

March 31, 1931.

C. G. MUTERS

1,798,951

REFRIGERATION

Filed Sept. 15, 1930

5 Sheets-Sheet 1

*Fig. 1.*

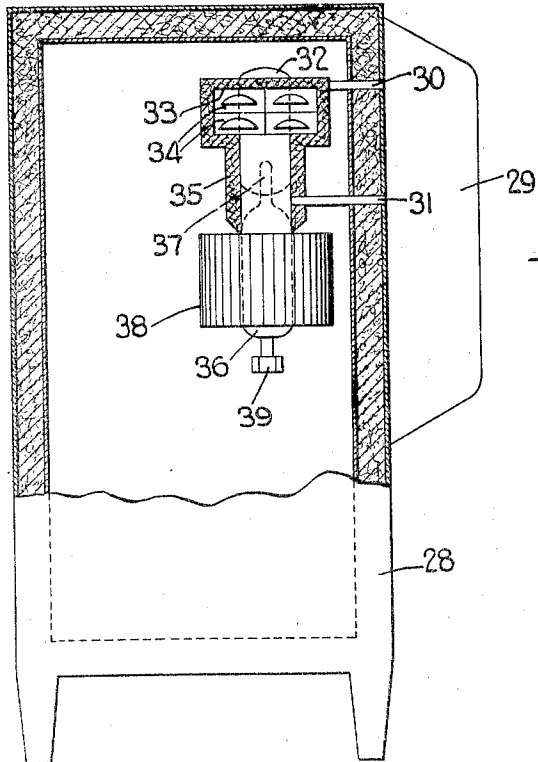
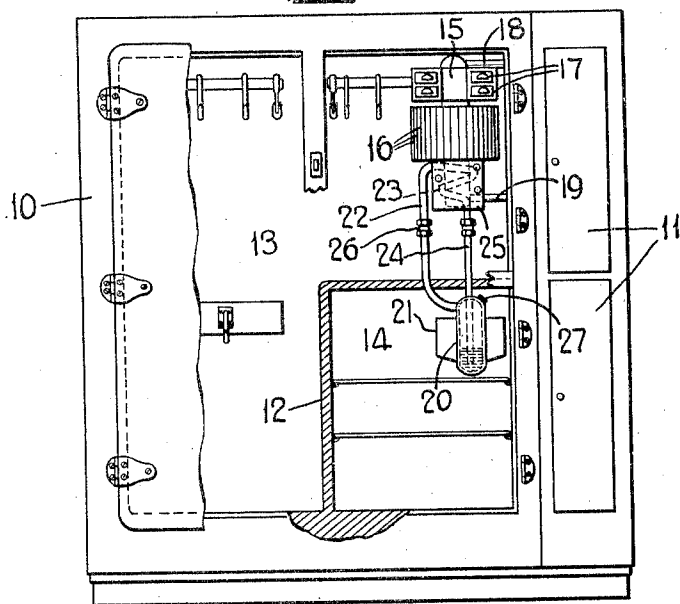


*Fig. 2.*

INVENTOR  
Carl Georg Muters  
BY  
*Hyatt Douse*  
ATTORNEY

March 31, 1931.

