Dec. 7, 1948. R. E. KRUCK ET AL 2,455,781

AIR CIRCULATING DUCT FOR TWO-TEMPERATURE REFRIGERATOR CABINETS

Filed Nov. 20, 1946 4 Sheets-Sheet 1

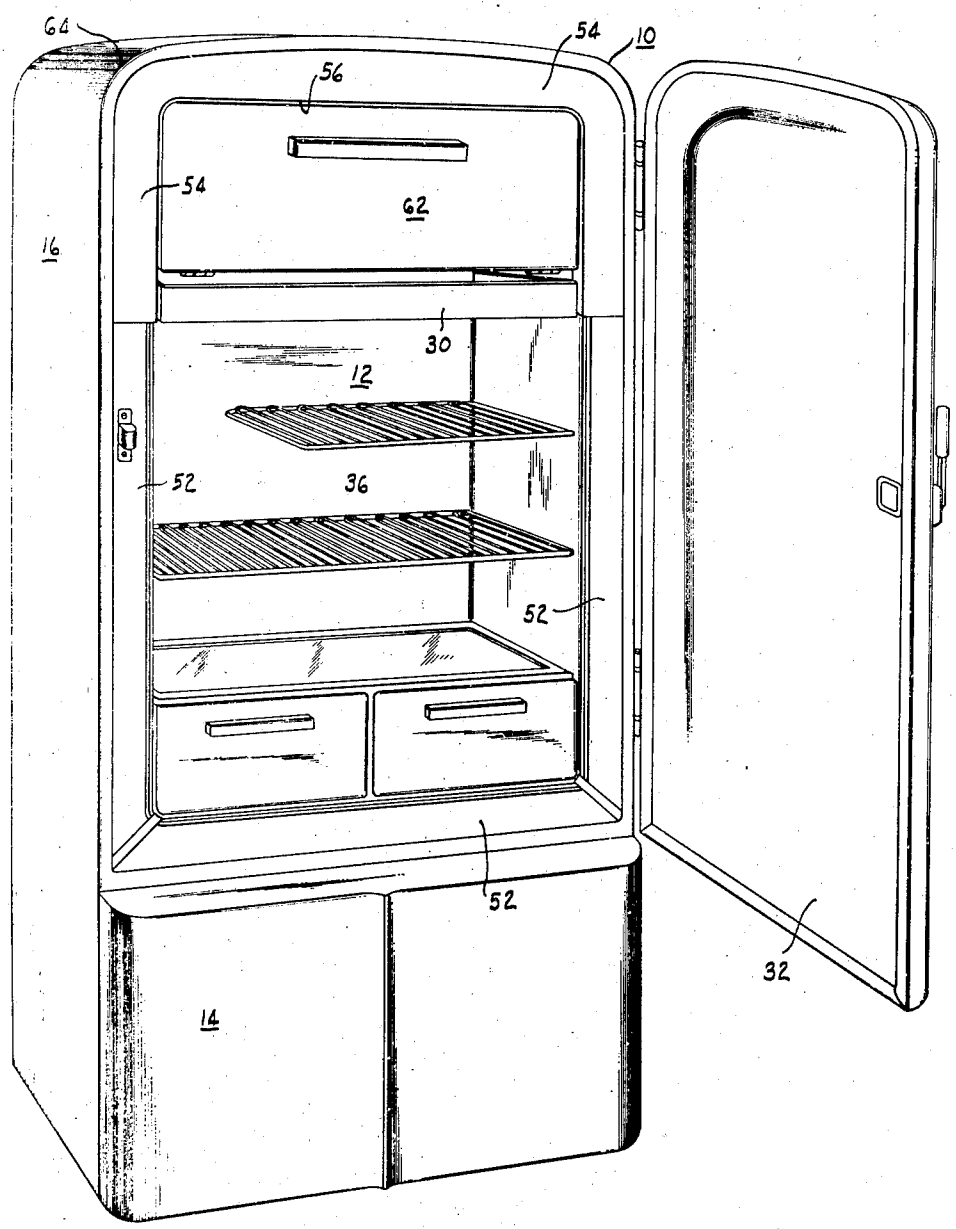


FIG. 1.

