Oct. 11, 1949. L. A. PHILIPP 2,484,310

REFRIGERATING APPARATUS

Filed April 3, 1946

Fig. 1

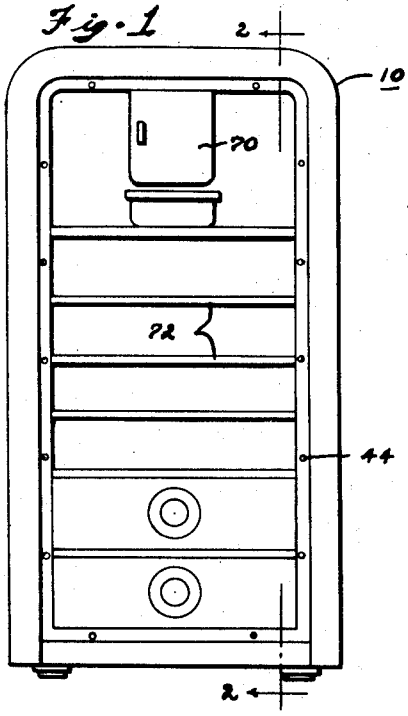


Fig. 2

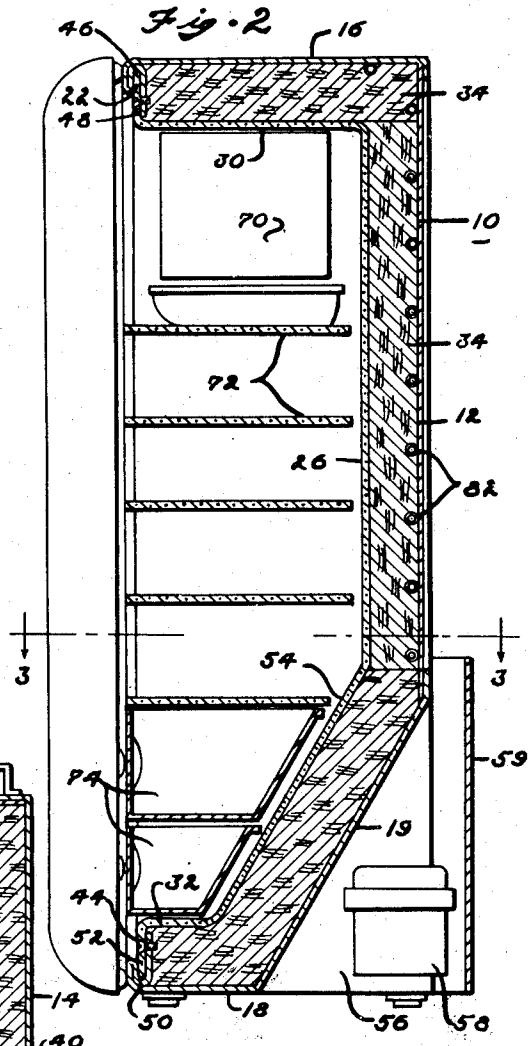


Fig. 3

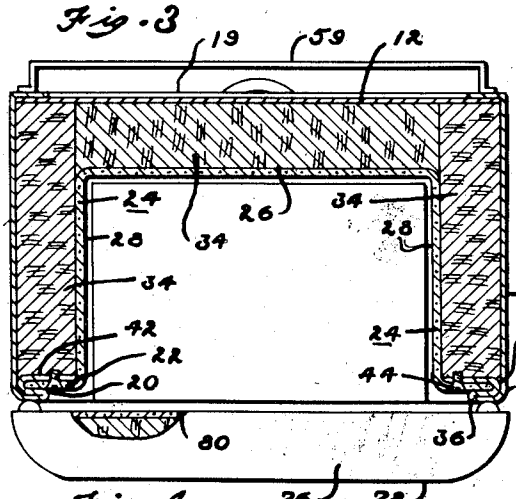
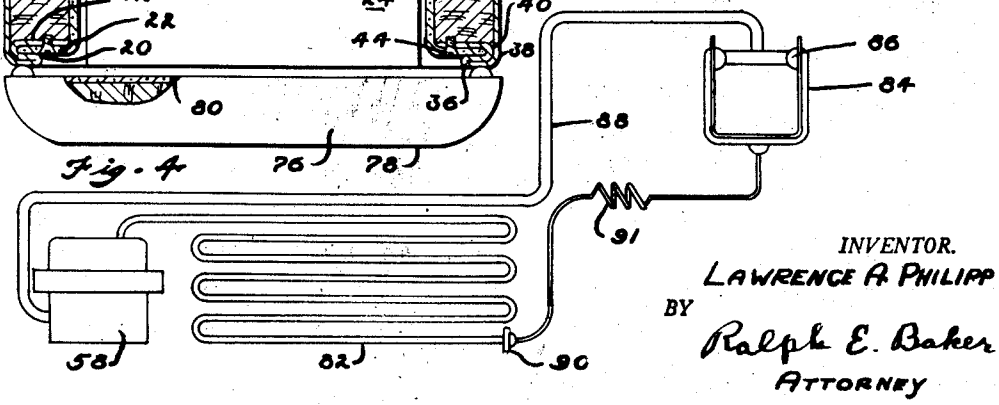


Fig. 4



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REFRIGERATING APPARATUS

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1 Claim. (Cl. 62—89)

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This invention relates to refrigerators, and, more particularly, to an improved domestic refrigerator that can be fabricated economically to provide greater refrigerated volume at lower cost than has heretofore been possible.