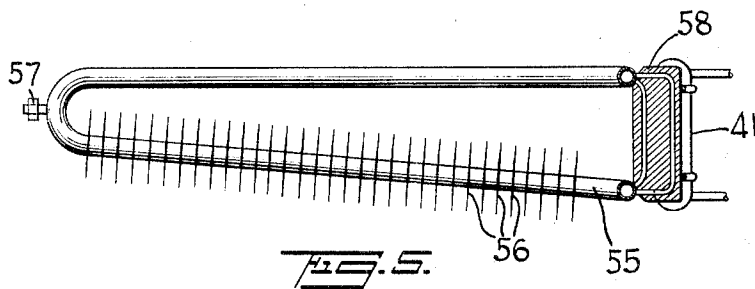
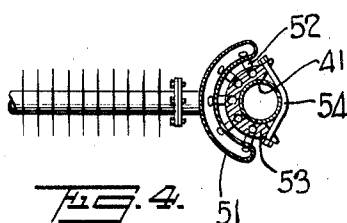
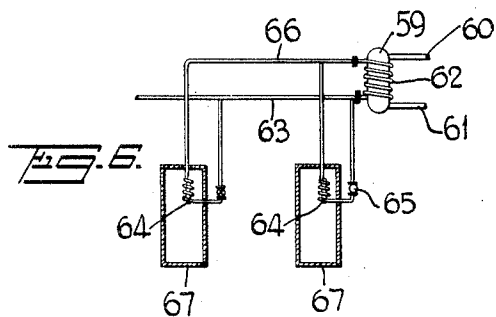
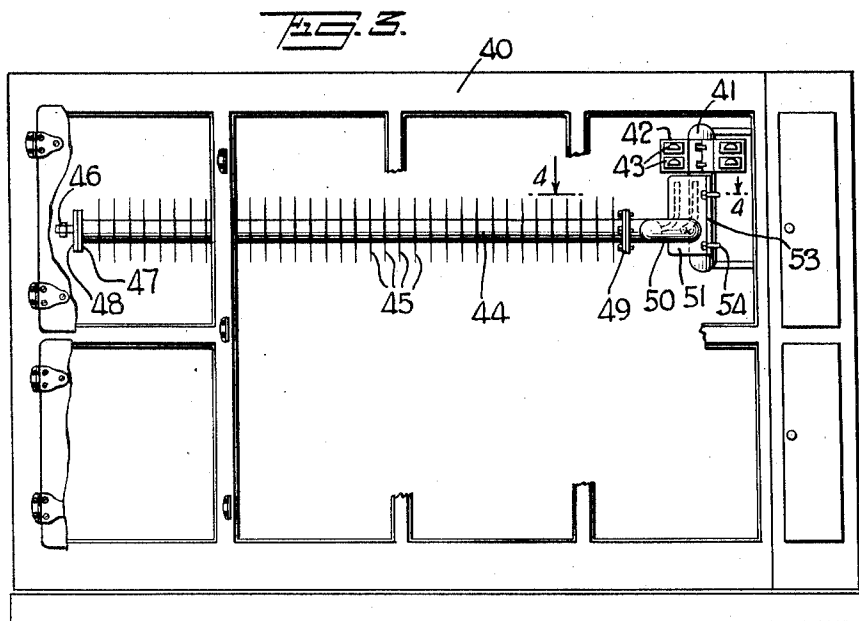
C. G. MUNTERS

1,798,951

REFRIGERATION

Filed Sept. 15, 1930

5 Sheets-Sheet 2



INVENTOR  
*Carl Georg Munters*  
BY  
*Hyatt D. Swell*  
ATTORNEY

March 31, 1931.

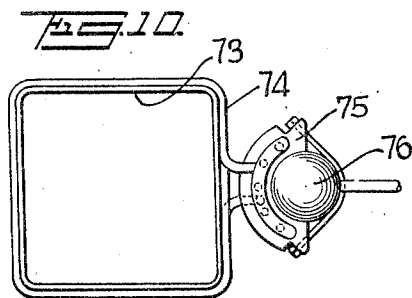
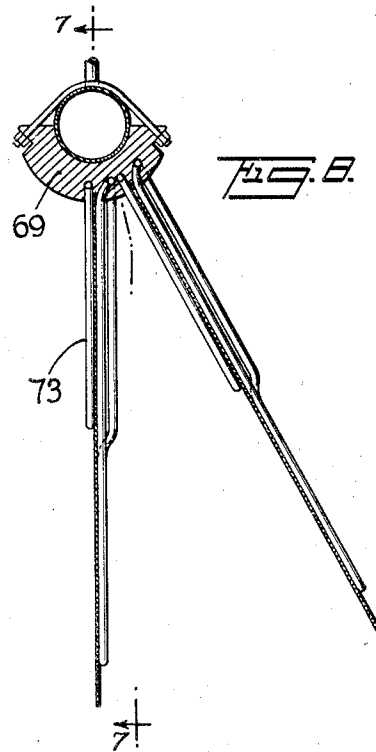
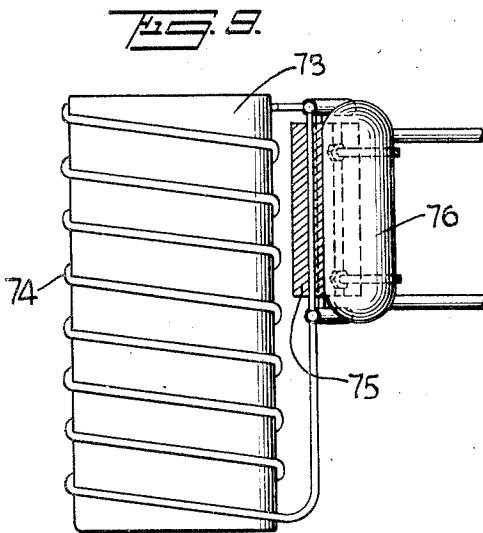
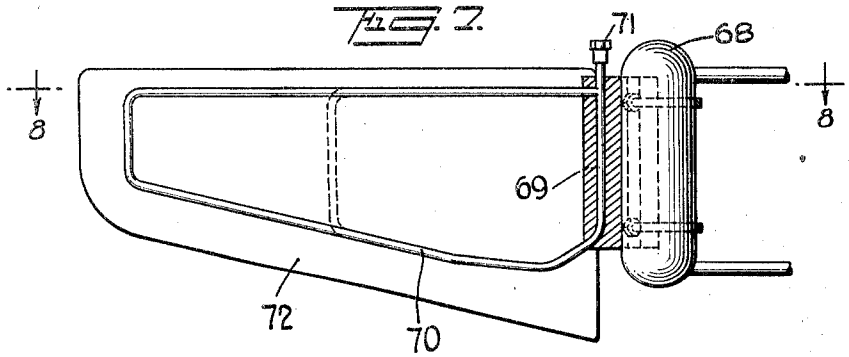
C. G. MUTERS

