June 29, 1943. W. RASKIN 2,322,882

REFRIGERATION APPARATUS

Filed April 18, 1942

Fig. 1.

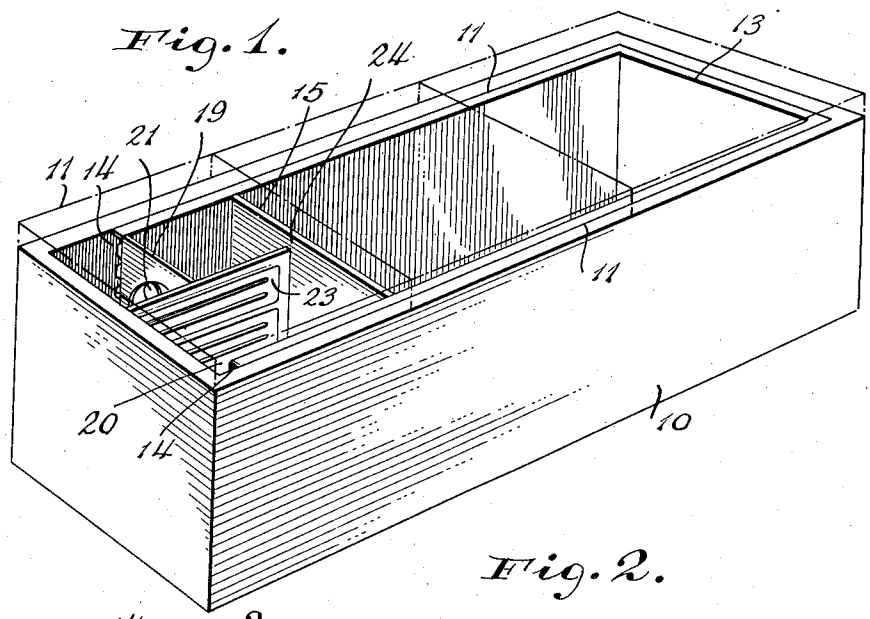


Fig. 2.

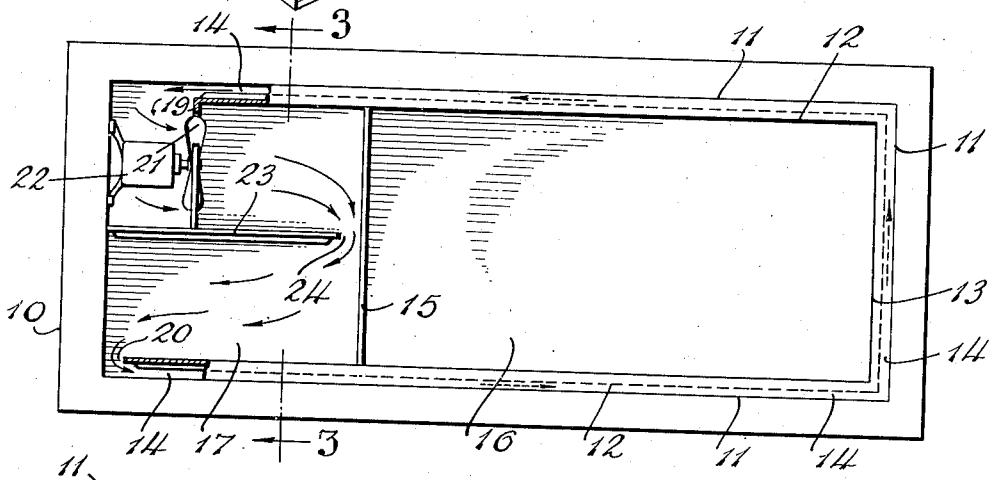
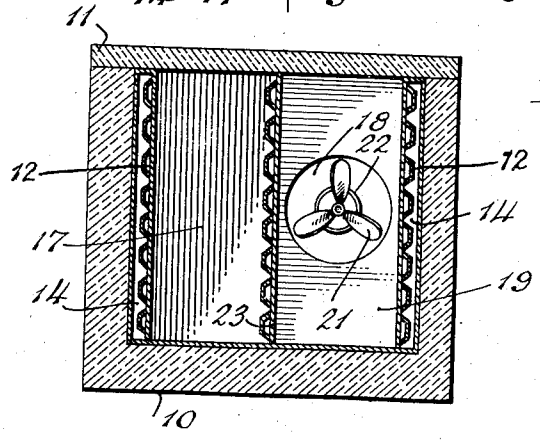


Fig. 3.



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REFRIGERATION APPARATUS

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7 Claims. (Cl. 62—102)

This invention relates to refrigeration apparatus and more particularly to a refrigerator storage cabinet, embodying a special compartment for the fast-freezing of food.

One of the principle objects is to increase the heat transfer or heat extraction within a localized area without substantial increase of the evaporator surface in said localized area and without appreciably affecting the temperature in the storage area.

