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R. W. DAVENPORT

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REFRIGERATING AND ICE MAKING CABINET

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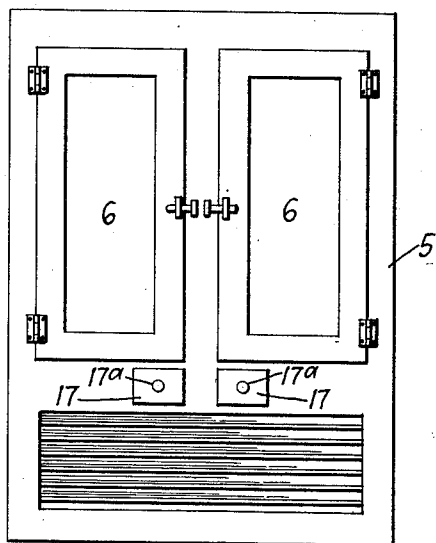


Fig. 1

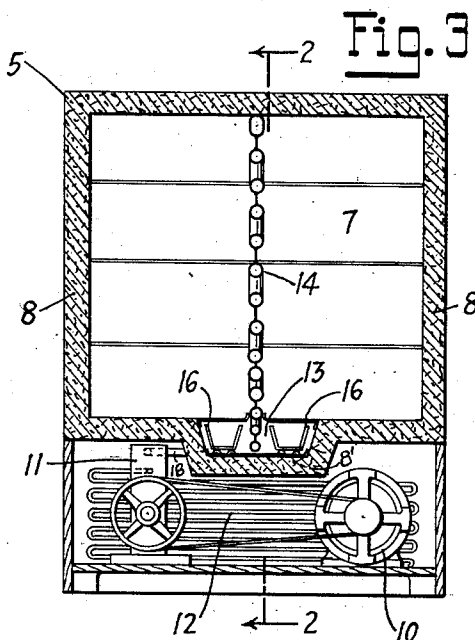


Fig. 3

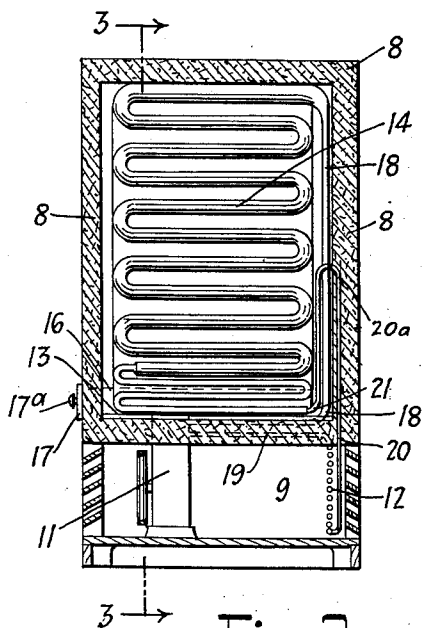


Fig. 2

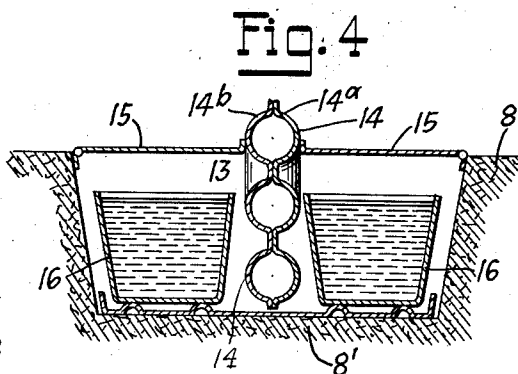


Fig. 4

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REFRIGERATING AND ICE-MAKING CABINET

Application filed August 1, 1925. Serial No. 47,457.

This invention relates to cabinets having mechanically operated means for producing refrigeration and for making a limited quantity of ice generally in the form of cubes. It particularly concerns cabinets for household use in the preservation of food.

Among the objects of the invention are to provide a cabinet of the described type so arranged and constructed as to afford maximum food storage space with minimum exposure to external heat, to arrange the ice-making apparatus so as not to encroach upon the food storage space nor to increase the size of the cabinet, to permit access to the ice without exposing the food storage space to external heat, and in general to effect economies in the cost of manufacture and of operation while increasing the efficiency and convenience of such cabinets.