1,798,951

REFRIGERATION

Filed Sept. 15, 1930

5 Sheets-Sheet 3



INVENTOR  
Carl Georg Mutters  
BY  
Myatt Downee  
ATTORNEY

March 31, 1931.

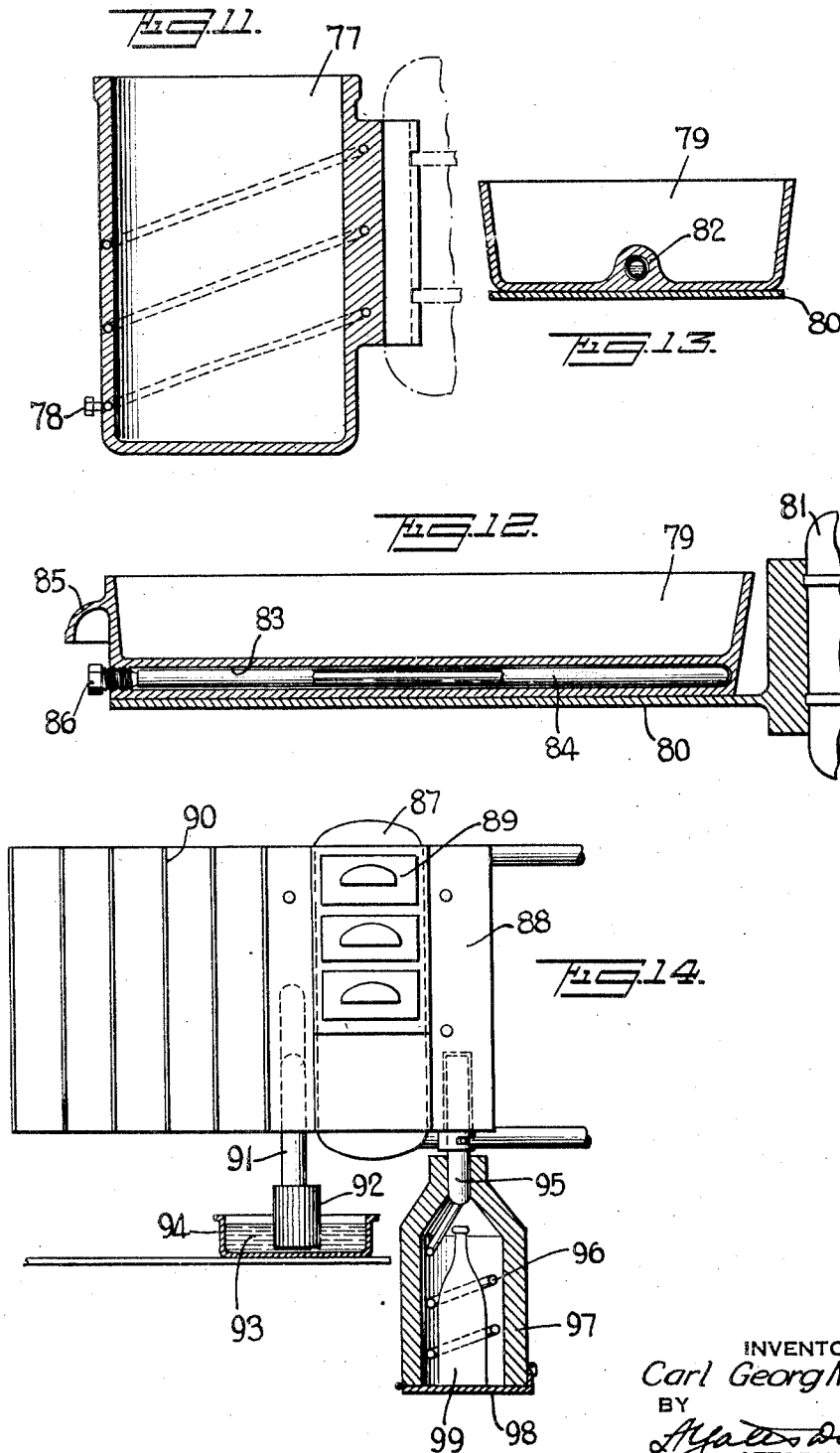
C. G. MUNTERS

1,798,951

REFRIGERATION