Another object is to make the evaporator surface of the entire storage cabinet effective for refrigeration within a localized area to increase the rate of freezing.

A further object is to provide a refrigeration apparatus and storage cabinet of increased efficiency and reduced operating costs.

Further objects and advantages inherent in the invention will become apparent from the following specification taken in conjunction with the accompanying drawing which describes and illustrates a preferred embodiment of the invention.

In the drawing:

Fig. 1 is a perspective view of a refrigeration apparatus according to the invention with the top removed.

Fig. 2 is a top plan view partly in section and Fig. 3 is a section taken along the line 3—3 of the Fig. 2.

The cabinet according to the invention is of the so-called dry type. Evaporator plates preferably of the type disclosed in my Patents Nos. 2,156,544 and 2,244,475 are used as refrigerating means. These consist of a pair of superimposed metal members which are welded together to provide a plurality of ducts which are flooded with refrigerant liquid from a receiver. These evaporator plates are also used as wall members to define the storage section and the fast-freezing section. The objects of the invention may be obtained by circulating the air in the storage cabinet directly behind the refrigerator surfaces defining the comparatively large storage area into the smaller area to bear directly on the food to be subjected to the fast-freezing process therein. In terms of broad inclusion the invention contemplates the utilization and concentration of the refrigerating surfaces throughout the cabinet upon the localized smaller area.

It will be understood, however, that the invention is not limited to any particular type of evaporator plate.

In order to preserve food products, it is important to freeze them rapidly to solidify the cell structure. Thereafter they may be stored in the storage section in which they are preserved for long periods of time. For this purpose of fast freezing it is essential to have a high rate of heat transfer or heat absorption within the fast-freeze section. Naturally, this necessitates a large refrigerator surface.

However, heretofore, the refrigerated or evaporator surface area has been concentrated in the fast-freeze section in order to achieve the required faster rate of heat pick up. Since the evaporator plates throughout the cabinet are intercommunicating, the surface temperature is the same throughout the cabinet. Furthermore, since the temperature in the storage section in the old type cabinet had to be maintained at a substantially higher degree than in the fast-freeze section, it was necessary to reduce the amount of evaporator surface in the storage section to produce this condition. This resulted in a high temperature differential between the evaporator surface temperature and the storage temperature, sometimes as high as 50° F. This differential has a very deleterious effect upon the food by reason of the increased dehydration and desiccation.

This harmful temperature differential has been corrected by the invention by circulating the air in the cabinet over the evaporator surfaces, which define the storage section, into the fast-freeze section. It will be understood that such circulation increases the surface temperature of the evaporator plates and renders the operation of the condensing unit more efficient.

Furthermore, the increases in the refrigerated surface within the fast-freeze section naturally is accompanied by an increase in manufacturing cost and by a decrease in the loading capacity of the fast-freeze section.

A further objection to this conventional construction results from the extremely low temperatures at which the machinery operates. It is obvious that the current consumption will be increased considerably.

These various objections have been removed by the invention.

Referring in greater detail to the drawing, the cabinet includes a housing 10 having a removable top or cover indicated in dotted lines in the drawing. Within the cabinet and spaced from the housing walls 11 are additional wall members 12 and 13 which define a passage 14.

The partition 15 between the walls 12 defines a storage section 16 and a fast-freeze section 17.

The fast-freeze section 17 opens into the passage 14 by means of the aperture 18 in the bulkhead 19 and by the aperture 20 which is provided by spacing the respective wall member 12 from the housing wall.

The fan 21 operated by the motor 22 is mounted for rotation in the aperture 18 and thus causes the air within the cabinet to circulate through the fast-freeze section 17 and the passage 14.

As previously indicated, the refrigerant medium consists of dry plates and these may be embodied in the wall members defining the sections. For all practical purposes, however, it will be sufficient to embody refrigerant surfaces only in the wall members 12 in the construction disclosed in the drawing, as experiments have shown that such surfaces meet the demands of the cabinet.

The evaporator surface, however, is so arranged that the temperature will be about the same in the fast-freeze section as in the storage section. On the other hand, the rate of heat pick up in the fast-freeze section will be much greater than in the storage section because of the fact that the air acts as a secondary refrigerating medium which makes the entire evaporator surface in the passage 14, as well as in the fast-freeze section 17, to become effective for refrigeration of the food in said fast-freeze section.

In passing, it might be mentioned that it is not necessary to have extremely low temperatures in order to accomplish fast freezing as long as the rate of heat pick up is substantially high.

It will be understood, however, that if the circumstances so demand, the wall member 13 as well as the partition 15 may be equipped with refrigerating surfaces.

As previously indicated, the refrigerating surfaces or the evaporator plates are connected in a continuous circuit and are fed by a reservoir through a condenser which is not shown in the drawing.

