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REFRIGERATOR ASSEMBLY

Filed Jan. 12, 1944

2 Sheets-Sheet 1

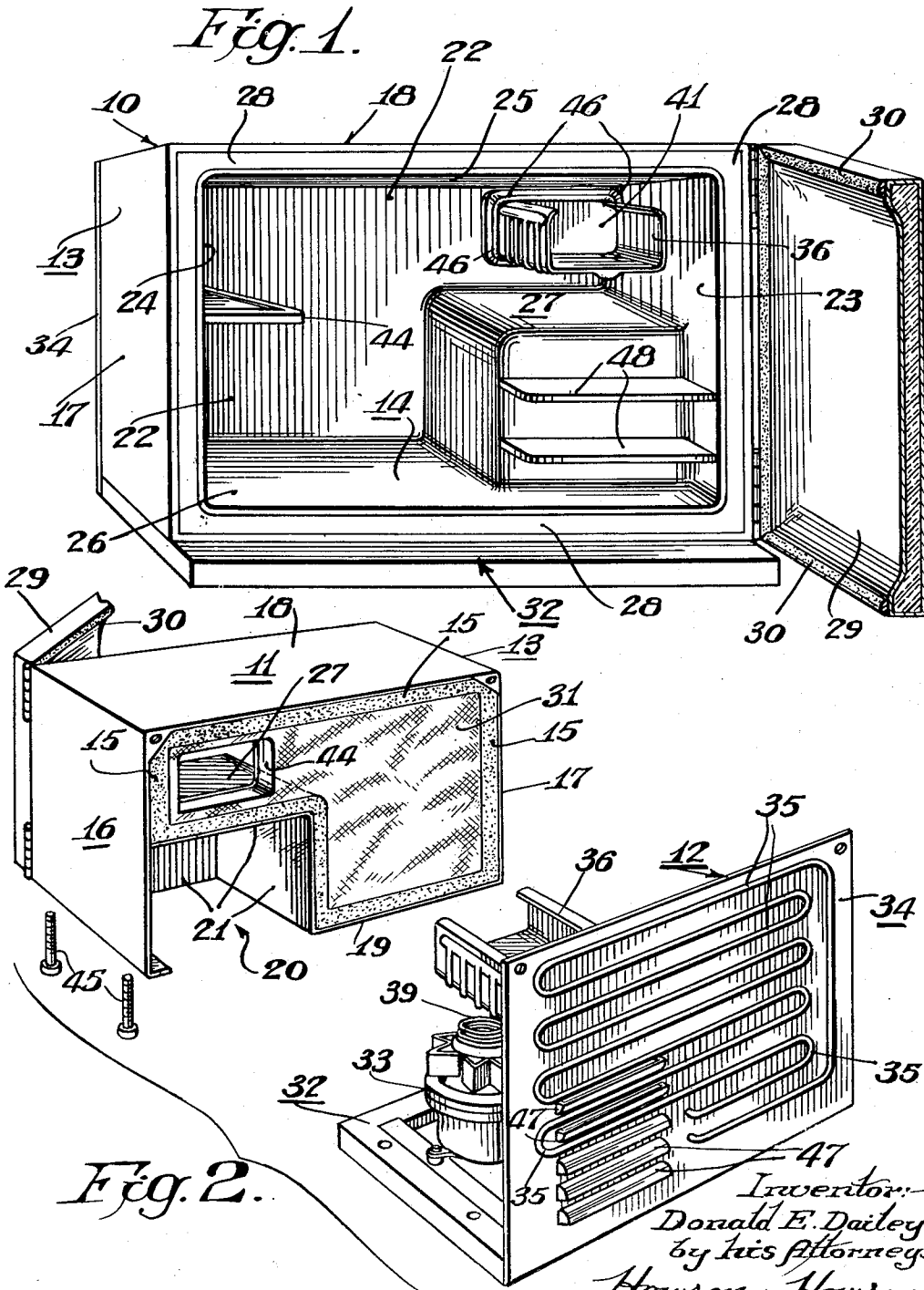


Fig. 2.

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Fig. 3.