WITNESSES:
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AIR CIRCULATING DUCT FOR TWO-TEMPERATURE REFRIGERATOR CABINETS

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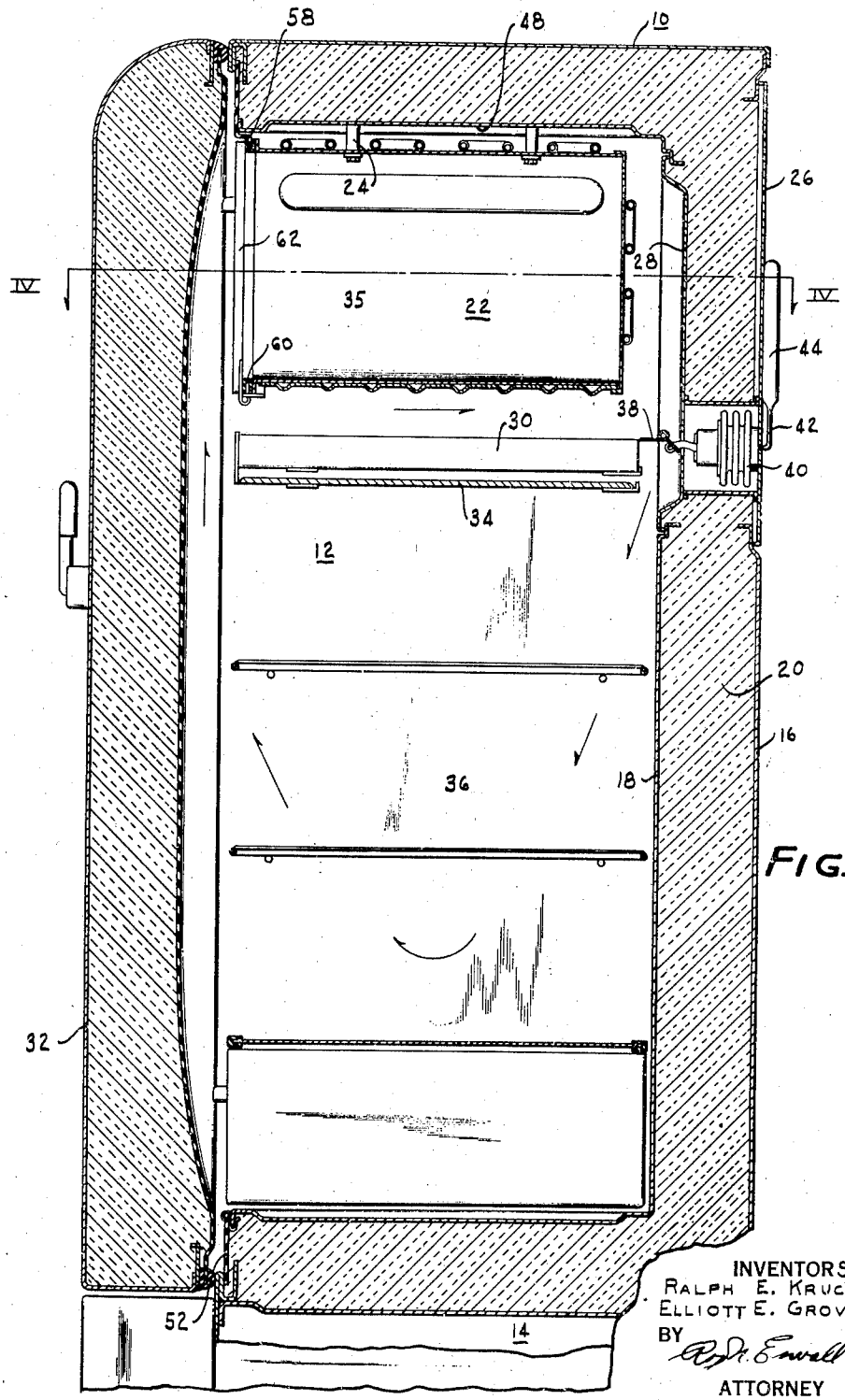


