

May 11, 1937.

O. M. SUMMERS
REFRIGERATING APPARATUS

Filed April 30, 1934

2,080,239

2 Sheets-Sheet 1

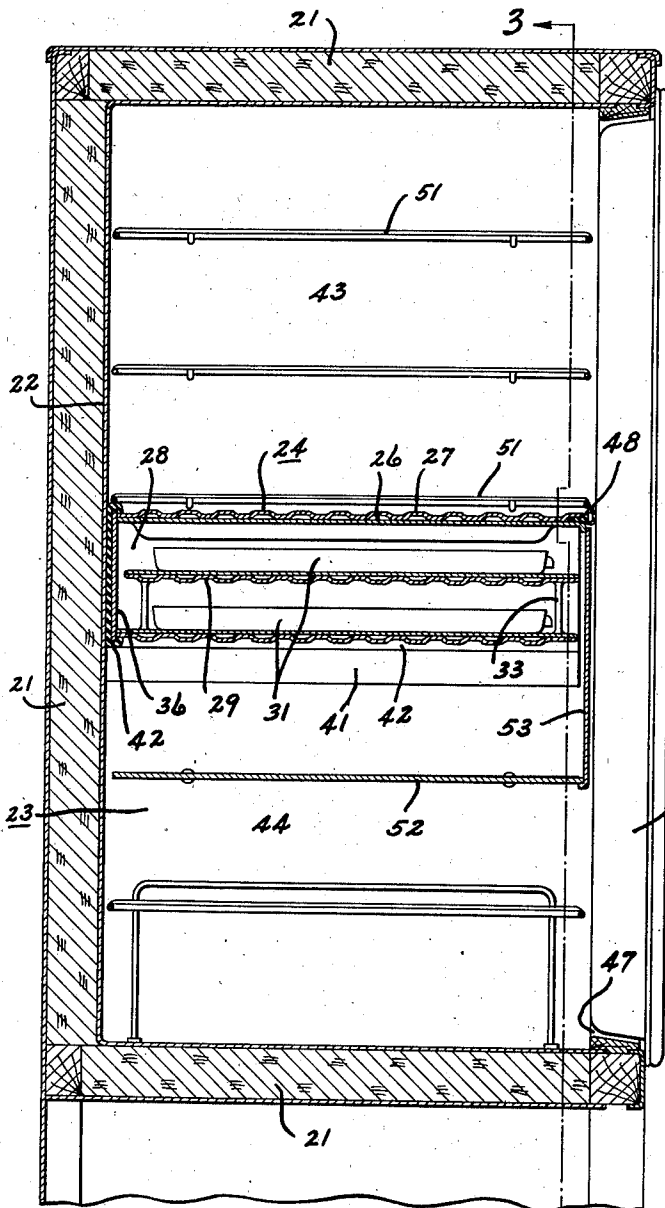


Fig. 2

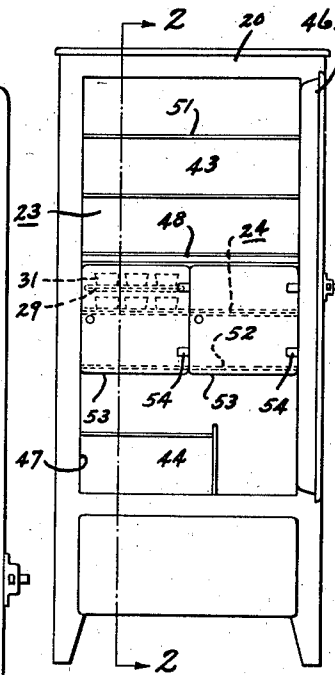


Fig. 1

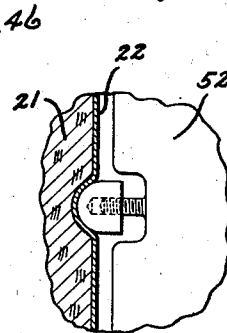


Fig. 4

Inventor
Otto M. Summers.

By *Spencer, Hardman and Felt.*
his Attorneys.