Filed Sept. 15, 1930

5 Sheets-Sheet 4



INVENTOR  
Carl Georg Munters  
BY  
*Alfred D. Sauer*  
ATTORNEY

March 31, 1931.

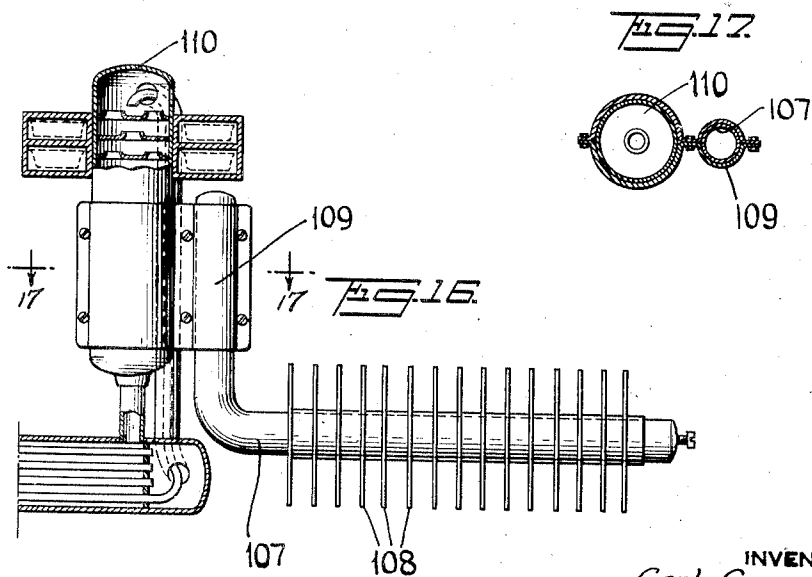
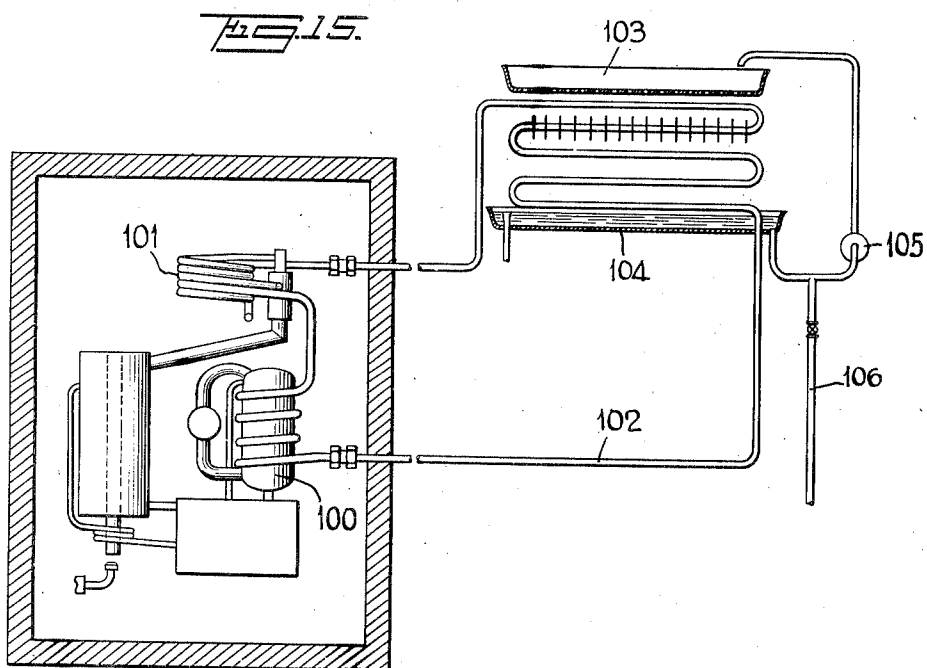
C. G. MUTERS