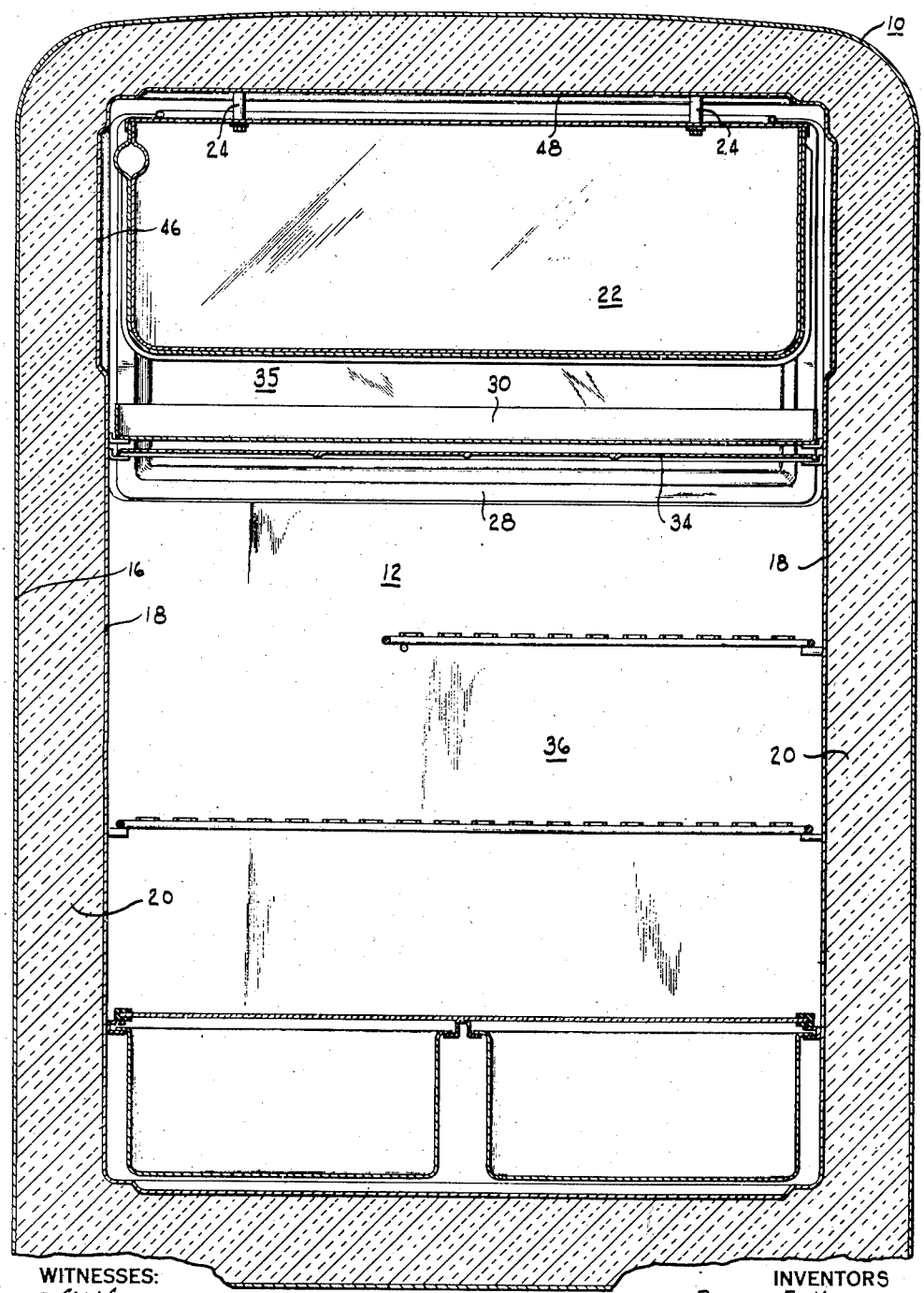
FIG. 2.

