March 3, 1942. R. HINTZE 2,275,365

REFRIGERATOR

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Fig. 3

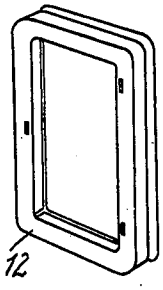


Fig. 1

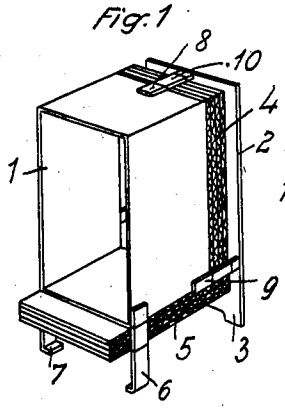


Fig. 2

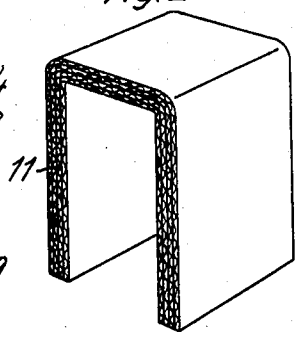


Fig. 4

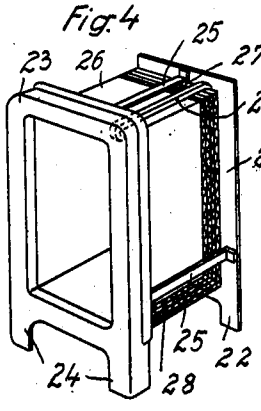


Fig. 5

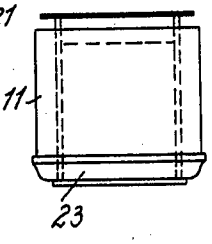


Fig. 9

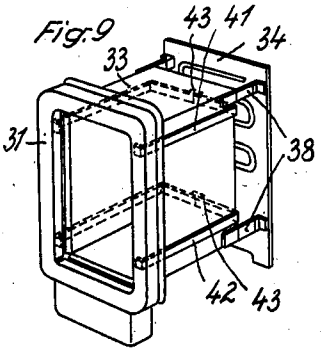


Fig. 6

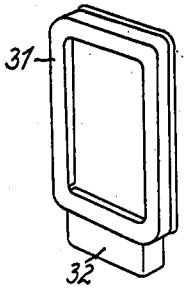


Fig. 7

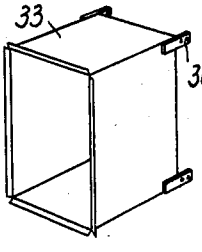
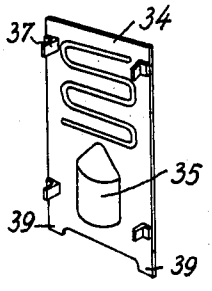


