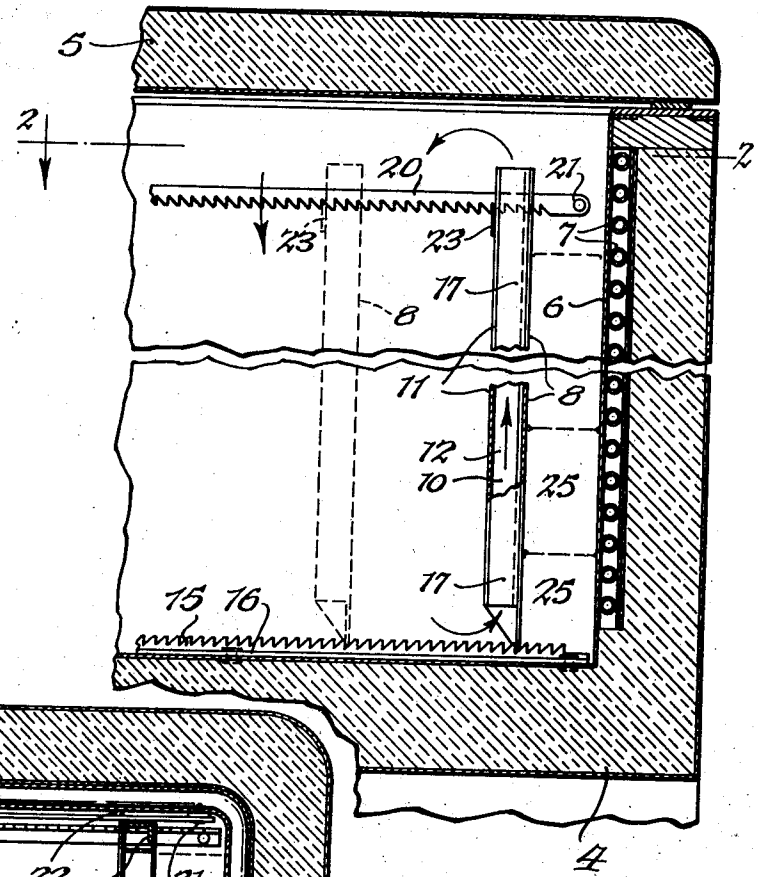
March 9, 1948. J. A. ARCHBALD, JR 2,437,414

METHOD AND APPARATUS FOR QUICK FREEZING FOODS

Filed May 23, 1945

Fig. 1.



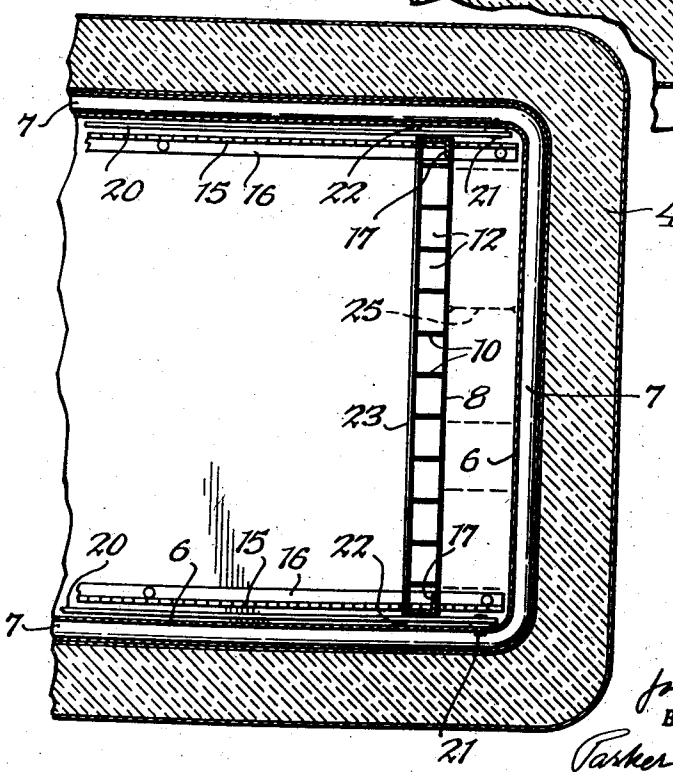


Fig. 2.

INVENTOR.
Joseph A. Archbald, Jr
BY
Parker, Prochnow & Starmer
Attorneys.

