Feb. 24, 1931. G. H. PHELPS 1,794,030

REFRIGERATING MACHINE

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Fig. 1.

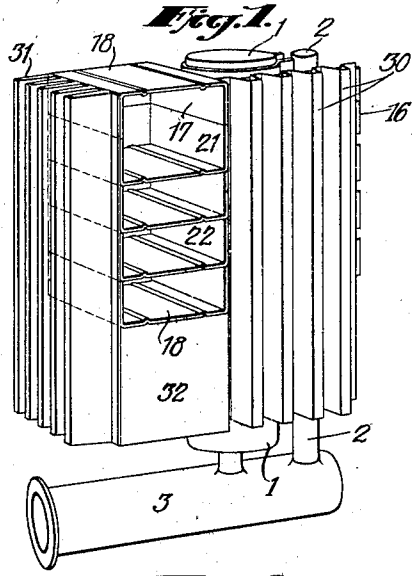


Fig. 2.

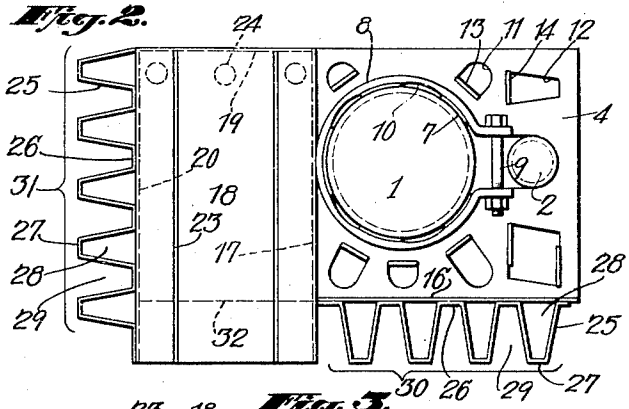


Fig. 3.

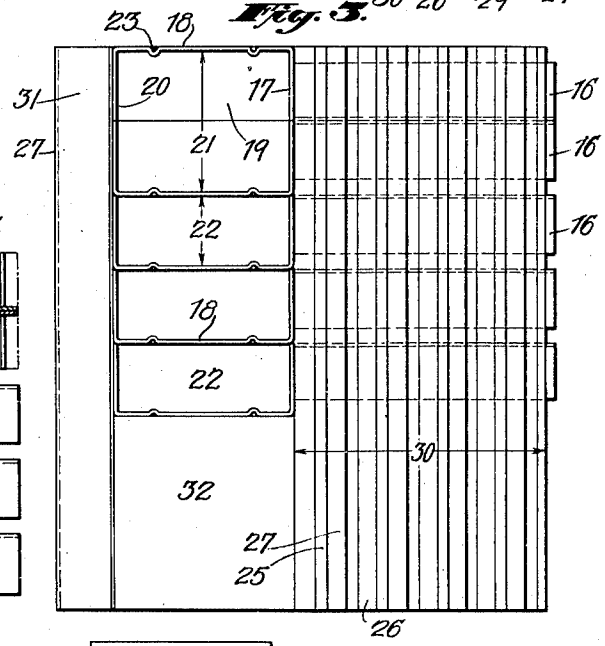


Fig. 4.

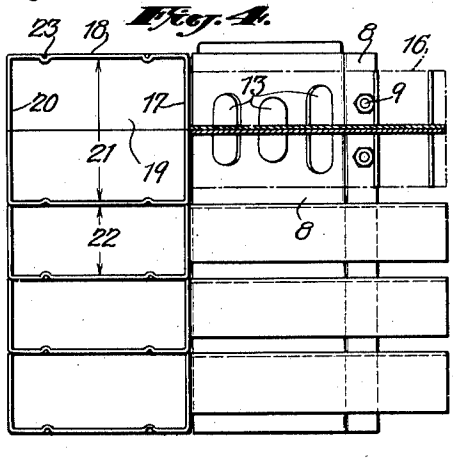


Fig. 5.