It has been common practice in the refrigeration art to provide inner and outer shells formed of sheet metal suitably secured together. The inner shell is smaller than the outer shell to provide a space for insulating material between the inner and outer shells. This type of construction has been relatively expensive because of the necessity of fabricating the inner and outer shells of sheet material and securing them together with the insulation in place. It has, therefore, been impossible to provide a relatively large sized domestic refrigerator that could be sold at prices within the economic range of many thousands of purchasers.

I have found that refrigerators can be produced more economically by forming an outer shell or cabinet of sheet metal having inwardly directed vertically extending grooves to receive an inner liner in the form of a plastic shell adapted to be inserted and locked in place after insulation is positioned in the outer shell.

An object of this invention resides in the development of an improved method of fabricating domestic refrigerators wherein an outer metallic shell is provided with spaced grooves to receive an inner shell formed of plastic material spaced from the outer shell to form an insulation space therebetween.

A further object of the invention resides in the provision of a domestic refrigerator that can be fabricated economically of an outer metallic shell having spaced channels to receive a plastic liner to define a food storage compartment.

Yet a further object of the invention is to provide a domestic refrigerator capable of economical fabrication to provide an outer shell capable of functioning as a refrigerant heat dissipating condenser element, and an inner shell formed of non-conducting material to improve the heat insulating characteristic of the refrigerator.

Another object of the invention resides in the development of an improved method of positioning a liner in a metallic refrigerator cabinet and securing the liner in place to provide a space for insulation between the liner and cabinet and to define a food storage compartment.

Other objects and advantages of this invention will be apparent from the following detailed description considered in connection with the accompanying drawings, submitted for purposes

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of illustration only and not intended to define the scope of the invention, reference being had for that purpose to the subjoined claim.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a front elevation of a domestic refrigerator embodying this invention with the access door removed;

Fig. 2 is a vertical view in cross-section taken substantially on the line 2—2 of Fig. 1, looking in the direction of the arrows, with the access door shown in elevation; and

Fig. 3 is a sectional view taken substantially on the line 3—3 of Fig. 2, looking in the direction of the arrows.

Referring now more particularly to the drawings, it will be observed that a domestic refrigerator is formed of an outer shell 10 having interconnected back, side, top and bottom walls 12, 14, 16 and 18, respectively. The bottom wall 18 includes an upwardly extending angular portion 19. The side, top and bottom walls 14, 16 and 18 are reversely contoured, as illustrated in Figs. 2 and 3, to provide spaced oppositely directed channels 20 acting as guides to receive outwardly extended flanges 22 of an inner liner 24, preferably formed of non-conducting material.

The liner 24 may be formed in any suitable manner, as by a plastic molding or forming operation, to provide interconnected back, side, top and bottom walls 26, 28, 30 and 32, respectively, spaced from and extending parallel with the walls 12, 14, 16, 18 and 19 of the outer shell 10 to provide an insulation space therebetween. The walls of the liner 24 may be contoured with reference to the walls of the cabinet where differential temperature is involved to provide greater insulation space surrounding sections of the cabinet where lower temperature is desired. For example, if a portion of the space within the liner 24 forms an ice freezing compartment, the walls of the liner may be offset inwardly to provide greater insulation surrounding the ice freezing compartment.

As illustrated more clearly in Fig. 3, the side walls 14 of the outer shell or cabinet have inwardly directed flanges 36 extending substantially at right angles thereto contoured, as illustrated at 38, to provide the oppositely disposed vertically extending channels 20 to receive the flanges 22 of the liner 24. The contoured section defining the channels extends substantially parallel with the side walls 14 of the cabinet for a short distance, as illustrated at 40, to provide de-

sired width of the channel 20 to receive the outwardly extended flanges 22 of the side members 28 of the inner shell 24. The contoured portion 40 preferably contacts the outer walls 14 to provide a more rigid and stronger structure. The sheet 14 is again contoured to provide a substantially right angle surface extending generally parallel with the flange 36, as illustrated at 42, to overlie a portion of the outwardly extending flange 22 of the liner 24 to extend beyond the inwardly directed flange 36 of the outer shell or cabinet.

Suitable fastening means, such, for example, as screws or rivets 44, may be projected through the outwardly extended flanges 22 of the inner shell 24 to project through the flange 42 of the outer shell or cabinet as illustrated to secure the inner and outer shells together.