Fig. 8



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Fig. 10

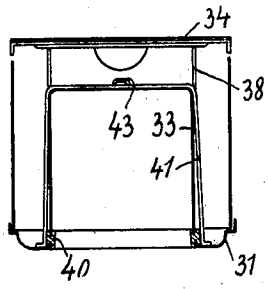


Fig. 11

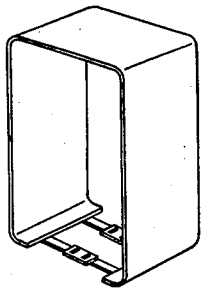


Fig. 12

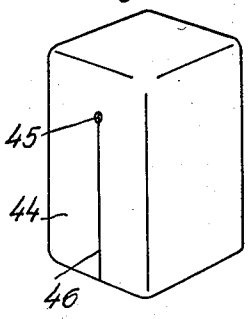


Fig. 13

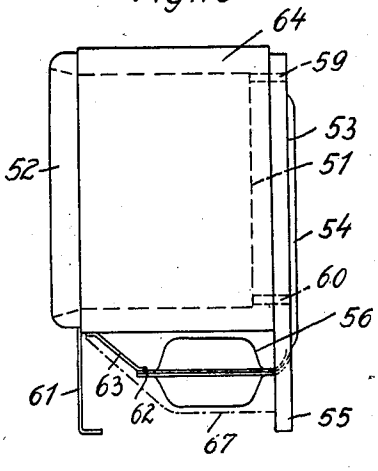
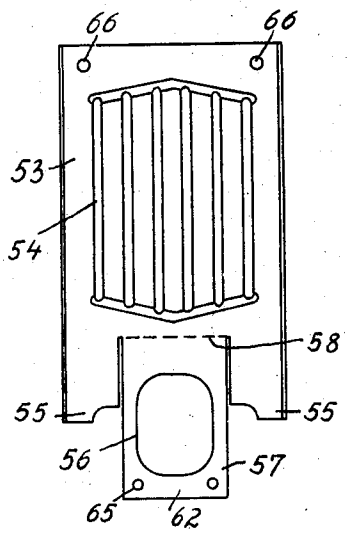


Fig. 14



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361

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UNITED STATES PATENT OFFICE

2,275,365

REFRIGERATOR

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Application July 21, 1939, Serial No. 285,645
In Germany July 25, 1938

13 Claims. (Cl. 62—89)

This invention relates to a refrigerator having a cabinet provided with an inner casing enclosing the cooling chamber and which is simple in design and economical to manufacture, this being of particular importance in the mass production of household refrigerators. In prior structures, the insulating walls and the outer sheet-iron lining therefor were generally employed for supporting the refrigerator cabinets and the refrigerating apparatus; in accordance with the present invention the feet or legs, the inner casing and the frame for the refrigerating apparatus which is preferably arranged on the rear side of the refrigerator cabinet or the refrigerating apparatus itself are combined so as to form the supporting body carrying the refrigerator cabinet including the insulation and the outer lining.

In the novel arrangement the insulation surrounding the inner casing is placed on the supporting body in such a manner that it is not required to carry or support parts of the refrigerating apparatus. Two or more adjacent insulating walls, i. e., for instance, the side walls and the upper insulating wall are made of one piece in the form of a hood to be arranged on the supporting body proper.

The invention may be carried into practice in different ways. The frame for carrying the refrigerating apparatus may, for instance, be made of angle iron provided with legs and secured to the inner casing of the cooling chamber by means of connecting pieces. The front legs of the refrigerator cabinet may be firmly secured to the inner casing. In a particularly simple preferred embodiment of the invention parts of the refrigerating apparatus lying outside the cooling chamber, i. e., in the case of refrigerating apparatus of the compression type, parts such as the condenser and the compressor-motor housing are made of two metal sheets provided with corresponding indentations and secured together around their edges by welding.

These sheet-iron parts may be so designed that they form at the same time the rear legs or feet of the refrigerator cabinet. This form of the invention is considerably simplified as compared with prior structures which require special legs at the side where the refrigerating apparatus is arranged. The connecting pieces are arranged between the inner casing and frame of the refrigerating apparatus or the feet and the portions thereof passing through the insulating walls are preferably made of insulating material in order to reduce the loss of refrigeration. A particularly simple construction of the refrigerator cabinet may also be obtained by providing the refrigerating apparatus or the frame carrying the same with legs or feet and securing it to the door frame—also provided with feet—by means of struts arranged on the inner cabinet casing. The lower and the rear insulating wall of the refrigerator cabinet may be secured to the supporting body before arranging thereon the other insulating walls.

In order to avoid perforations in the inner casing of the cabinet, it is advisable to arrange the conduits in such a manner—placed between the outer refrigerating apparatus arranged on the rear wall of the cabinet and the evaporator—that they enter the cooling chamber at the side of the door. The arrangement of the conduits differs from that of prior structures in that the conduits lie between the outer side of the inner cabinet casing and the insulating walls. In such a structure the side walls and the upper insulating walls, and in certain cases also the rear wall are made of one piece in the form of a hood which is placed on the supporting body provided with the refrigerating apparatus.

In the accompanying drawings are shown some forms of the invention in diagrammatic form.