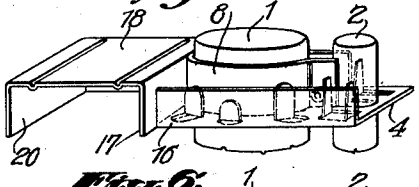


Fig. 6.

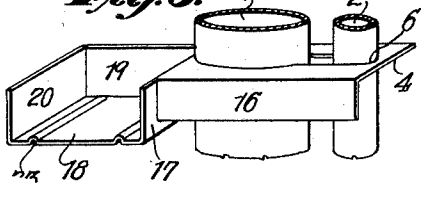
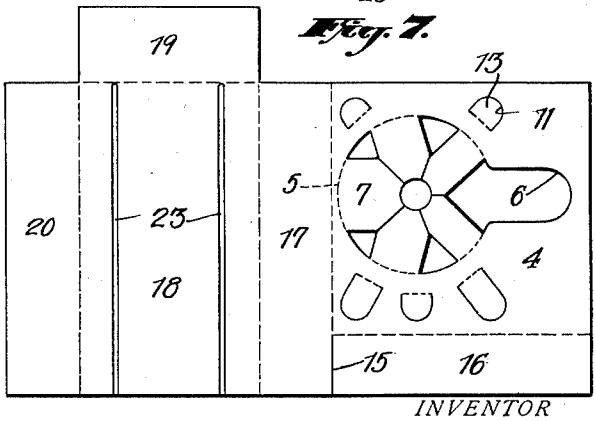


Fig. 7.



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Fig. 8.

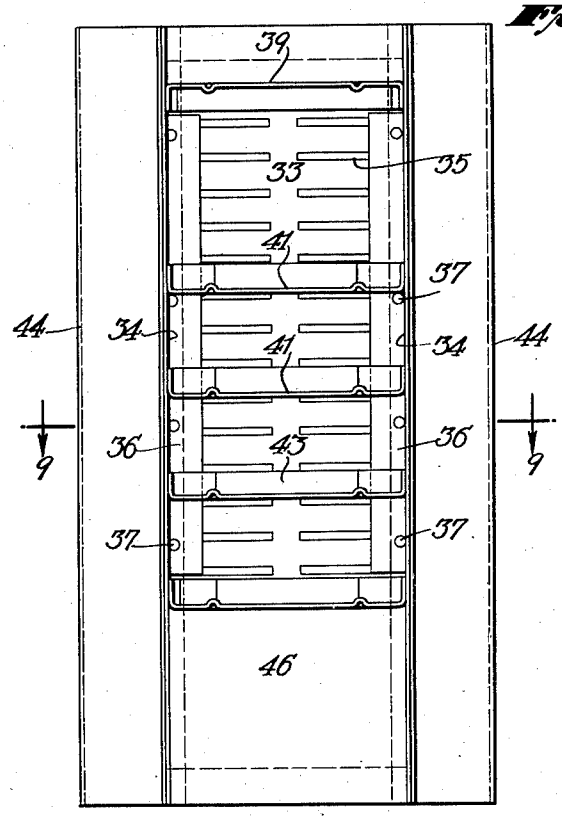


Fig. 10.

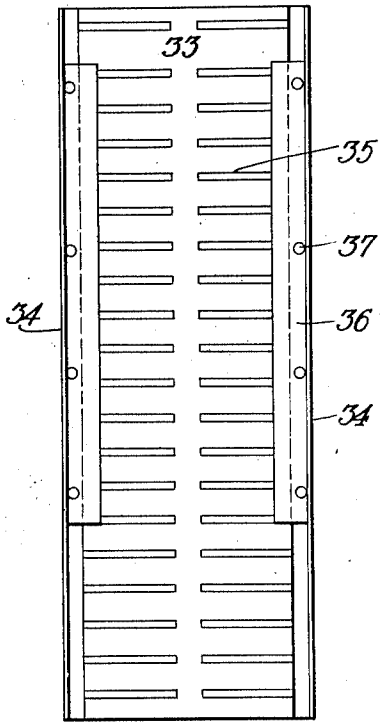


Fig. 9.