The top panel 16 of the outer shell 10 is contoured in a similar manner, as illustrated at 46, to provide a channel to receive an upwardly directed flange 48 formed integrally with the top surface 30 of the inner shell 24. The lower wall 18 of the outer shell is also provided with a contoured portion, as illustrated at 50 to provide a similar channel to receive a downwardly extended flange 52 carried by the lower surface 32 of the inner shell 24.

The back wall 26 of the inner shell 24 is preferably contoured, as illustrated at 54, to provide an angularly inclined section extending across the rear of the cabinet parallel with angular wall section 19. The section 19 and side walls 14 cooperate to provide a mechanism compartment 56 to receive and partially overlie a motor compressor unit 58. A flue 59 is secured to the back wall 12 of the outer casing adjacent the mechanism compartment 56 to induce a flow of convection cooling air currents to dissipate heat from the motor compressor unit 58.

In the fabrication of this improved refrigerator the back, side and top walls 12, 14 and 16 of the outer shell 10 may be fabricated and secured together in any suitable manner, as by welding. The insulating material 34 may then be positioned in the outer shell across the top, down the sides and down the rear wall to the angular wall portion 54. The inner shell 24, formed of non-conducting material, may be slid into place with the outwardly extended flanges 22 of the side walls 28 sliding in the channels 20 formed in the side walls 14 of the outer shell or cabinet 10. The inner shell 24 is moved to the fully telescoped position, as illustrated in Fig. 2, with the upwardly extended flange 48 of the upper wall 30 extending into the channel formed in the contoured portion 46 of the top wall 16 of the cabinet.

The fastening members 44 are projected through aligned apertures in the outwardly extended flanges 22 of the inner shell 24 and the portion 42 of the side walls contoured to underlie the outwardly extended flanges 22 of the side walls. Similar fasteners project through aligned apertures formed in corresponding members at the top of the refrigerator.

When the inner and outer shells have thus been assembled and secured in place, the insulation is placed between angular wall portions 54 and 19 and then the bottom wall 18 of the outer shell is applied, and the channel formed in the contoured portion 50 adjacent the front thereof is positioned over the downwardly extending flange 52 of the bottom wall 32 of the inner shell 24. The bottom wall 18 including extension 19 is then secured to the back and side walls 12 and 14 of the outer shell in any suitable manner, as

by welding or screws (not shown). The fastening means 44 are then projected through aligned apertures in the aligned flanges to securely lock the inner non-conducting shell to the outer metallic shell.

An ice freezing compartment 70 may be positioned in the space within the inner shell 24 and be secured thereto in any suitable manner. A plurality of spaced shelves 72 may be provided to divide the space within the food storage compartment within the inner shell 24 beneath the ice freezing compartment 70.

If desired, spaced drawers 74 having contoured back portions to align with the contoured portion 54 of the inner shell 24 may be provided for the reception of articles that cannot conveniently be positioned on the shelves 72.

An access door 76, having an outer metal wall 78 and preferably an inner wall 80 preferably formed of non-conducting material, is hinged to one side of the outer side walls 14 to close the food storage compartment. Suitable insulation may be interposed between the door walls 78 and 80 to provide substantially equal insulation surrounding the entire food storage compartment.

A refrigerant condenser is preferably formed of interconnected tubes 82 bonded in heat exchange relation with the walls of the outer shell 10 to use the outer surface of the cabinet as a heat dissipating member. As illustrated, the tubes 82 are bonded to the back and top walls of the shell 10. It will be understood that if desired the refrigerant condenser and tubes may be bonded to all of the outer walls of the shell 10. The ice freezing compartment 70 is provided with a refrigerant evaporator 84, as illustrated diagrammatically in Fig. 4. The refrigeration cycle of this invention is as follows:

Gaseous refrigerant is withdrawn from spaced headers 86 of the evaporator 84, and is directed through a conduit 88 to the inlet side of the motor compressor unit 58. The gaseous refrigerant is compressed by the motor compressor unit 58 and is discharged to the refrigerant condenser 82 bonded in heat exchange relation to the outer shell of the cabinet. As heat is dissipated from the compressed gaseous refrigerant it is converted to the liquid form and passes through a strainer 90 and a small diameter metering tube 91. The liquid refrigerant is then directed to the refrigerant evaporator 84 where it is again expanded and converted into the gaseous form absorbing heat from the surrounding atmosphere to provide the desired refrigerated effect.

Although only a preferred form of the invention has been illustrated, and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appending claim.

I claim:

A refrigerator comprising an outer metallic shell having contoured edge portions forming channel shaped members extending around a vertically extended access opening, an inner shell formed of plastic material having outwardly extended flanges positioned within the channel shaped members, the inner and outer shells being contoured angularly adjacent the bottom to provide a mechanism compartment, a motor compressor unit positioned within the motor compressor compartment, refrigerant condenser tubes bonded to the inner surfaces of the outer shell, a refrigerant evaporator positioned within the inner shell, connecting means between the motor com-

pressor unit and the refrigerant evaporator, and connecting means between the motor compressor unit and the refrigerant condenser tubes.

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