner side, said evaporator constituting an element of a refrigerating system including also said compressor and condenser and being located in one of said passages, and said impeller being operatively connected with said motor and being located in the other of said passages.

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