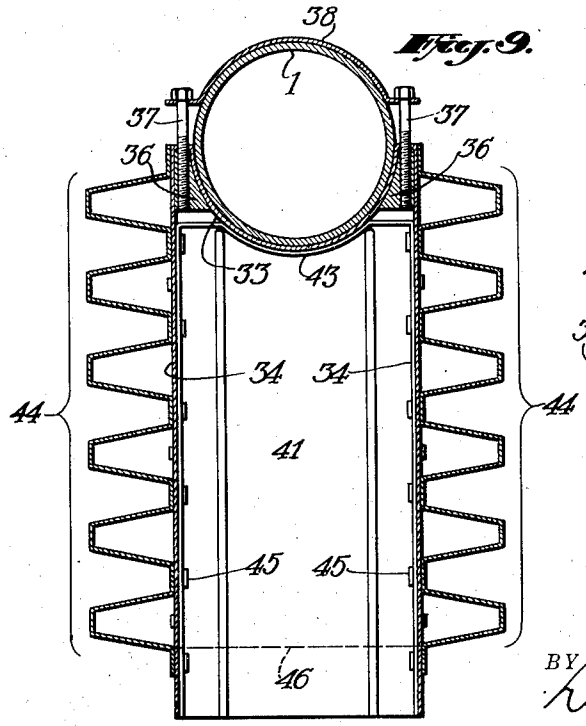
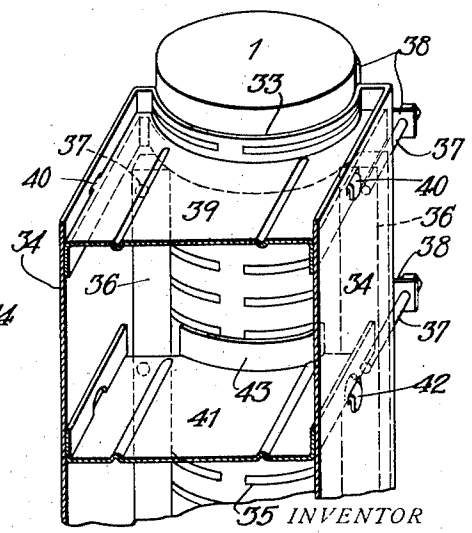


Fig. 11.



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Fig. 12.

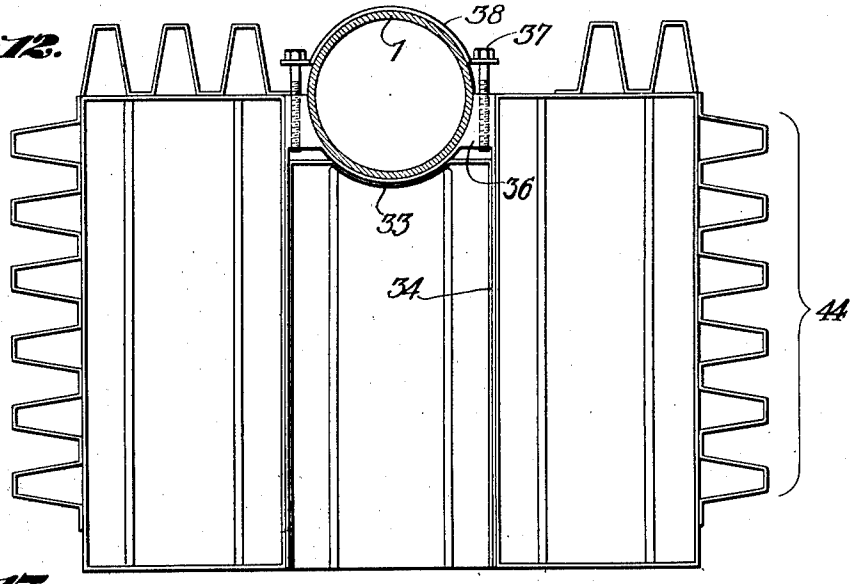


Fig. 13.