Patented Mar. 9, 1948

2,437,414

UNITED STATES PATENT OFFICE

2,437,414

METHOD AND APPARATUS FOR QUICK-FREEZING FOODS

Joseph A. Archbald, Jr., Buffalo, N. Y.

Application May 23, 1945, Serial No. 595,313

9 Claims. (Cl. 62—173)

1

This invention relates to appliances for use in connection with the quick freezing of articles of food and the like in refrigerators designed for the storage of frozen foods.

It is well known that in the freezing of articles of food, such articles suffer the minimum of damage if the freezing is done quickly and it is also very desirable that articles of food after they have once been frozen should be kept in frozen condition until they are to be used. In refrigerator cabinets designed mainly for the storage of frozen foods, it is generally difficult to freeze foods quickly, and if they are placed into the cabinet in contact with articles that have already been frozen, the transfer of heat from the unfrozen to the frozen articles is injurious to the latter, and furthermore, the unfrozen articles are frozen quite slowly in cabinets of this type.

One of the objects of this invention is to provide an appliance which may be installed and used in any refrigerator of this type and by means of which the freezing process is greatly expedited. Another object of this invention is to provide a removable and adjustable partition in a refrigerator of this type by means of which articles of food may be pressed into contact with a chilled wall of the refrigerator cabinet, to expedite the freezing of the article and to hold the article in the desired shape while being frozen. A further object is to provide an adjustable partition of this type which exerts pressure against the articles of food, and which also has heat exchange surfaces through which the heat from the articles may be transferred to the cold air in the cabinet. A further object is to provide a partition of this type which may be readily adjusted to accommodate itself to articles of different sizes. Other objects and advantages of this invention will appear from the following description and claims.

In the accompanying drawings:

Fig. 1 is a fragmentary sectional elevation of a refrigerator cabinet having applied thereto an adjustable partition embodying this invention.

Fig. 2 is a sectional plan view thereof, approximately on line 2—2, Fig. 1.

My improved adjustable partition may be applied to any suitable or desired refrigerator cabinet having at least one wall thereof chilled to a temperature materially below that required for freezing articles of food, and in the particular construction illustrated by way of example, the cabinet includes a box-like structure 4 suitably heat-insulated in any desired manner and having a lid or top 5 suitably mounted thereon to close

2

the cabinet. The inner surfaces of the walls of the cabinet are preferably provided with a metal liner or inner wall 6, which is preferably of relatively thin material of good heat conducting property and heat is removed from this liner by means of pipes or tubes 7 which may constitute the evaporator of a refrigerating machine, or in which brine or other liquid at low temperature may be circulated. Any other suitable means for chilling the inner liner 6 may be provided. In the particular cabinet illustrated, the pipes 7 extend around the liner in a narrow space between the liner and the insulation of the four side walls of the cabinet, and consequently, heat is removed from the interior of the cabinet through the liner 6 and through the cooling medium of the pipes 7.

In accordance with my invention, I provide a partition which is arranged to extend substantially parallel to one of the upright walls of the cabinet and which is adjustably mounted so that one or more packages of food to be frozen may be positioned between the wall 8 of the partition and the adjacent liner 6 of the cabinet wall, and preferably the partition is formed so that the article may be pressed into the desired shape between the wall or plate 8 of the partition and the liner 6. Preferably the partition wall 8 is flat so that it may be arranged parallel to the flat wall of the cabinet. This arrangement has two advantages, in the first place, the article is pressed into intimate heat exchange contact with the chilled liner 6 and also with the surface 8 of the partition, and in the second place, by freezing the article into the desired shape, the resulting frozen article will have two substantially parallel flat surfaces so that the article may be stored in the minimum space in the cabinet.

The partition wall 8, consequently, has one face in contact with the article to be frozen and the opposite face thereof is exposed to the chilled air within the cabinet. Consequently, heat will be conducted rapidly from the articles to be frozen through the partition wall 8 and will be removed from the partition by the cold air in the cabinet. If desired, the transfer of heat to the air in the cabinet through the adjustable partition may be improved by providing the partition with additional surfaces or fins with which the air in the cabinet may contact. For example, in the construction illustrated, I have provided the partition with a series of upright fins 10 which extend substantially throughout the height of the partition and which are preferably integrally formed with the wall 8 of the partition, thus forming a series of upright passages be-