1,798,951

REFRIGERATION

Filed Sept. 15, 1930

5 Sheets-Sheet 5



INVENTOR  
Carl Georg Muters  
BY *Hyatt Dower*  
ATTORNEY

## UNITED STATES PATENT OFFICE

CARL GEORG MUNTERS, OF STOCKHOLM, SWEDEN, ASSIGNOR TO PLATEN-MUNTERS REFRIGERATING SYSTEM, AKTIEBOLAG, OF STOCKHOLM, SWEDEN, A CORPORATION OF SWEDEN

## REFRIGERATION

Application filed September 15, 1930, Serial No. 481,847, and in Germany June 19, 1929.

This invention relates to an apparatus for the transference of heat between two or more rooms or compartments, one of which contains a body to receive or emit heat, for example, the heat receiving or emitting parts of refrigerators. This result is accomplished by a heat transferring element having in its interior a liquid which will evaporate and condense and by such evaporation in a warm compartment and condensation in a cool compartment the transfer of heat is accomplished.

The invention primarily comprises a method by which this heat transferring element or parts of the same are individually connected to the heat absorbing or receiving or the heat discharging or emitting body to maintain a good heat conducting contact with the same.

The application of the device is simple and is susceptible of various embodiments in refrigerators being capable of being employed in various capacities for cooling commodities of different size, shape or the like on account of the ease of establishing a good heat conducting connection between the respective parts.

This invention permits utilization of the small refrigerating unit in an enlarged capacity rendering it particularly applicable for special purposes. The method of connecting the parts together to afford a good heat conducting joint causes no appreciable heat loss so that the efficiency of the system is not materially altered and permits the transfer of heat a greater distance without increased losses. The invention is particularly adaptable for the evaporators of refrigerators, which evaporators have relatively small heat absorbing surfaces and substantially high internal pressures developed in the system in which the evaporator is associated, for example, in an absorption refrigerating unit of the Platen-Munters type.

The invention will first be hereinafter more particularly described with reference to the accompanying drawings which form a part of this application and later pointed out in the claims at the end of the description.

In the drawings:

Fig. 1 is a fragmentary front elevation of

a refrigerator cabinet illustrating one application of the invention;

Fig. 2 is a part front elevation part sectional view illustrating a modified form of the invention;

Fig. 3 is a fragmentary front elevation illustrating a further modified form of the invention;

Fig. 4 is a section taken on the line 4—4 of Fig. 3;

Fig. 5 is a modified form of transfer device for use in cabinet of Fig. 3;

Fig. 6 is a diagrammatic view of a multiple installation;

Fig. 7 is a further modified form of transfer device taken on the line 7—7 of Fig. 8;

Fig. 8 is a section on the line 8—8 of Fig. 7;

Fig. 9 is a side elevation illustrating the application of the invention to an ice cream can;

Fig. 10 is a top plan view of the structure shown in Fig. 9;

Fig. 11 is a vertical section through a further modified form of transfer device;

Fig. 12 is a vertical longitudinal section through a further modified form of transfer device adapted for a freezing device or ice freezing tray;

Fig. 13 is a view of a similar device taken at right angles to Fig. 12;

Fig. 14 is a fragmentary part elevation of a part sectional view of a modified form for quick freezing;

Fig. 15 is a diagrammatic view of a further modification illustrating the use of the invention for cooling the heat emitting parts;

Fig. 16 is a further modified form of the invention; and

Fig. 17 is a section taken on the line 17—17 of Fig. 16.

Referring to Fig. 1, reference character 10 indicates a refrigerator of the Platen-Munters absorption type which operates with the pressure equalizing gas. This refrigerator has a refrigerating unit compartment at the right provided with doors 11. The remaining portion of the cabinet is cooled and is adapted to contain articles to be cooled. A partition wall 12 serves to divide the refrig-

erated part of the cabinet into a large compartment 13 and a small compartment 14 in order that materials placed in these compartments may be kept separated in order that a substance like butter may be kept in one compartment and fish in the other to prevent the butter from absorbing the fish flavor. An evaporator 15 is mounted in the larger compartment and such evaporator for the purpose of illustration is of the Platen-Munters type and is provided with fins 16 around the same for a well known purpose and also is provided with an aluminum casting secured about its upper portion and in which are disposed ice trays 17.