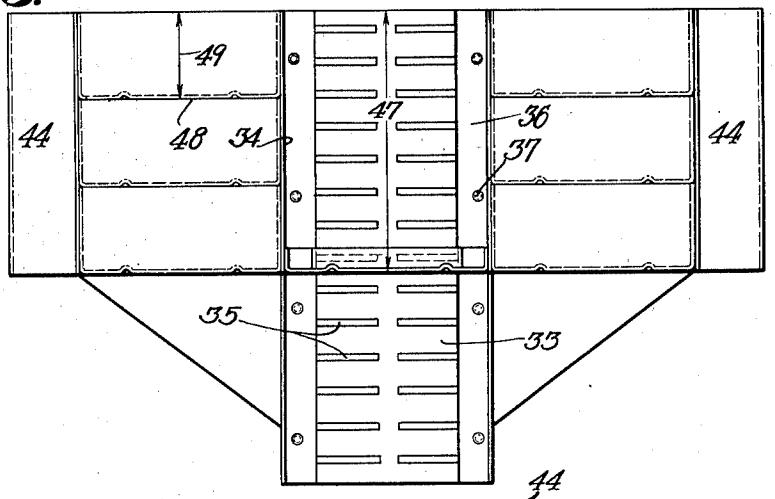
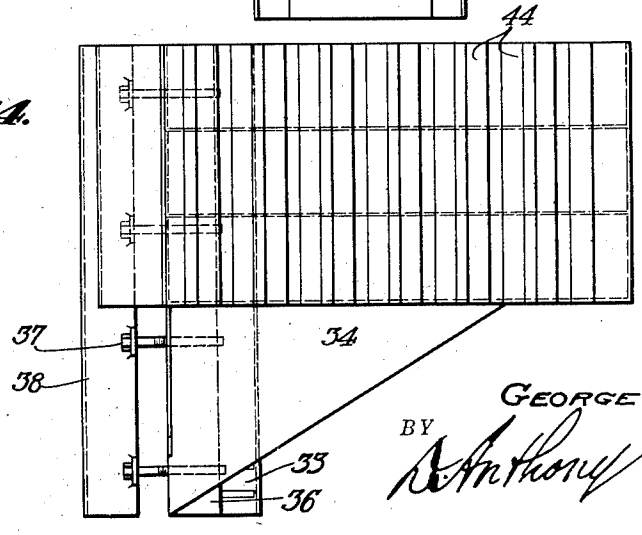


Fig. 14.



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UNITED STATES PATENT OFFICE

GEORGE H. PHELPS, OF WAREHOUSE POINT, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO METROPOLITAN ENGINEERING COMPANY, A CORPORATION OF NEW YORK

REFRIGERATING MACHINE

Application filed February 21, 1927. Serial No. 169,690.

My invention aims to provide certain improvements in the radiating unit by which the cooling effect is transmitted to the air in the refrigerator and generally to an ice-making compartment.

The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a front perspective view of the radiating unit mounted on the refrigerating element;

Figs. 2 and 3 are respectively a plan and a front elevation of the refrigerating unit;

Fig. 4 is a view similar to Fig. 3, showing the principal parts before the application of the radiating structure thereto;

Figs. 5 and 6 are partial perspective showing the front portions of the top section and the next section of Fig. 4;

Fig. 7 is a plan of a blank from which the sections are formed;

Fig. 8 is a front elevation of a modified style of unit;

Fig. 9 is a horizontal section on the line 9—9 of Fig. 8;

Fig. 10 is a front elevation of the piece constituting the back and sides of the same;

Fig. 11 is a perspective view of the rear end of a top part;

Fig. 12 is a plan and Figs. 13 and 14 front and side elevations of another modification.

The radiating unit may be designed for application to various styles and types of refrigerating machines. According to Fig. 1 it is shown applied to a cooling element 1 which is an evaporator to the top of which the refrigerant is fed through a pipe 2, and which leads at its lower end into a heat exchanger 3. These parts are located in an upper compartment of the cabinet or refrigerator proper, and a radiating structure or unit is applied thereto to transmit the cooling effect, so to speak, to the air in the refrigerator. Generally also a part of this unit constitutes a freezing compartment which receives trays of water or of desserts or other things which are to be frozen or gotten very cold. The term "freezing compartment" is used to define this special compartment in which things are brought to a much lower temperature than in the main food compartments.