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2 Sheets-Sheet 2

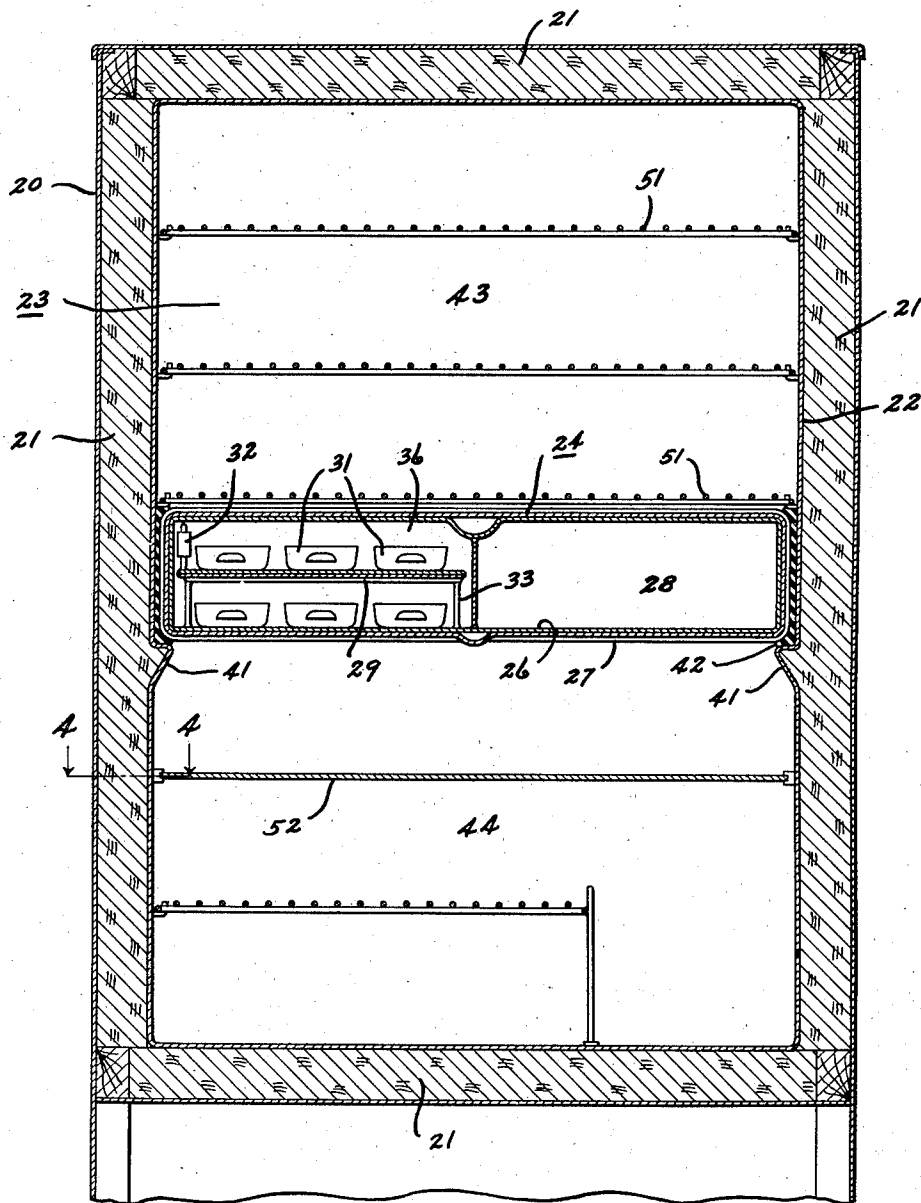


Fig. 3

Inventor
Otto M. Summers.

By *Spencer, Hardman and Felt.*
his Attorneys.

UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

Otto M. Summers, Dayton, Ohio, assignor to
General Motors Corporation, Dayton, Ohio, a
corporation of Delaware

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12 Claims. (Cl. 62-99)

This invention relates to refrigeration and particularly to a refrigerator cabinet having an evaporator of a mechanical refrigerating system mounted therein.

5 An object of the present invention is to provide an improved refrigerating apparatus of the type including a plurality of food storage compartments in a chamber of a refrigerator cabinet and which compartments are separately
10 cooled to different temperatures relative to one another by a single evaporator.

Another object of the invention is to seal a plurality of food-storage compartments, provided in a chamber of a refrigerator cabinet and cooled
15 to different temperatures relative to one another by a single evaporator, against air circulation therebetween whereby the transference of food odors or flavors from one compartment to the other is prevented.

20 A further object of the invention is to mount or install a cooling unit or evaporator of a closed refrigerant circulating system within a chamber of a refrigerator cabinet so as to divide the chamber into a plurality of food storage compartments without the aid of additional means and
25 so as to separately cool each compartment to a different temperature relative to one another.