Fig. 1 shows the assemblage of the inner casing, the rear wall, and the bottom and rear insulating walls on one form of the invention;

Fig. 2 indicates an insulating hood that may be slipped over the structure Fig. 1 and may also be used in a similar manner with other embodiments;

Fig. 3 represents the door frame for the structure Figs. 1 and 2;

Figs. 4 and 5 illustrate another embodiment of the invention in diagrammatic perspective and top plan view, respectively;

Figs. 6–10, inclusive, cover details of still another embodiment;

Fig. 11 indicates an outer shell or jacket for use with any of the embodiments disclosed herein;

Fig. 12 shows in perspective view a modification of an insulating jacket that may be used in place of the one illustrated in Fig. 2; and

Figs. 13 and 14 show details in connection with a refrigerator structure having a motor-compressor unit disposed underneath the cooling chamber.

In Fig. 1, 1 denotes the inner casing for the cabinet preferably made of enamel, igelite or the like. 2 is the rear wall serving at the same time as support for the refrigerating apparatus.

The rear wall 2 extends in the downward direction and is provided with legs or feet 3. This rear wall may be so designed that it forms at the same time the condenser or other parts of the refrigerating apparatus. 4 and 5 denote the rear and lower insulating walls of the refrigerator cabinet. These walls may be made of a piece of corrugated paper board bent in a corresponding manner. 6 and 7 are the front feet firmly secured to the lower part of the inner casing 1. The rear wall 2 is also secured to the inner casing 1 by connecting pieces 8, 9 which are preferably so designed that the portions thereof as indicated at 10 passing through the insulating walls consist of insulating material in order to avoid a loss of refrigeration. In Fig. 2 is shown an upper and lateral insulating wall forming the hood 11 made of corrugated paper board. The hood is slipped over and placed on the inner casing shown in Fig. 1. It will be seen from the dimensions of the hood as shown in the drawings, when compared with those of the inner casing 1 and the insulation 4, 5, that the front edge of the hood will then be in alignment with the front edge of the bottom insulation 5, thus forming an insulation around the cooling chamber which does not support any parts of the refrigerating apparatus. The door frame 12 shown in Fig. 3 which may be made of Bakelite is attached to the structure at the open front thereof.

Numeral 21 in Fig. 4 denotes the rear wall of the cabinet serving at the same time as a support for the refrigerating apparatus and provided with legs or feet 22. 23 is a door frame with feet 24. This door frame may be made of sheet metal, igelite or the like. The two parts 21 and 23 are held together by struts 25 secured thereto preferably by spot welding. The inner casing 26 contacts with the struts 25. 27 and 28 denote the rear and lower insulating walls of the cabinet. In this refrigerating apparatus the conduits 29 which are arranged between the refrigerating apparatus arranged exteriorly of the cabinet and the evaporator (not shown) enter the cooling chamber at the side of the door frame and then extend between the outer side of the inner casing 26 and hood 11 (Fig. 2) to be placed thereon.

Fig. 5 shows the assembly of the refrigerator and the hood 11. A correspondingly shaped outside hood or a shell of sheet metal, igelite or the like may be placed over the hood 11 so as to firmly hold together the different insulating parts and to form the outer jacket of the refrigerator cabinet.

Fig. 6 shows the cabinet frame 31 provided with a support 32. Fig. 7 shows the corresponding inner casing 33 and Fig. 8 the cabinet rear wall 34 in which an indentation 35 is provided for receiving the refrigerating apparatus. The rear wall 34 is provided with feet 39. To the inner casing 33 and rear wall 34 are secured butt struts 36 and brackets 37 respectively. Fig. 9 shows the assembly of the parts shown in Figs. 6 to 8. The butt struts 36 and the brackets 37 are secured to each other by means of connecting pieces 38 which may be made of insulating material. Fig. 10 shows a cross-section of the assembled parts shown in Fig. 9 after having positioned the hood of corrugated paper board shown in Fig. 2. The cabinet frame 31 is secured to the cabinet insert 33 by fillets 40. As will be seen from Fig. 10 these fillets are provided with grooves in which are inserted the sheet-iron parts of the frame 31 and of the inner casing 33. The inner casing is held together with the frame 31 by means of two tie-ribbons 41, 42. These tie ribbons are secured as will be seen from Fig. 9 to the frame 31, for instance, by spot welding or the like. The tie-ribbons are united as indicated at 43 in a manner as is usual, for instance, in sealing together bands tied around boxes or packages. The assemblage of the inner cabinet casing 33 with the outer lining of the refrigerator shown in Figs. 9 and 10 is particularly advantageous because no bolts or screws are necessary. The steel shell shown in Fig. 11 may be used for an outer lining for the corrugated paper board insulation in any of the structures.