The embodiment shown also includes an evaporator plate 23 which is mounted in the end wall of the housing 10. It extends into the fast-freeze section between the apertures 18 and 20 and is connected to the bulkhead 19. The end is spaced from the partition 15 to provide an aperture 24 for the air current.

It will be observed that the evaporator plate 23 is exposed directly to the air current so that it will be swept thereby, as it circulates through the fast-freeze section. This arrangement will still further increase the rate of freezing in said section.

During the operation of the apparatus the fan will force the air in the cabinet through the passage 14 over the evaporator plates 12 and through the fast-freeze section where it will sweep the plate 23 as well as the interior surfaces of plates 12. Thus, the air which is normally in contact with the refrigerating surfaces of the wall members 12 will be forced into the fast-freeze section to bear directly on the food products therein. In other words, the refrigerated air is used as a secondary refrigerating medium.

By virtue of this construction, the cabinet according to the invention will have two sections each of which has the ability of absorbing heat at different rates without having to reduce or increase the temperature of the food or produce to be stored in the storage section. Experiments have shown that approximately six times as much heat will be absorbed in the fast-freeze section as in the storage section in the particular embodiment illustrated in the drawing.

It will be understood that this disclosure is not given by way of limitation. On the other hand, the invention lends itself to a variety of expressions within the scope of the appended claims.

What is claimed as novel and what is desired to be protected by Letters Patent is:

1. In a refrigerated cabinet including a housing, a fast-freeze section and a storage section, the exterior walls of said sections being spaced from the walls of said housing to define a passage, said fast-freeze section being apertured with respect to said passage for circulation of air therethrough, at least some of said section walls including refrigerated surfaces, and means for circulating air in said passage, over said refrigerated surfaces and through said fast-freeze section, whereby the entire refrigerated surface in said passage will become effective for refrigeration within said fast-freeze section.

2. In a refrigerated cabinet including a housing, a substantially large storage section and a comparatively small fast-freeze section, the exterior walls of said sections being spaced from the walls of said housing to define a passage, said fast-freeze section being apertured with respect to said passage for circulation of air therethrough, at least some of said section walls including refrigerated surfaces, and means for circulating air in said passage, over said refrigerated surfaces and through said fast-freeze section, whereby the entire refrigerated surface in said passage will become effective for refrigeration within said fast-free section.

3. In a refrigerated cabinet including a housing, wall members defining a storage section and a fast-freeze section, said wall members being spaced from the walls of said housing providing an intermediate passage, said fast-freeze section being apertured with respect to said passage for circulation of air therethrough, said wall members including refrigerated surfaces, means for forcing the air in said cabinet through said apertures and through said fast-freeze section into said passage and over said refrigerated surfaces, whereby the entire refrigerated surface in said passage will become effective for refrigeration within said fast-freeze section, and an additional refrigerated surface in said fast-freeze section, said additional refrigerated surface being so disposed that it will be swept on both sides by the air current.

4. In a refrigerated cabinet including a housing, wall members defining a substantially large storage section and a comparatively small fast-freeze section, said wall members being spaced from the walls of said housing providing an intermediate passage, said fast-freeze section being apertured with respect to said passage for circulation of air therethrough, said wall members including refrigerated surfaces, means for forcing air in said cabinet through said apertures and through said fast-freeze section into said passage and over said refrigerated surfaces, whereby the entire refrigerated surface in said passage will become effective for refrigeration within said fast-freeze section, and an additional refrigerated surface in said fast-freeze section, said additional refrigerated surface being so dis-

posed that it will be swept on both sides by the air current.

5. In a refrigerated cabinet including a housing, wall members defining a storage section and a fast-freeze section, said wall members being spaced from the walls of said housing providing an intermediate passage, said wall members including refrigerated surfaces, means for forcing the air in said cabinet through said apertures and through said fast-freeze section into said passage and over said refrigerated surface, whereby the entire refrigerated surface in said passage will become effective for refrigeration within said fast-freeze section, said fast-freeze section being provided with spaced apertures in the end distant from said storage section for communication with said passage, an additional partition-forming refrigerated surface in said fast-freeze section between said apertures but spaced from said storage section, to provide an aperture whereby the air current will sweep both sides of said refrigerated surface.

6. In a refrigerated cabinet including a housing, a plurality of wall members spaced from the walls of said housing to define a passage therebetween, a partition between said wall members dividing said cabinet into a storage section and a fast-freeze section, at least two of said wall members which are contiguous to said fast-freeze section including rerigerated surfaces, and means for circulating the air in said cabinet through said passage over said refrigerated surfaces and into said fast-freeze section.

7. In a refrigerated cabinet, a storage section and a fast-freezing section, at least some of the wall members forming said sections including refrigerated surfaces, and means for making the entire refrigerated surface area of said sections effective for refrigeration within said fast-freeze section.

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