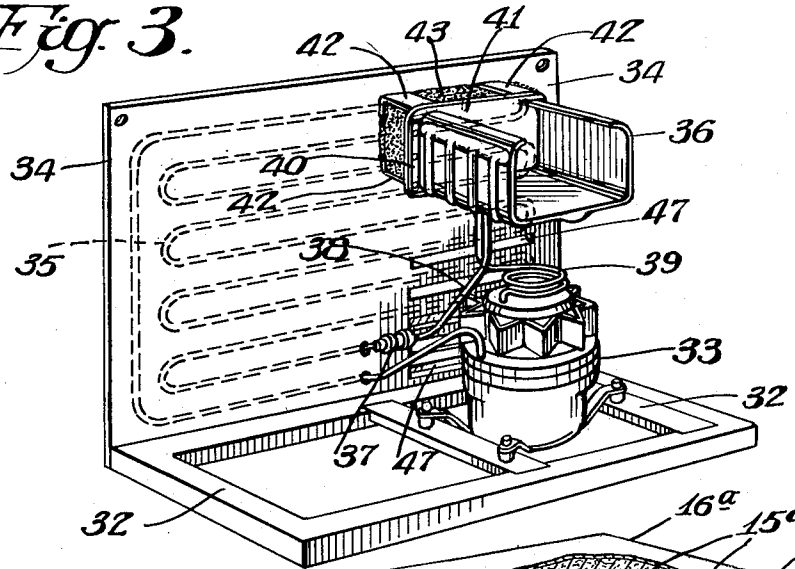
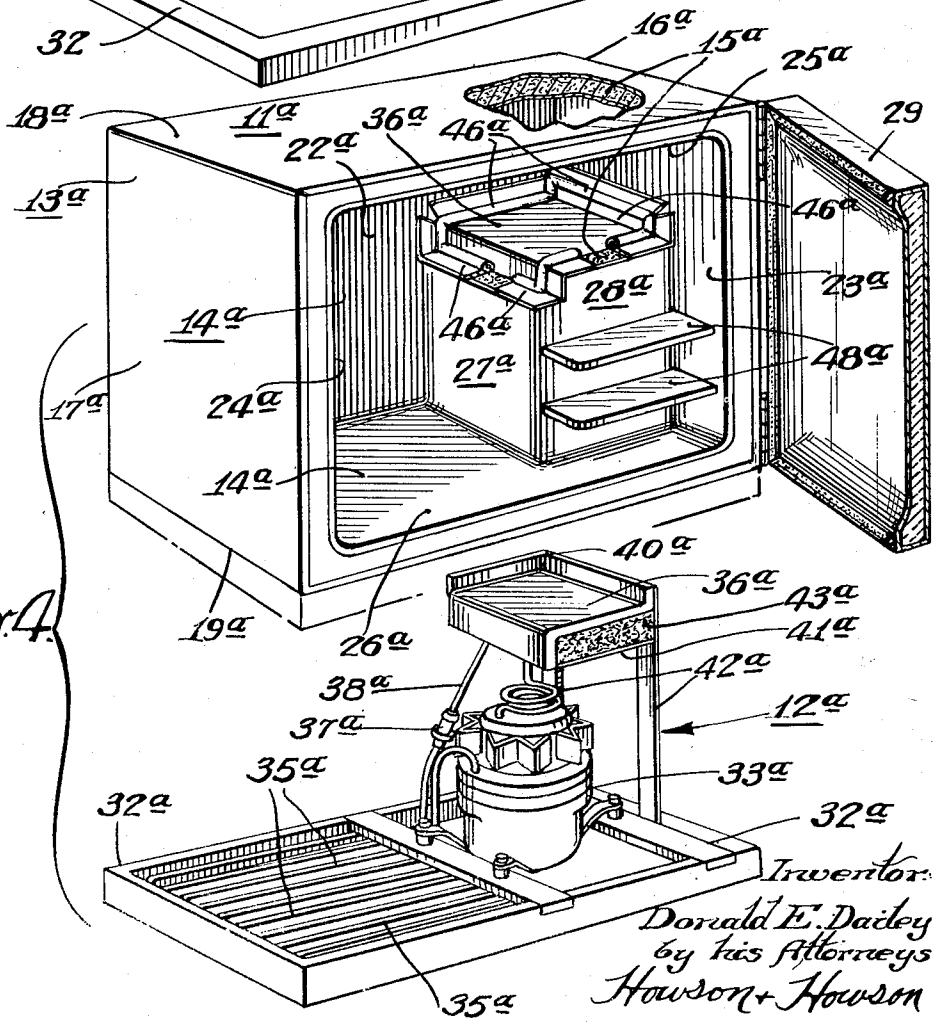


Fig. 4.



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UNITED STATES PATENT OFFICE

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REFRIGERATOR ASSEMBLY

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13 Claims. (Cl. 62—116)

This invention relates more particularly to refrigerators of a type designed primarily for use in small apartments, studios and the like.