Auxiliary gas enters the evaporator through the pipe 18 and the gas mixture is discharged from the evaporator through the lower pipe 19. The compartment 14 is cooled by means of a heat transferring apparatus which comprises an auxiliary evaporator 20 provided with fins 21 located within the auxiliary compartment. This auxiliary evaporator is connected by means of a pipe 22 which is provided with a coil 23 located around the lower portion of the main evaporator 15 in good heat conducting relation and a return pipe 24 connects the lower end of the coil with said auxiliary evaporator. The pipe 22, coil 23 and return line 24 forms with the auxiliary evaporator a separate transfer device complete in itself.

In order to increase the conductivity of heat between the pipe coil 23 and the lower part of the main evaporator, a jacket 25 is disposed around the coil 23 to prevent a severe temperature drop at this point, a jacket 25 being preferably formed of aluminum or the like and the coil may be formed in the aluminum. The jacket 25 may be formed either integrally with the lower portion of the evaporator or separately from the same and secured thereto by any desired fastening elements. In like manner the coil 23 may be secured to the main evaporator by separate fastening means for example soldering or the like, or may be formed integrally therewith and either before or after the evaporator is installed in the box, fittings 26 being required after the coil is attached to the evaporator before installation.

The transfer device is partially filled after evacuation through the filling opening 27 in the top of the auxiliary evaporator with a liquid, preferably ammonia.

In operation, the auxiliary evaporator will absorb heat through its fins 21 and cause vaporization of the ammonia, and the vapor rising will pass through the pipe 22 into the coil 23, where it will be condensed and run by gravity through the return line 24 to the auxiliary evaporator. This transference of heat from the auxiliary to the main evaporator occurs until the temperature of the auxil-

ary evaporator has reached substantially the temperature of the main evaporator.

In Fig. 2 a device is illustrated which is particularly adaptable for use with a refrigerating unit employing an oil burner or the like for furnishing the source of heat and in which the amount of heat is more difficult to regulate than with gas or electricity. With this type of installation, if too much heat is utilized so that the main evaporator is cooled too much, which would ordinarily result in the breakage of bottles contained therein or the freezing of meat or other provisions, the use of the present invention prevents the temperature of the air from being reduced beyond a certain point. In this figure a refrigerator cabinet 28 is provided with a casing 29 which houses an absorption refrigerating unit of the Platen-Munters type and which is connected by pipes 30 and 31 with the evaporator 32 within the cabinet. The upper part of the evaporator is surrounded with an aluminum casting 33 in which is disposed ice trays 34, such ice trays being provided with a casing 35 of insulating material so that the low temperature in the upper part of the evaporator is insulated from the compartment in which the same is mounted. The lower part of the evaporator has connected thereto a heat transfer device which constitutes the gist of the present invention.

In the present embodiment a vacuum body 36 made of aluminum, copper or some material having good heat conducting properties and preferably of a form to fit snugly against the evaporator is provided where it may be fastened in any desired manner, such body 36 containing one or more extensions or canals 37 which fit into or closely against the lower part of the evaporator 32, or in other words, in intimate heat transferring relation the lower portion of the insulation of the evaporator also serving to insulate the upper portion of said body 36. The body 36 is also preferably provided with fins 38 and a filling opening 39 through which may be supplied an evaporable liquid similar to the embodiment shown in Fig. 1, the operation of which is also similar to that of Fig. 1. In both of these embodiments the boiling point of the evaporable liquid can be determined by the pressure of the auxiliary gas, which is preferably added to the body along with the refrigerant.

In Fig. 3 is shown a modified form of the invention by means of which the evaporator may be made to cool a larger compartment. In this figure the cabinet 40 is of larger size than those previously described, in the upper right hand corner of which is shown an evaporator 41 with an aluminum casting 42 and ice trays 43. In order to enlarge the refrigerating effect produced within the evaporator 41, a pipe 44 of relatively large

diameter extends substantially throughout the length of the compartment, such pipe being provided with cooling ribs or fins 45 and at its outer end with a filling opening 46.

The pipe 44 is provided with a flange 47 for the attachment of a closure plate 48 on which is mounted a filling opening 46 and at its upper end the pipe is provided with a flange 49 for attachment through a pipe 50 extending to a grooved hollow saddle member 51 connected by small pipes 52 with a saddle casting 53 clamped by a bolt 54 to the evaporator 41. The small connections 52 may be fastened in any desired manner to the members 51 and 53. The pipe 44 is filled through the filling opening 46 until it is substantially half full. Likewise, if it is desired to control the temperature in this modification an inert gas may be inserted under a certain pressure as in the preceding volume.