tween the fins in which the air of the cabinet may flow. If desired, the outer ends of the fins 10 may be connected with a plate or outer wall 11 which may also be formed integrally with the fins, thus closing the sides of the passages 12 between the fins 10. The wall 11 is preferably spaced from the bottom and top of the cabinet in such a manner as to permit cold air to enter into the lower ends of the passages 12 of the partition and pass upwardly in these passages through the well known thermosiphon action, and then become discharged from the passages at the top of the box, as clearly indicated by the arrows in Fig. 1. By means of the air-cooling of the partition, the freezing of the articles is greatly expedited. Since the freezing of the articles is not dependent alone on the transfer of heat through the part of liner 6 with which the articles contact, but heat is also removed from the opposite face of the articles by the partition and the cold air in the cabinet. The air in the cabinet will not be materially raised in temperature by the use of the partition, since this air will be cooled by the cooling medium in the pipes 7 in the other walls of the cabinet.

The partition also holds the article of food out of contact with any other frozen articles of food that may be in the cabinet, and consequently, no material change in temperature of these frozen articles takes place during the freezing of one or more other articles in the space between the partition and one of the side walls of the cabinet. Actual tests have shown that by the use of my improved partition, an article of food can be frozen in about one-third of the time that is ordinarily required for freezing the same, if it is merely laid on the bottom of the cabinet or otherwise loosely positioned in the cabinet as has heretofore been customary.

Any suitable means may be provided for securing the partition in the desired relation to the cabinet wall, and in the construction shown by way of example, I have provided a pair of ratchet or toothed plates or members 15, one being arranged adjacent to each side of the partition. These toothed bars or plates may, for example, each be a leg of a bar of angle-shaped cross section, the other leg 16 of which may be suitably secured to the bottom wall of the cabinet. The lower edge of the partition may engage the toothed bars, or if desired, the partition may have upright angle-shaped reinforcing members 17 secured to the opposite sides thereof, the lower edges of which may engage the toothed bar. By means of this construction, the partition may be made of aluminum or other metal having good heat conductivity and the portions engaging the ratchet bars 15 may be made of steel or other durable metal which will not be damaged by engagement with the teeth of the ratchet bars.

Ratchet bars 20 may also be provided for engaging the upper portion of the partition to hold the same in the desired position, and in the construction shown, these ratchet bars are pivoted to the side walls of the cabinet by suitable pivot pins 21 so that the ratchet bars 20 may be swung up and down about their pivots to enable the teeth of the ratchet bars to engage with or disengage outwardly extending projections 22 of the partition. These projections may, for example, be the ends of a plate or bar 23 secured to the upper portion of the partition and extending beyond the sides thereof, as clearly shown in Fig. 2, so as to be easily engaged by the pivoted ratchet bars. The strip or bar 23 is preferably also made of steel or other durable material and may act as a reinforcement for the partition.

In the use of the device, one or more articles of food are placed into the cabinet in upright position adjacent to the wall of the cabinet with which the partition cooperates, and the partition may then be pressed against the article of food to press the same against the liner 6 of the cabinet wall with the desired pressure, whereupon by slight downward movement of the partition, the lower portion thereof may engage the nearest teeth of the two lower toothed or ratchet bars 15, and the upper pivoted ratchet bars may be lowered into engagement with the projecting ends of the plate 22 of the partition, thus securing the partition in the desired position. The articles of food may, of course, be vegetables placed in bags or containers, and if desired, a number of these articles 25 may be stacked one above the other, as shown in Fig. 1, or a single article, such as a piece of meat, may be first wrapped and then placed between the partition and the liner 6. The squeezing of the articles of food by the partition definitely determines the shape of the same when frozen and compacts the same so that by having their opposite faces substantially parallel to each other, the articles can be easily stacked after they have been frozen, so as to occupy the minimum of space in the cabinet. The pressure of the partition against the articles also improves the conduction of heat from the articles and expedites the passage of heat from the articles to the liner 6, and thence to the cooling medium in the tubes 7 and also through the wall 8 of the partition into heat exchange relation with the air in the cabinet.

The partition may, of course, be in the form of a single wall 8 without having the radiating fins and the opposite wall 11 secured thereto, but the construction shown greatly expedites the passage of heat from the partition into the air in the cabinet and also reinforces the partition so that the wall 8 may be made of relatively thin material which further helps to improve and expedite the flow of heat from the articles to be frozen.