Instead of using the arrangement shown in Fig. 4, the side of the cabinet insulation facing the refrigerating apparatus and the upper and the two lateral parts of the insulation may be made of one piece. In this case the hood shown in Fig. 12 may be employed which is a perspective view of the insulating hood, viewed from the side facing the refrigerating apparatus. The wall 44 of this hood with which the refrigerating apparatus contacts when the unit is assembled is provided with an opening 45 through which pass the conduits leading from the refrigerating apparatus arranged exteriorly of the cabinet to the evaporator. To facilitate the arrangement of the conduits a slit 46 is provided in the insulating wall 44. When placing the hood on the supporting body the conduits glide along this slit.

Figs. 13 and 14 show an embodiment of the invention in which a refrigerating apparatus of the compression type is employed whose motor-compressor set is arranged below the cooling chamber. 51 denotes the inner casing. 52 is the cabinet door frame. The inner casing 51 and the frame 52 may, for instance, be secured to each other in the manner shown in Fig. 9. 53 is the rear wall of the refrigerator cabinet and forms the condenser 54 of the refrigerating apparatus as well as the lower feet 55 of the refrigerator cabinet. The housing 56 in which is arranged the compressor motor is firmly secured to the rear wall. The rear wall 53 and the compressor-motor housing 56 are made of two sheets in which corresponding indentations are provided for the condenser 54 and for the reception of the motor-compressor set. The metal sheets are secured together around their edges by welding and form at the same time the rear feet 55 of the refrigerator cabinet. Fig. 14 shows the portion 57 of the metal sheet in which is provided the indentation 58, before bending the same about the dotted line 59. The part 57 is bent at right angles so as to obtain the form as shown in Fig. 13. A refrigerating unit is thus obtained in which the feet, the condenser and the compressor-motor housing consists of two metal sheets.

59 and 60 denote connecting pieces which serve to secure the inner casing 51 to the walls of the refrigerating apparatus. Feet 61 are secured to the frame 52. The compressor-motor housing is secured to the support 63 arranged at the lower end of the frame 52. The supporting body consisting of the parts 51, 52, 53 and 61 is provided with the insulation 64 in a manner as described in connection with previously discussed embodiments. To secure the support 63 corresponding holes 65 are arranged in the front part 62 of the compressor-motor housing.

The refrigerator cabinet is preferably so designed that it may easily be arranged on the wall. To this end, the feet 61 are detachably secured to the part 52 and the holes 66 provided in the upper

part of the rear wall 53 serve to secure the refrigerator cabinet to a wall. If the cabinet is to be arranged on the wall, the front feet 61 are removed and a bottom cover or apron 67 is provided, having perforations for the passage of cooling air. This cover may consist of paper board or similar material.

What is claimed is:

1. In a refrigerator, a cooling chamber of box-like conformation, a back plate, means rigidly securing said back plate to said chamber in spaced relation thereto, said plate and chamber constituting a frame on which all the parts are supported, means including legs formed integrally with the lower portion of said plate for supporting said frame, and heat insulating means surrounding said chamber and supported thereon outside said securing means.

2. In a refrigerator, a cooling chamber of box-like conformation open at the front, a door frame secured to the front of said chamber, said frame having a support formed integrally therewith, a back plate spaced away from the rear of said chamber and rigidly secured thereto, said plate having feet formed integrally therewith, means for insulating the back and bottom of said chamber, and a separate one-piece hood of insulating material for covering the top and sides of said chamber which is applied thereto after the chamber, door frame and back plate are assembled.