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AIR CIRCULATING DUCT FOR TWO-TEMPERATURE REFRIGERATOR CABINETS

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WITNESSES:
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FIG. 3.

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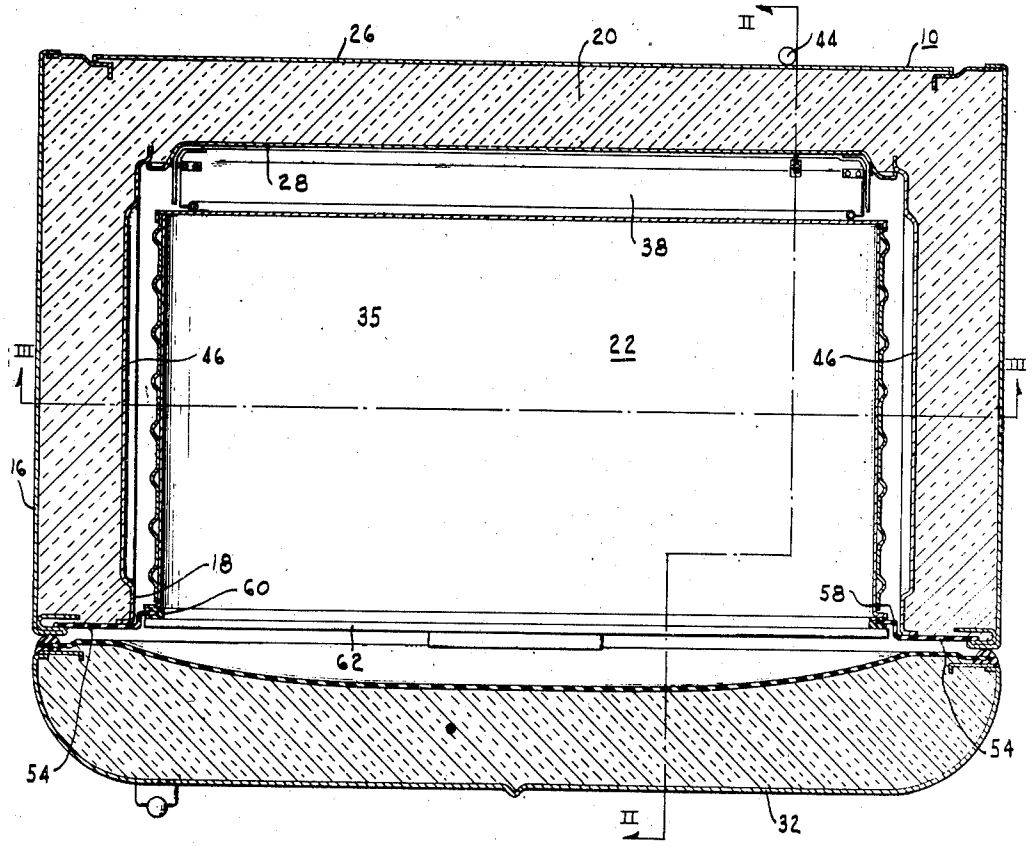


FIG. 4.

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Patented Dec. 7, 1948 2,455,781

UNITED STATES PATENT OFFICE

2,455,781

AIR CIRCULATING DUCT FOR TWO-TEMPERATURE REFRIGERATOR CABINETS

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Application November 20, 1946, Serial No. 710,974

7 Claims. (Cl. 62—89)

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This invention relates to refrigerator cabinets and more especially to a cabinet having two compartments maintained at different temperatures.

It is an object of the invention to provide novel air-circulating ducts in a refrigerator cabinet for cooling one of the compartments therein. It is a further object of the invention to provide novel concealing means for the air ducts in a refrigerator.