In operation, the liquid within the pipe 44 will be boiled off or vaporized and the vapors will be condensed as a result of the filling action of the evaporator 41, whereupon the liquid will run back into the pipe 44.

A further exemplification of a method of forming the heat transferring action may be accomplished by the structure shown in Fig. 5 wherein in lieu of the pipe 44 in Fig. 3, a substantially U-shaped pipe 55 may be employed provided with fins 56 and a filling opening 57. In this embodiment the extremities of the pipe 55 are connected directly to a casting 58 clamped directly to the evaporator 41 and a circulation is established through the pipe 55, the vaporization occurring in the finned portion of the pipe and passing through the return portion and being condensed in the casting 58.

In Fig. 6 is shown a diagrammatic view of a multiple installation in which a main evaporator 59 supplied through pipes 60 and 61 is surrounded by a coil 62. The coil 62 has one end connected to a supply line 63, a plurality of auxiliary evaporators 64 controlled by manually or thermostatically operable valves 65, a return line 66 being connected with the upper end of the coil 62. The auxiliary evaporator 64, of which there may be several in number, two of which are illustrated, are adapted to be located in individual cabinets 67. The operation of this type of device is substantially the same as in those previously described, the ebullition or evaporation of the refrigerant taking place in the individual boxes in the auxiliary evaporator 64 and the vapors passing through the pipe 66 to the coil 62 where such vapors are condensed and pass again through line 63 to the evaporators.

In Figs. 7 and 8 an evaporator 68 has a cooling casting 69 attached thereto and the transfer device is similar to that shown in Fig. 5, a U-shaped pipe 70 containing the vaporizable liquid having a filling or charg-

ing opening 71 and the pipe 70 has attached thereto chilling flanges or ribs 72 secured in good heat conducting relation to the pipe 70 in any desired manner. Also as shown in these figures a pipe 73 similar in character to the pipe 70, except shorter, may also be used, each plate 72 being disposed between a long and a short pipe 70 and 73 and connected to both of them. It is preferable to space the lower portion of the pipe 70 away from the plate 72 where it parallels the lower portion of the pipe 73 in order to insure the cooling of the extremities of the plate 72.

In Figs. 9 and 10 are shown means for utilizing the transfer device for cooling ice cream cans. The receptacle 73 for the can is shown as square and is surrounded by a coil of pipe 74 which connects to a casting 75 fastened to an evaporator 76. The heating of the refrigerant within the coil produces a vaporization and the cooling by the evaporator 4 causes a cooling of such refrigerant which runs back in the coil.

In Fig. 11 is shown a receptacle 77 which corresponds to the receptacle 73 in Figs. 9 and 10. However, instead of the coil 74 of Figs. 9 and 10, a passage is formed in the wall of the receptacle and a portion at one side which conforms to the curvature of the evaporator so that it will fit snugly against the same; a filling opening being closed by a plug 78 as shown.

In Figs. 12 and 13 is shown an ice tray 79 supported upon a shelf 80 fixed to an evaporator 81, the ice tray 79 being provided with a central ridge 82 having a channel 83 in which is disposed a tube 84. The ice tray is provided with a handle 85. The pipe 84 is closed by a plug 86, which may be removed to fill said pipe. With this construction the vaporization or ebullition of the contained liquid will occur at the outer end of the tube and such vapors will condense to cause a circulation. Also, if desired, instead of the incorporation of the tube within the tray it may be located at another position, as for example below the shelf 80.

In Fig. 14 is illustrated two examples of a transfer device adapted to produce a quick freezing or quick cooling action. In this illustration an evaporator 87 has a casing 88 attached thereto in which are mounted ice trays 89 and such casing 88 having fins or ribs 90. A transfer member 91 is provided on its lower extremity with fins 92 which are partially immersed in a liquid 93 to be cooled contained within a vessel 94. Also a heat exchange element 95 has a coil 96 connected thereto around which is disposed a jacket 97 of insulating material and a hinged bottom plate 98 to permit the insertion and removal of an object to be cooled, as for example a bottle 99.

While I have described the cover plate 98 at the bottom it obviously might be provided

at the side of the device to permit insertion and removal of an object to be cooled. In order to afford means for readily clamping the parts, they may be attached by bayonet joints or any other desired manner as shown or for the attachment of a modified form of transfer device.