3. A refrigerator as claimed in claim 2, in which the door frame is made of molded plastic material.

4. In a refrigerator, a cooling chamber of box-like conformation open at the front, a layer of heat insulating material covering the bottom and rear of said chamber, a back plate for supporting refrigerator parts and having feet formed integrally therewith, means for rigidly securing said back plate to the rear of said chamber in spaced relation thereto, foot members secured to the sides of said chamber at the front thereof, said securing means and said foot members being composed in part of heat insulating material, a door frame secured to the front of said chamber, and a one-piece hood of insulating material of inverted U-shape covering the top and sides of said chamber.

5. In a refrigerator, a main frame structure on which all the apparatus is mounted, said structure comprising a cooling chamber, a door frame, and a rear plate member all rigidly secured together, there being independent means for securing the said frame and plate, respectively, to said chamber, and the said chamber together with said securing means constituting the sole mechanical connection between the said frame and plate, feet formed integrally with the door frame and rear plate, respectively, and heat insulating means covering and supporting entirely on said chamber.

6. In a refrigerator, a main frame comprising a cooling chamber, a front door frame, and an apparatus mounting plate at the rear, tie straps extending around said chamber and rigidly securing the same to said door frame, connecting members composed of heat insulating material rigidly securing said mounting plate to said chamber in spaced relation thereto, and heat insulating means surrounding said chamber and supported thereon.

7. In a refrigerator, a cooling chamber, means including a front door frame for supporting said chamber in front, heat insulating material covering said chamber at the sides and back, an apparatus mounting plate spaced away from the heat insulating material at the back of said chamber and constituting means for supporting said chamber at the rear, and means extending inside the side insulation for rigidly securing said mounting plate to said chamber, said last means being of heat insulating material where it passes through the insulation zone at the back of the chamber.

8. A refrigerator as claimed in claim 7, in which refrigerant conduits are provided which extend from the mounting plate along the top of the cooling chamber and beneath the insulation and enter the cooling chamber at the door opening.

9. In a refrigerator, a main frame structure on which all the apparatus and parts are mounted, said structure comprising a cooling chamber, supporting means at the front thereof, and an apparatus mounting plate spaced away from said chamber at the rear, means securing said frame elements rigidly together, a conduit leading from said chamber to said mounting plate, and a one-piece hood of heat insulating material adapted to cover the top, sides and back of said chamber, said hood having an opening in the rear wall for said conduit and a slit extending from the opening to the bottom of said wall, whereby said hood may be placed in position after the other parts are assembled.

10. In a refrigerator, a main frame including a cooling chamber and an apparatus mounting plate spaced away from said chamber at the rear and rigidly secured thereto, said mounting plate comprising a one-piece metal stamping coextensive in area with the back of said chamber, having downwardly extending portions at each side forming feet, and having a central indented portion at the bottom which is bent forward at right angles and forms part of a housing for apparatus underneath said chamber.

11. In a refrigerator, a main frame structure comprising a door frame, a cooling chamber, and an apparatus mounting plate, means for rigidly securing the said frame parts together, and heat insulating means for the chamber applied after assembly of said parts and removable while they remain in rigidly secured relation to each other.

12. A refrigerator comprising, in combination, means forming a cooling chamber, a door frame positioned at one end of said chamber and a mounting plate for receiving refrigerating apparatus positioned at the other end thereof, securing means for firmly uniting said door frame, cooling chamber and said mounting plate to form a unitary carrying structure which solely and exclusively supports the entire refrigerator and all its component parts, said door frame and said mounting plate extending beyond the periphery of said cooling chamber and forming a marginal space on three adjacent sides thereof, and heat insulating means removably disposed in said space around said cooling chamber, said heat-insulating means being removable from said space as a unit.

13. The structure and combination in claim 12, together with a shell-like member secured to the outside of said insulating means for holding said insulating means in place in said marginal space.

RUDOLF HINTZE.