In mechanically operated cabinets as heretofore provided a considerable amount of the available interior space, about one quarter, has been occupied by the bulky frost coil or brine tank constituting the refrigerating element. The ice trays provided in the coil or brine tank can be reached only by opening the cabinet doors and exposing the food storage space to the heat on the exterior of the cabinet.

The present invention contemplates the use of a flat thin refrigerating element disposed vertically within the cabinet and consequently taking up but little space. In the side-icer type of cabinet the element forms the central partition in the food space. Provision is made for the freezing of ice cubes by forming a recess in the bottom of the food space into which the trays for the ice cubes slide like drawers from the exterior of the cabinet. The apparatus for producing refrigeration is preferably arranged to operate on the vapor-gas principle and in accordance with process disclosed in my copending application Serial No. 15,172, filed March 12, 1925. With the exception of the refrigerating element which is within the food storage space the greater part of the apparatus is housed in a compartment in the base of the cabinet and the invention includes certain features re-

lating to the disposition of the parts of the apparatus.

In order to illustrate the invention one concrete embodiment thereof is shown in the accompanying drawing, in which:

Fig. 1 is a front elevational view;

Fig. 2 is a transverse vertical sectional view substantially through the center of Fig. 1, as on line 2—2 of Fig. 3, and showing the refrigerating element in elevation;

Fig. 3 is a longitudinal vertical sectional view substantially on line 3—3 of Fig. 2; and

Fig. 4 is a detail view on an enlarged scale of certain parts shown in Fig. 3.

The invention is illustrated as embodied in a cabinet 5 of the side-icer type provided with a pair of horizontally spaced doors 6 which give access to the large food storage compartment 7 in the upper portion of the cabinet, the walls of the compartment being formed of suitable heat insulating material 8. A second compartment 9 beneath the food storage compartment 7 provides space for the mechanically operated refrigerating apparatus comprising the prime mover or electric motor 10, the pump or compressor 11 driven by the motor, and the coils 12 forming the condenser.

As clearly indicated in Fig. 3 the cabinet 5 is arranged to provide a recess 13 opening into the bottom of the food storage compartment 7, the walls 8' of this recess being also of heat insulating material and projecting into the lower compartment 9 of the cabinet. The heat ejecting member or refrigerating element 14 of the food storage compartment 7 is vertically disposed centrally of the latter behind the center door post of the cabinet and extends from the top of compartment 7 to the bottom of recess 13 conforming substantially to the depth of the compartment 7, thereby forming a central partition for the food storage space. Element 14 presents a heat absorbing surface of substantial extent and can be made very thin. The disposition of this thin element vertically and centrally of compartment 7 results in a minimum and, in effect, an almost imperceptible loss of food storage space. While a coiled pipe may be

used for element 14 it is preferably of opposed sheet metal plates 14^a and 14^b (Fig. 4) stamped so as to produce an elongate winding passage or coil when the plates are secured together as indicated. This type of refrigerating element is described and claimed in my copending application, Serial No. 54,867, filed September 8, 1925. With such an element the loss of food storage space is easily kept down to one-tenth or less, and when used as a central partition as disclosed in this application the loss of space drops to one-twentieth or less.

Closure means, if desired for recess 13, may take the form of hinged plates 15 on opposite sides of the refrigerating element 14 (Fig. 4). This recess 13 forms an ice-making compartment in which trays 16 for water or other substances to be frozen are disposed. These trays may be in the form of drawers slidable through openings in cabinet 5 and provided with closure plates 17 and knobs 17^a by which the trays are manually inserted and removed without opening doors 6 and thus exposing the food storage space to heat on the exterior of the cabinet.

As indicated in Fig. 2 the top of the refrigerating element 14 is connected to the inlet of pump 11 by a pipe 18. The outlet of the pump connects with the condenser coil 12 by a pipe 19 and the outlet from the condenser 12 is connected by a pipe 20 to the expansion nozzle 21 which opens into the winding passage through the refrigerating element 14. The refrigerating apparatus herewithin described operates in accordance with the principle disclosed in my copending application Serial No. 15,172, filed March 12, 1925. The refrigerating element 14 accordingly contains a body of liquid refrigerant. In order to prevent this liquid refrigerant from flowing down into condenser 12 when the apparatus is not working and thus producing delayed and inefficient operation, pipe 20 extends above the bottom of element 14 in a loop 20^a to serve as a trap for the liquid refrigerant.