A still further and more specific object of the invention is to mount or install a cooling unit or evaporator of a closed refrigerant circulating system within a chamber of a refrigerator
30 cabinet so that the evaporator will divide the chamber into an upper food storage compartment and a lower food storage compartment and will also form a refrigerated bottom wall of the upper food storage compartment, and a refrigerated top wall of the lower food storage compartment.

Further objects and advantages of the present
40 invention will be apparent from the following description reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

45 Fig. 1 is a front view of a refrigerator cabinet constructed in accordance with the present invention;

Fig. 2 is an enlarged vertical sectional view of the cabinet taken on line 2-2 of Fig. 1;

50 Fig. 3 is a vertical sectional view of the cabinet taken on line 3-3 of Fig. 2, and

Fig. 4 is an enlarged fragmentary sectional view taken on line 4-4 of Fig. 3 showing a support for a partition or shelf.

55 For the purpose of illustrating my invention, I have shown in the drawings a refrigerator cabinet of the household type. The desirability of having a plurality of compartments which are isolated against air circulation therebetween and
60 which are maintained at different temperatures

relative to one another in such refrigerator cabinets occurs almost daily because of the increasing sales of frozen meats, fish and the like which must be maintained at a sub-freezing temperature together with the sale of other comestibles usually maintained at different temperatures relative to one another until consumed by the purchaser. Therefore my invention is particularly directed to the division of a refrigerating chamber of a refrigerator cabinet, normally maintained at substantially the same temperature throughout its entirety, into two or more food storage compartments by a single evaporator or cooling element to afford a plurality of compartments maintained at different temperatures relative to one another. My invention is also directed to the sealing or isolating of such individual compartments against air circulation therebetween to prevent the transference of food odors or flavors from food contained in one of the compartments to food stored in another thereof. For example, my invention contemplates the division of a refrigerating chamber of a household refrigerator cabinet into an upper food storage compartment to be maintained at a substantially constant temperature and a lower food storage compartment to be maintained at a substantially constant temperature, differing from the temperature of the upper compartment, by a single evaporator which provides a sub-freezing chamber or compartment for receiving frozen products or water or other substances to be frozen intermediate the food storage compartments.

Referring to the drawings, the numeral 20 designates a refrigerator cabinet preferably, although not necessarily, of the household type having insulated walls 21 surrounding a lining member 22 which forms a chamber 23 in the cabinet to be cooled. Such refrigerator cabinets normally have an evaporator installed in the upper portion thereof for cooling the entire chamber provided by the lining member 22. The evaporator normally positioned within such a chamber is ordinarily connected to a suitable refrigerant liquefying and condensing unit usually located in a machine compartment provided in the cabinet. Refrigerating apparatus of this type, construction, operation and control are now common and well known to those skilled in the art, thus eliminating the necessity of herein describing same in detail. However, in the present invention I employ an evaporator of the sheet metal variety designated by the numeral 24. The evaporator 24 is shown as a unitary structure and is constructed of sheet metal portions or shells 26 and 27 cooperating with one another to provide a double wall having a refrigerant passage or passages formed therebetween. The double wall of the evaporator 24

is formed to define a rectangularly shaped sharp freezing chamber or compartment 28. At one side of compartment 28 and midway between the top and bottom thereof there is located a refrigerated shelf 29 formed of super-imposed sheet metal portions having a refrigerant passage or passages provided therebetween. The refrigerated shelf 29 divides the one side of compartment 28 into a plurality of smaller compartments for receiving and supporting a plurality of ice making trays or receptacles 31 in intimate thermal contact with the evaporator. A restrictor, expansion valve or device 32, connected to the liquid refrigerant supply line of any suitable refrigerant liquefying unit (not shown) communicates with the refrigerant passage in shelf 29. Refrigerant flows from the restrictor or expansion device 32 through the refrigerant passage in shelf 29 and thence through one of a plurality of shelf supporting legs 33 to the bottom wall of the evaporator. At this point in the bottom wall of evaporator 24 the refrigerant may be distributed by a header or manifold so as to flow in refrigerant passages across the bottom wall thence upwardly in the side wall to the top wall of the evaporator. A gaseous refrigerant outlet connection (not shown) may be in communication with the evaporator at any desired point along the top wall thereof. A plate 36 may be secured to the back of the compartment 28 for sealing the interior of the sharp freezing compartment against air circulation at this point. Sheet metal evaporators of the type disclosed have become more or less well known to those skilled in the art and no claim is made to the evaporator construction except that it be of such shape and size as to permit the carrying out of the objects and principles of the present invention.