These and other objects are effected by our invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a view in perspective of a refrigerator cabinet embodying the invention;

Fig. 2 is a vertical section of the refrigerator of this invention taken on the line II—II of Fig. 4;

Fig. 3 is a horizontal section of the refrigerator cabinet of this invention taken on the line III—III of Fig. 4; and

Fig. 4 is a section on the line IV—IV of Fig. 2.

In the drawings, the reference numeral 10 designates a refrigerator cabinet having a food storage chamber 12 in the upper portion thereof and a machinery chamber 14 in the lower portion. The walls of the food storage chamber 12 are formed by an outer metal shell 16 and an inner metal shell 18 with thermal insulating material 20 therebetween. A cooling unit 22 is secured to the upper wall 48 of the inner shell 18 by supports 24 and is of the type described in the copending patent application, Serial No. 666,950, filed on May 10, 1946, by Jules N. Saler, now Patent No. 2,450,732, granted October 5, 1948, and assigned to the assignee of this application. A removable panel 26 in the upper rear wall of the outer shell 16 and a similar panel 28 in the inner shell 18 provide for the insertion of the cooling unit 22 and the refrigerant tubing (not shown) through the rear wall of the cabinet 10.

A defrost pan 30 is located a spaced distance below the cooling unit 22 to catch defrost water dripping therefrom. The defrost pan 30 extends substantially to both side walls of the food storage chamber 12, but its rear edge is spaced from the rear wall thereof and its front edge from the door 32 thereof. A sheet of heat-insulating material 34 is located below the pan 30 to prevent condensation of moisture on the lower surface thereof. The defrost pan 30 and the sheet 34 form a horizontal partition in the food storage chamber 12 dividing it into an upper compartment 35, comprising mainly the cooling unit 22

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which is adapted for the storage of frozen foods and a lower compartment 36 for refrigerated storage at about 40° F.

The lower food storage compartment 36 is cooled by a convectional flow of air which flows upwardly in the space at the front edge of the defrost pan 30, then upwardly and rearwardly along the cold walls of the cooling unit 22 and thereafter downwardly through the space at the rear edge of the defrost pan 30. This flow of cooling air is controlled by a damper 38 located at the rear edge of the defrost pan 30. The damper 38 is actuated by a metal bellows 40 which communicates through a tube 42 with a bulb 44 located in the ambient temperature of the cabinet 10. The bellows 40, the tube 42 and a substantial portion of the bulb 44 are filled with a volatile fluid. The operation of the damper 38 is more fully described in the patent application, Serial No. 621,058, filed on October 8, 1945, by Raymond E. Tobey, and assigned to the assignee of this application.

The upper portion 46 of the inner shell 18 opposite the cooling unit 22 is bulged outwardly towards the outer shell 16. In like manner, the upper wall 48 of the inner shell 18 and the central portion of the panel 28 is bulged outwardly and away from the cooling unit 22, the bulged-out portion of the panel 28 extending to below the sheet 34. These bulged-out portions permit the use of a large cooling unit which is almost as wide as the lower food storage compartment 36.

The spaces between the front edges of the inner and outer shells at the lower food storage space 36 are closed by a heat breaker strip 52 and the space between the front edges of the cooling unit 22 and the front edges of the outer shell 16 adjacent thereto is closed by a panel of rigid heat-insulating material 54. The panel 54 overlaps the front edges of the inner shell 18 adjacent the cooling unit 22 and has a central opening 56 which registers with the open front of the cooling unit 22. The panel 54 is formed into an offset 58 and a rubber gasket 60 engages the edge portion of the offset 58. A door 62 is so hung in the offset portion 58 of the panel 54 that the front surface of the door 62 is substantially flush with the front surface of the panel 54. The door 62 closes on the gasket 60.