I claim as my invention:

1. An adjustable partition member for use in a refrigerator cabinet having a wall provided with means through which a refrigerant may be circulated for chilling said wall and the air in said cabinet to a temperature at which articles of food become frozen, said member being made of a heat conducting material and extending substantially parallel to said wall and being out of contact with said refrigerant, and means for adjustably holding said member in position to press an article to be frozen against said wall and to conduct heat from said article through said member only to the air in said cabinet.

2. An adjustable partition member for use in a refrigerator cabinet having an upright wall provided with means through which a refrigerant may be circulated for chilling said wall and the air in said cabinet to a temperature at which articles of food become frozen, said member being made of a material of good heat conducting property and being adjustable toward and from said wall to press an article to be frozen between said wall and said partition, said partition being out of contact with said refrigerant and having one surface thereof formed to contact the article to be frozen and the other surface thereof exposed to contact with the air in said cabinet for trans-

ferring heat from said partition only to the air in said cabinet.

3. An adjustable partition member for use in a refrigerator cabinet having upright walls provided with means for chilling the same and the air in said cabinet to a temperature at which articles of food become frozen, said member being made of a material of good heat conducting property and being adjustable toward and from one of said walls to press an article to be frozen between said wall and said partition, said partition being chilled only by the air in said cabinet and having a flat face for engaging the article to be frozen and having heat dissipating projections on the other face thereof for chilling said partition by contact only with the air in said cabinet.

4. A partition according to claim 2, characterized in that ratchet bars are provided which are secured to said cabinet for adjustably holding said partition in position to engage the article to be frozen and to press the same against said wall.

5. An adjustable partition member for use in a refrigerator cabinet having an upright wall provided with means for chilling the same to a temperature at which articles of food become frozen, said member being made of a material of good heat conducting property and being adjustable toward and from said wall to press an article to be frozen between said wall and said partition, said partition having one surface thereof formed to contact the article to be frozen and the other surface thereof exposed to contact with the air in said cabinet for removing heat from said partition, toothed bars secured to the bottom of said cabinet and with which the lower portion of said partition may engage, and a pivoted toothed bar on the upper part of said cabinet for engaging the upper portion of said partition for securing said partition in position to press against the article to be frozen and press the same against said wall.

6. An adjustable partition member for use in a refrigerator cabinet having upright walls provided with means for chilling the same and the air in said cabinet to a temperature at which articles of food become frozen, said member being made of a material of good heat conducting property and being adjustable toward and from one of said walls to press an article to be frozen between said wall and said partition, said partition having a substantially flat surface to contact the article to be frozen and having a series of upright passages formed on the opposite surface thereof, said passages being open at the upper and lower ends thereof to permit the passage of air in the cabinet through said passages to

remove heat from said partition by contact only with the air in said cabinet.

7. An adjustable partition member for use in a refrigerator cabinet having upright walls provided with means for chilling the same and the air in said cabinet to a temperature at which articles of food become frozen, said member being made of a material of good heat conducting property and being adjustable toward and from one of said walls to press an article to be frozen between said wall and said partition, said partition having one face thereof substantially flat to contact the article to be frozen and having the opposite face thereof provided with outwardly extending upright fins between which air from the interior of said cabinet may flow for removing heat from said partition only by the air in said cabinet.

8. An adjustable partition member for use in a refrigerator cabinet having upright walls provided with means for chilling the same and the air in said cabinet to a temperature at which articles of food become frozen, said member being made of a material of good heat conducting property and being adjustable toward and from one of said walls to press an article to be frozen between said wall and said partition, said partition having one face thereof substantially flat to contact the article to be frozen and having the opposite face thereof provided with outwardly extending upright fins for reinforcing said partition, a plate connecting the outer edges of said fins and terminating short of the upper and lower walls of said cabinet and forming with said fins a series of upright passages through which air from the interior of said cabinet may flow for removing heat from said partition.

9. A method of quick freezing articles of food in a cabinet having inner upright walls provided with means for chilling the same and the air in said cabinet to a temperature at which articles of food become frozen, which includes pressing the articles between one face of a partition of heat conducting material and one of said walls, and removing heat from said partition only by circulation of chilled air in the cabinet along the other face of said partition.

JOSEPH A. ARCHBALD, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,822,089	Hall	Sept. 8, 1931
1,822,121	Barry	Sept. 8, 1931
2,192,562	Scott	Mar. 5, 1940