It will be noted that the evaporator 24 is relatively flat and is of a width sufficient to extend horizontally substantially entirely across the chamber 23 into close proximity to the lining member 22. The evaporator 24 may be supported intermediate the top and bottom walls of chamber 23 in any suitable manner. In the present disclosure the lining member 22 has horizontally aligned bulged portions 41 formed therein and which extend a short distance inwardly of the walls of chamber 23 to provide supporting ledges on the two opposed side walls of chamber 23 for receiving the evaporator. A seal or gasket 42 of resilient material is positioned between walls of the evaporator 24 and lining member 22 to prevent thermal conduction from the evaporator to the walls of chamber 23. By mounting an evaporator of the type disclosed and described within a chamber it is obvious that the single evaporator forms the sole means for dividing the interior of a chamber into a plurality of compartments which are sealed or isolated against air circulation therebetween and for providing a refrigerated wall of each of the compartments. For example, in the present disclosure the evaporator 24 divides the chamber 23 into an upper food storage compartment 43 and a lower food storage compartment 44. The seal or gasket 42 extends around three walls of the evaporator 24 and prevents circulation of air about three sides of the evaporator between the food storage compartments 43 and 44. The top wall of evaporator 24 forms a refrigerated bottom wall for compartment 43 and the bottom wall of the evaporator forms a refrigerated top wall for compartment 44.

The cabinet 20 is provided with a single door 46 closing a door opening 47 providing access to both food storage compartments 43 and 44. In order to isolate the food storage compartments 43 and 44 from air circulation therebetween adjacent the door 46 a seal or gasket 48 is secured in any suitable manner to the evaporator 24 along the top front edge thereof (see Fig. 2) which gasket is compressed into abutting relation with the door 46 and the evaporator 24 when the door is in closed position. A wire or perforated shelf or shelves 51 may be disposed in the upper food storage compartment 43 for supporting food products therein. A shelf 52 may be disposed in the lower food storage compartment 44 for supporting articles therein and for dividing the compartment 44 into a plurality of small food storage compartments. The shelf 52 is formed of sheet metal and is imperforated. Shelf 52 is preferably mounted in compartment 44 in such a manner that its edges or at least a portion of its edges at the sides and back thereof are spaced a slight distance from lining member 22 (see Fig. 4) to permit a limited circulation of air between the small upper compartment and the small lower compartment formed by the partition or shelf 52. Doors 53 are carried by the evaporator 24 and are hinged as at 54 (see Fig. 1). These doors 53 seal the interior of the ice freezing compartment 28 from other compartments in the chamber 23 and prevent the cold air therein from flowing therefrom when the large single door 46 is opened. Doors 53 also seal the cold air in the small compartment formed by the partition or shelf 52 and the bottom of the evaporator 24 except for the limited circulation about the edges of the partition 52 as previously explained.

The construction and arrangement of the elements of the refrigerating apparatus disclosed and as above described provides a refrigerator cabinet with a plurality of food storage compartments sealed from air circulation therebetween and to be cooled to different temperatures relative to one another by a single evaporator. By locating the evaporator 24 intermediate the top and bottom walls of chamber 23 and the provision of a refrigerant circuit through the evaporator so that refrigerant first flows through the bottom wall of the evaporator inherently causes the evaporator to cool the lower food storage compartment 44 to a lower temperature than the food storage compartment 43 by virtue of the fact that cold air cooled by the evaporator tends to flow downwardly. By dividing the lower food storage compartment 44 into a plurality of smaller compartments by the partition or shelf 52, I provide a compartment above the partition for the storage of such food products as are required to be maintained at a very low temperature. For example, food products containing a large amount of butter fat such as butter and the like should be stored in the compartment 44 above the partition 52 which is maintained substantially at a temperature of between 35° and 40° F. while milk and cream or bottle beverages to be rapidly chilled should be stored in the compartment 44 below the partition 52. Fruits, vegetables and the like should be stored in the upper food storage compartment 43 since this compartment is inherently cooled by the evaporator 24 to a higher temperature than compartment 44, such as one merely sufficient to prevent food deterioration, for example, between 45° and 50° F. Frozen meats, fish and the like, should be placed in the freezing compartment 28 for stor-

age at a sub-freezing temperature. The storage compartments 43 and 44 being sealed against air circulation therebetween prevent the transference of odors from food products stored in either compartment to food products stored in the other compartment.