Referring now to Figs. 2 to 7, the body of the structure is made of a number of separate sections (see Figs. 5 and 6) which are assembled in the manner shown in Fig. 4; and plates corrugated in the horizontal direction are applied to the sides of the complete body so as to provide fins or plates presenting an extended radiating surface, and to form vertical flues inducing circulation of the cooled air.

The blank, Fig. 7, shows how the individual sections are made. There is a horizontal plate 4 with a circular opening 5 to embrace the part 1 of the cooling element. This opening is continued in a slot 6 which embraces the part 2 of the cooling element. Around the opening 5 are tabs 7 which are bent up as in Fig. 2 to provide surface contact with the element 1. A split clamping ring 8 for each section is fastened by a bolt 9 to press the tabs 7 against the element 1. Between the tabs 7 the edge of the plate 4 is cut out to leave recesses 10 for the escape of water during defrosting. Otherwise the water, freezing later, would distort the surfaces and impair the contact. Openings 11 and 12 are provided for air circulation through the plates 4; the metal being bent up to save the radiating surface, forming tabs 13 and 14.

The blank of Fig. 7 is slitted at 15. The portion 16, for the top section, is bent up to form a part of the front wall; and the portion 17 is bent up to form a part of the transversely extending side wall of the freezing compartment. The portion 18 is bent to the horizontal position and the portions 19 and 20 bent downward to form parts of the back and the left side wall of said compartment.

The blank for the other sections is the same as for the top section. But the parts 16, 17, 19 and 20 are bent in the opposite direction. See Figs. 4 and 6. Also the tabs 7 are bent down and the clamping ring 8 in each case is on the under side of the plate 4, preferably filling the vertical spaces between successive plates as indicated in Fig. 4, spacing them apart and stiffening the structure.

The result of assembling the sections is a

compartment 21 at the top of double depth for special desserts and compartments 22 of the depth of a single section for standard ice trays.

The plates 18 are provided with raised ribs 23 which stiffen them and form supporting ribs to hold the ice trays above the floor and diminish the chance of freezing thereto. Holes 24, Fig. 2, are provided in the bottoms of the compartments to allow the escape of any water spilled from the trays.

The body thus described is supplemented by a radiating structure of vertical fins applied to the front wall formed by the sections 16 and the left side wall formed by the sections 20. A plate is corrugated in the horizontal direction to form fins 25 connected at alternate edges by inner portions 26 attached to the face of the body and portions 27 which connect the outer edges so as to form closed flues 28 and alternate open channels 29. This arrangement provides an extended radiating surface and causes a rapid circulation of air, particularly through the closed flues 28, thus making the unit highly efficient in transmitting the cooling effect to the air in the refrigerator. At the left side there is a similar corrugated structure. These radiating structures, indicated as a whole by the numerals 30 and 31, are extended below the body as indicated in Fig. 3. The space below the compartments 22 is preferably closed by a plate 32 for improving the appearance. The extension of the radiating structure beyond the body of the unit adds to the circulating effect, and this may be increased again by closing the space between the edges of the fins in the spaces 29 and also in the spaces 28 below the body.

The cooling element shown is for a commercial gas-fired absorption type of machine. For machines having cooling elements of other shapes, the invention may be applied by correspondingly altering the portion of the radiating unit which engages the cooling element and altering the design of the clamp or fastener. Similarly the invention may be applied by obvious changes in design to cooling elements which extend in other directions than the vertical elements 1 and 2 illustrated and which extend over the top or adjacent to some other side or sides of the body than that illustrated.

The parts described can be made economically of sheet metal, preferably copper because of its easy-working property and its high conductivity. They can be made thinner than is possible with cast metal, so as to have a greater radiating surface in proportion to the quantity of metal used and the weight of the unit. The joints between the parts are preferably made by soldering or welding. Such a joint in applying the fins to the body gives the best conducting effect. But rivets, bolts and other fastening devices can be used. The variations above referred to are applicable not only to the unit of Figs. 2 to 7, but also to those shown in other figures of the drawings.