The desirability of a small compact refrigerator for use primarily in apartments, studios and the like, has long been recognized, but difficulty has been experienced in devising an efficient arrangement of cabinet and refrigerating mechanism affording adequate food storage capacity within the strictly limited permissible overall dimensions of the unit. Furthermore, the commercial success of a refrigerator of this type depends largely upon low cost, and accordingly simplicity of construction and assembly are factors of prime importance.

It is a primary object of this invention to provide a refrigerator characterized by extreme simplicity of structure and assembly, and in other essential respects satisfying the requirements of a refrigerator of the stated type.

Another important object of the invention is to provide a refrigerator comprising cabinet and mechanical heat transfer elements which cooperate to produce a unitary refrigerator structure wherein compactness of form is coupled with relatively large food storage capacity without sacrifice of operative efficiency.

Still another object is to provide a refrigerator of the stated type including cooperative cabinet and heat transfer units constructed so as to reduce to a minimum the number of elements of the assembly and to materially simplify the assembling operation.

Other objects and advantages of the invention will appear to those skilled in the art in the following detailed description and in the accompanying drawings, in which:

Fig. 1 is a perspective view illustrating one form of a refrigerator constructed in accordance with this invention;

Fig. 2 is an exploded view, in perspective, showing the refrigerator cabinet and the refrigerating unit structures forming elements of the refrigerator illustrated in Fig. 1;

Fig. 3 is a perspective view showing the reverse side of the refrigerating unit shown in Fig. 2;

Fig. 4 is an exploded view, in perspective, illustrating another form of refrigerator cabinet and associated refrigerating unit.

Referring more particularly to that embodiment of the invention illustrated in Figs. 1, 2 and 3 of the drawings, the refrigerator, which is designated in its entirety by the numeral 10, comprises essentially a cabinet 11 and a refrigerating unit 12, said cabinet and unit forming in assem-

bly the unitary refrigerator structure, as hereinafter described.

The cabinet 11, preferably, is of generally rectangular form and consists of an outer shell 13, an inner liner 14, and a body of insulating material 15 between said shell and liner. The outer shell 13 is preferably formed from a single sheet of suitable material shaped to provide diametrically opposed side walls 16 and 17, a top wall and a bottom wall 19. The bottom wall 19 adjacent one side wall 16 is recessed to form a chamber 20 open at the bottom and at the rear and defined by the reentrant walls 21 which extend upwardly from the plane of the bottom wall and laterally towards the side wall 16.

The inner liner 14 may be formed in a suitable manner known in the art to provide a back wall 22, side walls 23 and 24, a top wall 25 and a bottom wall 26. A reentrant portion 27, extends inwardly from one lower rear corner of the liner and forms a recess for accommodation of the walls 21 of the reentrant portion of the shell.

In practice the outer shell 13 and the inner liner 14 are preferably made of sheet metal, breaker strips 28 being interposed in the usual manner between the said shell and liner at the front edges thereof. If desired, the inner liner may be made of suitable known plastic material, and in that event and in lieu of the breaker strips the forward marginal edge portions of the inner liner 14 may be provided with outwardly extending coplanar flanges to cover the front faces of the insulating material 15 between said liner and outer shell 13. Closure of the open front of the cabinet is effected by means of an insulated door 29 of suitable construction, sealing gaskets, shown at 30, being carried by the door to properly seal the cabinet. A batt 31 of insulating material extends over the rear surface of the back wall 22 of the inner liner 14, thus completing the insulation of the cabinet structure.

The refrigerating unit 12 includes a substantially rectangular base 32 upon which is mounted a motor-compressor 33, of conventional design in the present instance. Also mounted on the base 32 and extending upwardly therefrom substantially at right angles thereto is a plate 34 having a condenser coil 35 bonded or otherwise secured thereto. The condenser coil 35 is connected in the usual manner with the motor-compressor 33 and with an evaporator 36, a refrigerant flow restrictor device 37 being interposed in the line 38 leading from said coil to said evaporator. A return line 39 leads from the evaporator to the

compressor in the manner shown in Fig. 3. As illustrated in Fig. 2, the evaporator 36 is of the so-called U-shaped type and is carried by the plate 34. For this purpose the evaporator 36 may be provided with a rearwardly disposed laterally extending flange 40 which flange may be suitably secured to a support plate 41. This plate in turn may be connected to the back cover plate 34 by means of brackets 42 suitably secured to said plates. A pad 43 of insulating material is interposed between the plates 34 and 41 and is retained in position by the brackets 42. The plate 41 or brackets 42, or both, will preferably be composed of material of low heat conducting capacity so as to effectively thermally insulate the evaporator from the back plate.