From the foregoing it will be apparent that I have provided an improved refrigerating apparatus including a cabinet having a plurality of food storage compartments maintained at different individual temperatures relative to one another for the storage of certain food products that should be maintained at different temperatures relative to one another while at the same time having provisions for producing blocks or ice cubes. Food products which are unnecessarily cooled to a low temperature in conventional refrigerator cabinets, thus causing dehydration of such products, are maintained at their respective proper temperature for preservation in my improved apparatus without dehydration thereof. Therefore, my improved refrigerating apparatus more specifically meets requirements of present day refrigeration methods and is more efficient in operation than refrigerators now in use by virtue of the fact that food products not required to be stored in or maintained at a low temperature are refrigerated or cooled to a temperature for insuring proper preservation thereof only.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerating apparatus comprising in combination, a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in and spaced from the top and bottom walls of said chamber and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being constructed of sheet metal and including a plurality of refrigerated walls providing a sharp freezing compartment, between the food storage compartments, and said evaporator being relatively flat and wide and extending substantially entirely across said chamber to isolate said food storage compartments from air circulation therebetween and to provide a refrigerated wall portion for each of said food storage compartments.

2. A refrigerating apparatus comprising in combination, a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in and spaced from the top and bottom walls of said chamber and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being constructed of sheet metal and including a plurality of refrigerated walls providing a sharp freezing compartment, between the food storage compartments, said evaporator being relatively flat and wide and extending substantially entirely across said chamber to isolate said food storage compartments from air circulation therebetween and to provide a refrigerated wall portion for each of said food storage compartments, a single door providing access to said food storage compartments, and means abutting the evaporator and door for sealing the food storage compartments from one another ad-

jacent the door opening when the door is closed.

3. A refrigerating apparatus comprising in combination, a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in a substantially horizontal plane within said chamber and spaced from the top and bottom walls thereof and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being relatively flat and wide and extending substantially entirely across said chamber to isolate said compartments from air circulation therebetween, and said evaporator including two vertically spaced apart refrigerated walls constructed and arranged to cool the lower of said compartments to a temperature lower than that of the upper compartment.

4. A refrigerating apparatus comprising in combination, a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in a substantially horizontal plane within said chamber and spaced from the top and bottom walls thereof and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being relatively flat and wide and extending substantially entirely across said chamber, and a seal between the evaporator and walls of said chamber for isolating said compartments from air circulation therebetween, said evaporator including two vertically spaced apart refrigerated walls constructed and arranged so that the top wall thereof cools the upper of said compartments and the bottom wall thereof cools the lower of said compartments.

5. A refrigerating apparatus comprising in combination a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in a substantially horizontal plane within said chamber and spaced from the top and bottom walls thereof and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being relatively flat and wide and extending substantially entirely across said chamber, and a seal between the evaporator and walls of said chamber for isolating said compartments from air circulation therebetween, said evaporator including two vertically spaced apart refrigerated walls constructed and arranged so that the top wall thereof forms a refrigerated bottom wall for the upper of said compartments and the bottom wall thereof forms a refrigerated top wall for the lower of said compartments.

6. A refrigerating apparatus comprising in combination, a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in and spaced from the top and bottom walls of said chamber and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being constructed of sheet metal and including a plurality of refrigerated walls providing a sharp freezing compartment between the food storage compartments, said evaporator being relatively flat and wide and extending substantially entirely across said chamber to provide a refrigerated wall portion for each of said food storage compartments, and sealing means between said evaporator and walls of said chamber for isolating said food storage

compartments from air circulation therebetween.

7. A refrigerating apparatus comprising in combination, a cabinet including a plurality of vertical and horizontal walls forming a chamber therein, a single evaporator disposed in and spaced from the top and bottom walls of said chamber and forming the sole means for dividing the chamber into an upper food storage compartment and a lower food storage compartment, said evaporator being constructed of sheet metal and including a plurality of refrigerated walls providing a sharp freezing compartment, between the food storage compartments, said evaporator being relatively flat and wide and extending substantially entirely across said chamber to provide a refrigerated wall portion for each of said food storage compartments, sealing means between said evaporator and walls of said chamber for isolating said food storage compartments from air circulation therebetween, a single door providing access to said food storage compartments, and means abutting the evaporator and door for sealing the food storage compartments from one another adjacent the door opening when the door is closed.