From the above it will be apparent that the present invention provides in any refrigerating cabinet a maximum of available food storage space, that for a food compartment of any given size a cabinet with a minimum exposure to exterior heat can be provided, that these results are effected by forming the refrigerating element as a relatively thin member presenting a large area for heat absorption but occupying a negligible amount of space, that in the side-icer type of refrigerator there is practically no lost space since the refrigerating element may be arranged to take the place of the central partition behind the central door post, that provision is made for ice-making without sacrifice of food storage space by providing a recess which opens into the bottom of the food space and into

which the refrigerating element extends, that by making the ice-trays insertable and removable from the exterior of the cabinet losses resulting from opening the main doors to the food compartment are avoided, and that the above features contribute to marked economies in the cost of production and of operation of refrigerating apparatus of the type described.

While a preferred form of the invention has been herewith shown and disclosed it is to be understood that the invention is not limited to the specific details thereof but covers all changes, modifications and adaptations within the scope of the appended claims.

I claim as my invention:

1. A refrigerating cabinet having a pair of horizontally spaced doors giving access to a food storage compartment, said cabinet having a centrally disposed recess opening into the bottom of said compartment, and a thin refrigerating element vertically disposed within said compartment and forming a central dividing partition for the same, said element extending into said recess, said cabinet having at least one opening in the walls thereof permitting the insertion and removal of substances into and from said recess.

2. A refrigerating cabinet having a pair of horizontally spaced doors giving access to a food storage compartment, said cabinet having a centrally disposed recess opening into the bottom of said compartment, and a thin refrigerating element vertically disposed within said compartment and forming a central dividing partition for the same, said element extending into said recess, said cabinet having openings through which trays are slidable into and removable from said recess from the exterior of said cabinet.

3. A refrigerating cabinet having a pair of horizontally spaced doors giving access to a food storage compartment, said cabinet having a centrally disposed recess opening into the bottom of said compartment, a refrigerating element vertically disposed within said compartment and forming a central dividing partition for the same, said element extending into said recess and hinged closures for said recess on opposite sides of said element, said cabinet having door openings communicating directly with said recess through which trays are slidable into and removable from said recess.

4. A self contained mechanically operated refrigerating cabinet having an upper insulated compartment for perishable articles, means providing a closed cycle system operating on the vapor-gas principle comprising a refrigerating element in said compartment containing liquid refrigerant, refrigerating apparatus in a compartment beneath said insulated compartment, a connection from said apparatus directly to the lower portion of said

element, said connection forming a trap to prevent the liquid refrigerant from reaching the apparatus in the lower compartment when said apparatus is not in operation.

5 5. A self contained mechanically operated refrigerating cabinet having an upper insulated compartment for perishable articles, means operating on the vapor-gas principle for extracting heat from said compartment
10 including a refrigerating element therein containing a quantity of liquid refrigerant, refrigerating apparatus in a compartment beneath said insulated compartment including a condenser, a compressor and a prime mover
15 to operate the latter, said compressor having its inlet connected to the top of said element and its discharge connected to the inlet of said condenser, a connection from the outlet of said condenser to the bottom of said element, said connection being arranged to extend in a loop above the bottom of said element to form a trap to prevent the liquid refrigerant in said element from flowing out of the latter when the apparatus is not in
20 operation.
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6. A cabinet having a heat insulated compartment for perishable articles and a recess formed in the bottom of said compartment, a refrigerating element in said compartment
30 extending into said recess, and closure means for said recess giving access to the same directly from said compartment.

7. A cabinet having a heat insulated compartment for perishable articles and a recess formed in the bottom of said compartment, a refrigerating element in said compartment
35 extending into said recess and closure means of sheet material for separating said recess from said compartment but providing access
40 from the compartment thereto.

8. A cabinet having a heat insulated compartment for perishable articles and a recess formed in the bottom of said compartment, a refrigerating element in said compartment
45 extending into said recess and means giving access to said recess directly from the exterior of said cabinet.

9. A cabinet having a heat insulated compartment for perishable articles and a recess
50 for receptacles to be frozen adjacent said compartment, a refrigerating element in said compartment extending into said recess and means giving access to said recess for the insertion or removal of receptacles both directly
55 ly from the exterior of said cabinet and from said compartment.

Signed by me at Detroit, Michigan, this 27 day of July, 1925.

RANSOM W. DAVENPORT.