It will be noted, particularly from Fig. 2, that the cabinet 11 and refrigerating unit 12 are constructed for inter-mating assembly, that is, the cabinet may be placed bodily in position upon the base 32, the motor-compressor 33 fitting into the chamber 20 and the evaporator 36 extending into the cabinet through a window 44 cut in the back wall 22 of the inner liner 14 and in the overlying batt 31 of insulating material so that the evaporator supporting plate 41 fits into the window cut in the back wall of the inner liner to lie flush with the latter. The pad 43 of insulating material then fills the window cut into the batt 31 and the plate 34 then forms the back cover of the cabinet and completes the structure thereof.

The cabinet and refrigerating unit may be connected rigidly together by means of suitable fastening elements such as bolts 45, passing through apertures in the base 32 and the plate 34 and the adjoining portions of the outer shell 13.

The marginal edges of the window 44 and the evaporator supporting plate 41 may be sealed by means of a gasket 46 as represented in Fig. 1 of the drawings; and louvers 47 may be, and preferably are, formed in the rear plate 34, as illustrated in Figs. 2 and 3 to allow circulation of air for cooling the motor-compressor 33. If desired, shelves, such as shown at 48, may be arranged within the cabinet for the storage of foodstuffs.

The embodiment of the invention illustrated in Fig. 4 includes a cabinet 11a and a refrigerating unit 12a, said cabinet and unit, when assembled, cooperating to produce a unitary refrigerator structure. The cabinet 11a has a generally rectangular form and consists of an outer shell 13a, an inner liner 14a and a body of insulating material 15a between said shell and liner. The outer shell is preferably formed from a single sheet of material shaped to provide diametrically opposed side walls 16a and 17a, a top wall 18a and a bottom wall 19a. The inner liner 14a may be made of any suitable material and is provided with a back wall 22a, side walls 23a and 24a, a top wall 25a and a bottom wall 26a.

The bottom wall 19a of the outer shell and the bottom wall 26a of the inner liner are apertured to form an opening affording admission from the bottom of the cabinet to a chamber defined by upstanding insulated walls 27a, 28a which respectively join the back wall 22a and end wall 23a of the said liner. The said chamber is thus located in one corner of the cabinet and opens at the top into the food storage area within the latter.

The refrigerating unit 12a includes a substantially rectangular base 32a upon which is mounted a motor-compressor 33a and a condenser coil

35a the latter being connected in the usual manner with the motor-compressor and also with an evaporator 36a. A refrigerant flow restricting device 37a is inserted in the line 38a which connects the condenser coil to the evaporator. The evaporator is supported upon brackets 42a on the base 32a, and has a generally L-shaped form, with flange portions 40a projecting upwardly therefrom in the manner clearly shown in Fig. 4. A pad 43a of insulating material is arranged at the underside of the evaporator 36a together with an underlying surface plate 41a.

As in the previously described embodiment, the cabinet structure and the refrigerating unit are designed for intermating assembly, that is, the cabinet may be placed bodily in position upon the base 32a, the motor-compressor 33a fitting into the chamber behind the walls 27a, 28a, and the L-shaped evaporator 36a fitting within the open top of the chamber and forming in effect a top wall for the latter, the pad 43a of insulating material cooperating with the insulated walls 27a and 28a of said chamber to completely isolate the chamber from the evaporator and from the food storage area within which the evaporator is exposed. The top of the chamber may be sealed by means of gasket-carrying trim strips 46a. Shelves 48a may be mounted in convenient places within the cabinet for the support of foodstuffs.

From the preceding description, it will be apparent that the invention provides a compact refrigerator of simple construction and mode of assembly wherein the number of parts and structural elements is reduced to a minimum with correspondingly low production cost. The construction also affords ready access to all parts of the refrigerator for servicing and upkeep of the apparatus. Due to the fact that the evaporator, compressor and condenser are all mounted together upon a common chassis frame to form a unitary assemblage with which the cabinet member may be readily associated, it is possible to manufacture the cabinet and the refrigerating unit at separate points and to bring them together for assembly at one of said points or at a convenient third point. The refrigerating cabinet units are devised to complement each other when assembled to the end that the completed structure, while extremely compact, has a relatively large storage capacity and high operating efficiency.

It is to be understood that the specific structures herein shown and described as embodiments of the invention may be modified without departing from the gist of the invention as defined in the appended claims.

I claim:

1. In a refrigerator, a cabinet comprising an outer shell, an inner liner having a reentrant portion forming a recess, and a self-contained refrigerating unit assembled with the cabinet and including a motor-compressor housed within said recess and a support for said motor-compressor constituting also a base for said cabinet, and means for detachably securing the cabinet to said base.

2. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, said wall structure having a reentrant portion forming a chamber apart from said storage area, and a self-contained refrigerating unit assembled with the cabinet and including a motor-compressor housed within said chamber and a support for said motor-compressor constituting also a base for said cabinet, and means for detachably securing the cabinet to the base.

3. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, said wall structure having a reentrant portion forming a chamber apart from said storage area, and a self-contained refrigerating unit including an evaporator section exposed within said area, a compressor section housed in said chamber, and a support for said sections constituting also a base for said cabinet, and means for detachably securing the cabinet to said base.

4. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area; a reentrant portion in said wall structure forming a chamber apart from said storage area; and a self-contained refrigerating unit including an evaporator section exposed within said area at the top of said reentrant portion, a compressor section housed in said chamber, and a common support for said sections constituting also a mounting for said cabinet.

5. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, said wall structure having a reentrant portion at the back of the cabinet projecting forwardly into said storage area and forming a rearwardly opening recess, and having an opening above the reentrant portion affording an access from the rear to said area; and a refrigerating unit comprising a compressor section and a superimposed evaporator section arranged for insertion respectively into said recess and through said opening into the storage area, and a support for said sections forming also a detachable base for said cabinet.

6. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, said wall structure having a reentrant portion at the back of the cabinet projecting forwardly into said storage area and forming a rearwardly opening recess, and having an opening above the reentrant portion affording an access from the rear to said area; and a refrigerating unit comprising a compressor section and a superimposed evaporator section arranged for insertion respectively into said recess and through said opening into the storage area, and a support for said sections having horizontal and vertical portions forming a base and a rear wall cover for said cabinet respectively.

7. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, said wall structure having a reentrant portion at the back of the cabinet projecting forwardly into said storage area and forming a rearwardly opening recess, and having an opening above the reentrant portion affording an access from the rear to said area; and a refrigerating unit comprising a compressor section and a superimposed evaporator section arranged for insertion respectively into said recess and through said opening into the storage area, a support for sections having horizontal and vertical portions forming a base and a rear wall cover for said cabinet respectively, and a condenser section attached externally to said vertical portion.

8. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, a reentrant portion in said wall structure forming a chamber apart from and having an opening communicating with said storage area, and refrigerating apparatus having a compressor section housed within said chamber and an evaporator section installed within said opening and exposed to the storage space.

9. In a refrigerator, a cabinet having an insu-

lated wall structure defining a food storage area, said wall structure having a reentrant portion forming a chamber apart from said storage area, said chamber being open at the bottom and opening at the top into said area; and a refrigerating unit comprising a compressor section housed within said chamber and a superimposed evaporator section exposed in said area through the open top of said chamber, and a support for said sections forming a base for said cabinet.

10. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, a reentrant portion in said structure forming a chamber apart from said storage area, said chamber being open at the bottom and having an opening at the top communicating with said area, and a refrigerating unit comprising a compressor section and a superimposed evaporator section arranged for insertion into said chamber through the bottom opening thereof and through the said top opening into the storage area to a position wherein the said sections are housed respectively within said chamber and within the storage area.

11. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, a reentrant portion in said structure forming a chamber apart from said storage area and having openings at top and bottom, said top opening communicating with the storage area, a refrigerating unit comprising a horizontal support and a compressor section and evaporator section mounted on said support in superimposed relation, said support forming a base for said cabinet and said top and bottom openings forming a passage through the chamber for introduction for the evaporator section into the storage area and for the compressor section into said chamber, and means carried by said refrigerating unit for insulating the evaporator from said chamber.

12. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, a reentrant portion in said structure forming a chamber apart from said storage area, said chamber having an open top extending downwardly in one wall of said chamber, an evaporator section installed in said opening and exposed within the storage area, said evaporator having a substantially horizontal portion covering the top of said opening and a depending portion at one side closing the extension of said opening in the one wall of the chamber, a body of insulating material at the underside of said evaporator and insulating the evaporator from the interior of said chamber, and a motor-compressor unit installed in said chamber.

13. In a refrigerator, a cabinet having an insulated wall structure defining a food storage area, a reentrant portion in said structure forming a chamber apart from said storage area, said chamber having an open top extending downwardly in one wall of said chamber, an evaporator section installed in said opening and exposed within the storage area, said evaporator having a substantially horizontal portion covering the top of said opening and a depending portion at one side occupying the extension of said opening in the one wall of the chamber, a body of insulating material at the underside of said evaporator and insulating the evaporator from the interior of said chamber, a motor-compressor unit installed in said chamber, and means for sealing the joints between said evaporator and the walls of said chamber.

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