8. A refrigerating apparatus comprising in combination, a cabinet including a plurality of insulated upright walls and an insulated top and bottom wall forming a chamber therein, a relatively flat and wide unitary evaporator disposed within and extending across said chamber to divide the interior thereof into an upper food storage compartment and a lower food storage compartment and isolating said compartments from air circulation therebetween, and said evaporator including two vertically spaced apart refrigerated walls constructed and arranged to cool the lower of said compartments to a temperature below that of the upper compartment.

9. A refrigerating apparatus comprising in combination, a cabinet including a plurality of insulated upright walls and an insulated top and bottom wall forming a chamber therein, means extending across said chamber to divide the interior thereof into an upper food storage compartment and a lower food storage compartment and isolating said compartments from air circulation therebetween, said means comprising an evaporator, and said evaporator including two vertically spaced apart refrigerated walls defining a sharp freezing compartment intermediate the said food storage compartments for receiving a receptacle adapted to contain a substance to be congealed or frozen, said evaporator walls being constructed and arranged to cool the lower of said food compartments to a temperature below that of the upper food compartment.

10. A refrigerating apparatus comprising in combination, a cabinet including a plurality of insulated upright walls and an insulated top and bottom wall forming a chamber therein, a relatively flat and wide unitary evaporator disposed within and extending across said chamber to divide the interior thereof into an upper food storage compartment and a lower food storage compartment and isolating said compartments from air circulation therebetween, and said evaporator including two vertically spaced apart refrigerated walls defining a sharp freezing compartment intermediate the said food storage compartments for receiving a receptacle adapted to contain a substance to be congealed or frozen, the spaced apart walls of said evaporator pro-

viding a refrigerated wall for each of said food storage compartments, a single door providing access to both of said food storage compartments, and means abutting the evaporator and said door for sealing the food storage compartments from one another adjacent the door opening when the door is closed.

11. A refrigerating apparatus comprising in combination, a cabinet including a plurality of insulated upright walls and an insulated top and bottom wall forming a chamber therein, a unitary evaporator disposed within and extending across said chamber to divide the interior thereof into an upper food storage compartment and a lower food storage compartment and isolating said compartments from air circulation therebetween, said evaporator including two vertically spaced apart refrigerated walls defining a sharp freezing compartment intermediate the said food storage compartments for receiving a receptacle adapted to contain a substance to be congealed or frozen, the spaced apart walls of said evaporator providing a refrigerated wall portion for each of said food storage compartments, a food supporting shelf disposed within and extending across the said lower food storage compartment to divide said lower compartment into an upper compartment and a lower compartment, and said food supporting shelf being impervious and spaced from the side walls of said lower food storage compartment to limit the circulation of air between the upper and lower compartment formed thereby within the lower food storage compartment.

12. A refrigerating apparatus comprising in combination, a cabinet including a plurality of insulated upright walls and an insulated top and bottom wall forming a chamber therein, a unitary evaporator disposed within and extending across said chamber to divide the interior thereof into an upper food storage compartment and a lower food storage compartment and isolating said compartments from air circulation therebetween, said evaporator including two vertically spaced apart refrigerated walls defining a sharp freezing compartment intermediate the said food storage compartments for receiving a receptacle adapted to contain a substance to be congealed or frozen, the spaced apart walls of said evaporator providing a refrigerated wall portion for each of said food storage compartments, a food supporting shelf disposed within and extending across the said lower food storage compartment to divide said lower compartment into an upper compartment and a lower compartment, said food supporting shelf being impervious and spaced from the side walls of said lower food storage compartment to limit the circulation of air between the upper and lower compartment formed thereby within the lower food storage compartment, a single door providing access to the upper of said food storage compartments and to the lower compartment formed by said shelf within the lower food storage compartment, a second door inwardly of said first named door providing access to said sharp freezing compartment and to the upper compartment formed by said shelf within the lower food storage compartment, and means abutting the evaporator and said first named door for sealing the food storage compartments from one another adjacent the said first named door opening when said first named door is closed.

OTTO M. SUMMERS.