According to Figs. 8 to 11, the unit is attached directly to the tube 1 only, which is the principal refrigerating element. The back wall 33 and side walls 34 are made in one piece bent to the shape shown in cross-section in Fig. 9. The back 33 is curved to fit the cooling element and provided with slots 35 for drainage. In the angles between the back and the sides there are triangular fillers 36 which receive bolts 37 which pass through flanges on the strap 38 by which the unit is attached to the cooling element.

A top piece 39 (Fig. 11) is inserted shortly below the upper edges of the sides. It is fastened by lugs 40 at its edges which pass through openings in the side walls 34 and are bent over. At desired levels floor plates 41 are inserted with flanges at the sides and ears 42 similarly attached to the sides 34. At the backs the plates 41 have flanges 43 which bear against the back wall 33. On the outer faces of the side walls 34 are radiating structures 44 identical with those of Figs. 2 and 3 and fastened to the side walls by ears 45 passing through openings in the walls and bent down. The radiating structures in this design are also extended below the compartment. The back wall 33 extends similarly below the compartment proper, so as to secure an extended contact. And the front is closed at the bottom by a supplementary plate 46.

Figs. 12, 13 and 14 illustrate a variation in the location of the parts, details not illustrated being assumed to be substantially as in the previous figures. The central compartment 47 is of triple height. At each side of this central compartment is a supplementary compartment with shelves 48 which divide it into three compartments 49 of less height. This gives a broad unit of less height than that of Fig. 8; which serves to utilize to better advantage the space in some types of refrigerator.

All the styles of radiator shown are best made of copper for its high conductivity and other qualities. However, when the parts are assembled (as by the ears 45, Fig. 9, for example) the whole unit is dipped in a bath of molten tin; thus tinning all copper surfaces and at the same time "soldering" (with tin) the contact faces of the fins to the main body. It is through this tin that the main transfer of heat from fin to body is obtained. The tinning also avoids exposed copper surfaces, which might cause contamination of food or ice to a slight extent.

Various modifications may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:

1. A radiating unit for refrigerating machines including in combination vertical plates and horizontal plates forming the walls of a freezing compartment, means for attaching said compartment to the cooling element of the machine and a radiating structure of sheet metal attached to said compartment.

2. A radiating unit for refrigerating machines including in combination a freezing compartment having side walls, a back wall adapted for attachment to the cooling element of the machine and an open front, and a radiating structure comprising sheet metal fins attached to said side walls.

3. A unit for attachment to the vertical cooling element of a refrigerating machine including in combination a freezing compartment, horizontal plates extending outward therefrom and adapted for conductive engagement with the cooling element and a radiating structure of vertical fins in conductive engagement with said plates.

4. A unit for attachment to the cooling element of a refrigerating machine, said unit including a freezing compartment and comprising a number of sections assembled together, the sections comprising sheets of metal bent to form horizontal and vertical walls of the freezing compartment and also horizontal plates extending laterally therefrom and adapted for conductive engagement with the cooling element.

5. A unit for attachment to the cooling element of a refrigerating machine, said unit including a freezing compartment and comprising a number of sections assembled together, the sections comprising sheets of metal bent to form horizontal and vertical walls of the freezing compartment and also horizontal plates extending laterally therefrom and adapted for conductive engagement with the cooling element and a radiating structure of vertical fins applied to said horizontal extensions.

6. A unit for attachment to the cooling element of a refrigerating machine, said unit including a freezing compartment and comprising a number of sections assembled together, the sections comprising sheets of metal bent to form horizontal and vertical walls of the freezing compartment and also horizontal plates extending laterally therefrom and adapted for conductive engagement with the cooling element and a radiating structure of vertical fins applied to said horizontal extensions and also to the opposite side of the freezing compartment.

In witness whereof, I have hereunto signed my name.

GEORGE H. PHELPS.