The bulged-out portions of the inner shell 18 adjacent the cooling unit 22 provide adequate air-circulating ducts for cooling the lower compartment 36. These ducts are substantially concealed from view. The door 62 for the cooling unit 22 is substantially as wide as the lower food

storage compartment 36 and is spaced from the top wall 64 of the outer shell 16 a distance equal to about the width of the breaker strip 52 of the lower food storage compartment 36. This arrangement economizes space and is pleasing to the eye.

It will be apparent from the above that this invention provides a refrigerator cabinet having air-circulating ducts which are formed in part by bulged-out portions in the inner shell and that these ducts are concealed from view.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What we claim is:

1. A refrigerator comprising an outer metal shell having vertical side walls, an inner metal shell within and spaced from the outer shell, the upper portion of each of the side walls of the inner shell being bulged outwardly to lie closer to the adjacent side walls of the outer shell than does the lower portion of each of the side walls of the inner shell, the front of said inner shell being open, heat-insulating material in the spaces between the outer and inner shell, a cooling unit in the upper portion of the inner shell, the side walls of the cooling unit lying near but spaced from said bulged-out portions to provide narrow ducts adjacent the cooling unit, and means for closing the space between the top edge and the side edges of the cooling unit at the front thereof and the respective adjacent front edges of the inner shell.

2. A refrigerator comprising an outer metal shell having vertical side walls, an inner metal shell within and spaced from the outer shell, an upper portion of each of the side walls of the inner shell being bulged outwardly to lie closer to the adjacent side walls of the outer shell than do the lower portions of each of the side walls of the inner shell, heat-insulating material in the spaces between the outer and inner shells, and a cooling unit in said upper portion of the inner shell and spaced from the walls thereof to provide an air-circulating space around the cooling unit, said air-circulating space communicating with the space in the inner shell below the cooling unit.

3. A refrigerator comprising an outer metal shell having vertical side walls, an inner metal shell within and spaced from the outer shell, the upper portions of each of the side walls and rear wall of the inner shell being bulged outwardly to lie closer respectively to the adjacent side walls and rear wall of the outer shell than do the lower portions of each of the side walls and the rear wall of the inner shell, heat-insulating material in the spaces between the outer and the inner shell and a cooling unit in said upper portion of the inner shell and spaced from the walls of the refrigerator to provide a narrow air-circulating space around the cooling unit.

4. A refrigerator comprising an outer metal shell having vertical side walls, an inner metal shell within and spaced from the outer shell, an upper portion of the side walls of the inner shell being bulged outwardly to lie closer to the adjacent side walls of the outer shell than do the side walls of the lower portion of the inner shell, heat-insulation material in the spaces between the outer and inner shells, a cooling unit in the upper portion of the inner shell but spaced from the walls thereof to provide an air-circulating space around the cooling unit, the front of said outer shell, said inner shell, and said cooling unit being open, and a heat breaker strip at the front of said cabinet, said heat breaker strip closing the spaces between said outer shell and said inner shell and also between the two side walls and the top wall of the cooling unit and the respective adjacent portions of the side walls of the inner liner and the top wall thereof.

5. A refrigerator comprising insulated side, rear and top walls and a vertical door forming at least a part of the front wall of said refrigerator, a partition in said refrigerator dividing it into upper and lower food storage compartments, said partition extending substantially to said side walls, the inner surface of said side walls being bulged outwardly above said partition, the upper portion of the inner surface of said rear wall being bulged outwardly to an elevation below that of said partition, the rear edge of said partition being spaced from said last-mentioned bulged-out portion and the front edge of said partition being spaced from said door, and a cooling unit in said upper compartment, said cooling unit having side walls located near but spaced from the respective bulged-out inner side wall portions of the refrigerator, said cooling unit also having a rear wall near but spaced from the bulged-out inner rear wall portion of the refrigerator.

6. The refrigerator defined in claim 5, including an air valve in the space between the partition and the rear wall of the refrigerator.

7. The refrigerator defined in claim 5, including a panel for closing the space between the top and the side edges at the front of the cooling unit and the top and adjacent side walls of the refrigerator, respectively.

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