The structures hereinbefore described enlarge the cooling capacity of a refrigerator. However, as shown in Fig. 15, means is provided for transferring the heat from the warm or heat emitting parts of a refrigerating unit of the Platen-Munters absorption type. In the illustration shown in this figure an absorber 100 and a condenser 101 are cooled by coils from a heat transfer device 102. The transfer device 102 which consists of a plurality of coils in the pipe should preferably be located in the north or cool side of the house or in a hollow shaft or other place where either a natural or artificial draft may be obtained, or as shown in Fig. 15, water can be caused to trickle over the coils from an upper perforated pan 103 and caught in a lower imperforate pan 104, a circulation being provided from the lower to the upper pan by means of a pump 105. A supply line 106 may be connected to the circulating system.

In Figs. 16 and 17 is shown a simple transferring device which consists of an L-shaped pipe 107 provided with fins 108, the upright portion of the L-shaped pipe being attached by a bracket 109 with evaporator 110.

I claim:

1. An evaporator, a closed conduit removably connected to said evaporator, an element in heat exchange relation with said conduit and a volatile liquid partially filling said conduit.
2. A freezing tray comprising a compartment for receiving liquid to be frozen, said compartment having a bottom, a cavity in said bottom and a volatile liquid partly filling said cavity.
3. A refrigerator having a compartment to be cooled, said compartment containing an evaporator, a cooling fin in said compartment, a conduit in said compartment attached to said evaporator and to said fin, and a volatile fluid partly filling said conduit.
4. A refrigerator having a compartment to be cooled, said compartment containing an evaporator and an element to be cooled by said evaporator, a conduit in heat exchange relation with said element and with said evaporator, and a volatile fluid partly filling said conduit.
5. A refrigerator having a compartment to be cooled, an evaporator in said compartment, an element in said compartment to be cooled by said evaporator, a conduit in heat exchange relation with said element and with said evaporator and a volatile fluid partly filling said conduit.
6. A refrigerator having a cooling com-

partment and a heat transfer device in said cooling compartment containing a volatile liquid for producing an interchange of heat between different parts of the compartment.

In testimony whereof, I affix my signature.  
CARL GEORG MUNTERS.

75

80

85

90

95

100

105

110

115

120

125

130

**DISCLAIMER**

-1,798,951.—*Carl Georg Munters*, Stockholm, Sweden. REFRIGERATION. Patent dated March 31, 1931. Disclaimer filed December 17, 1935, by the assignee, *Servel, Inc.*

Hereby enters this disclaimer to claims 3, 4, 5, and 6 thereof, to wit:

"3. A refrigerator having a compartment to be cooled, said compartment containing an evaporator, a cooling fin in said compartment, a conduit in said compartment attached to said evaporator and to said fin, and a volatile fluid partly filling said conduit.

"4. A refrigerator having a compartment to be cooled, said compartment containing an evaporator and an element to be cooled by said evaporator, a conduit in heat exchange relation with said element and with said evaporator, and a volatile fluid partly filling said conduit.

"5. A refrigerator having a compartment to be cooled, an evaporator in said compartment, an element in said compartment to be cooled by said evaporator, a conduit in heat exchange relation with said element and with said evaporator and a volatile fluid partly filling said conduit.

"6. A refrigerator having a cooling compartment and a heat transfer device in said cooling compartment containing a volatile liquid for producing an interchange of heat between different parts of the compartment."

[*Official Gazette January 14, 1936.*]

### DISCLAIMER

1,798,951.—*Carl Georg Munters*, Stockholm, Sweden. REFRIGERATION. Patent dated March 31, 1931. Disclaimer filed December 17, 1935, by the assignee, *Servel, Inc.*

Hereby enters this disclaimer to claims 3, 4, 5, and 6 thereof, to wit:

"3. A refrigerator having a compartment to be cooled, said compartment containing an evaporator, a cooling fin in said compartment, a conduit in said compartment attached to said evaporator and to said fin, and a volatile fluid partly filling said conduit.

"4. A refrigerator having a compartment to be cooled, said compartment containing an evaporator and an element to be cooled by said evaporator, a conduit in heat exchange relation with said element and with said evaporator, and a volatile fluid partly filling said conduit.

"5. A refrigerator having a compartment to be cooled, an evaporator in said compartment, an element in said compartment to be cooled by said evaporator, a conduit in heat exchange relation with said element and with said evaporator and a volatile fluid partly filling said conduit.

"6. A refrigerator having a cooling compartment and a heat transfer device in said cooling compartment containing a volatile liquid for producing an interchange of heat between different parts of the compartment."

[*Official Gazette January 14, 1936.*]