

April 6, 1937.

L. L. TORREY

2,075,838

MECHANICAL REFRIGERATOR APPARATUS

Filed Dec. 3, 1932

3 Sheets-Sheet 1

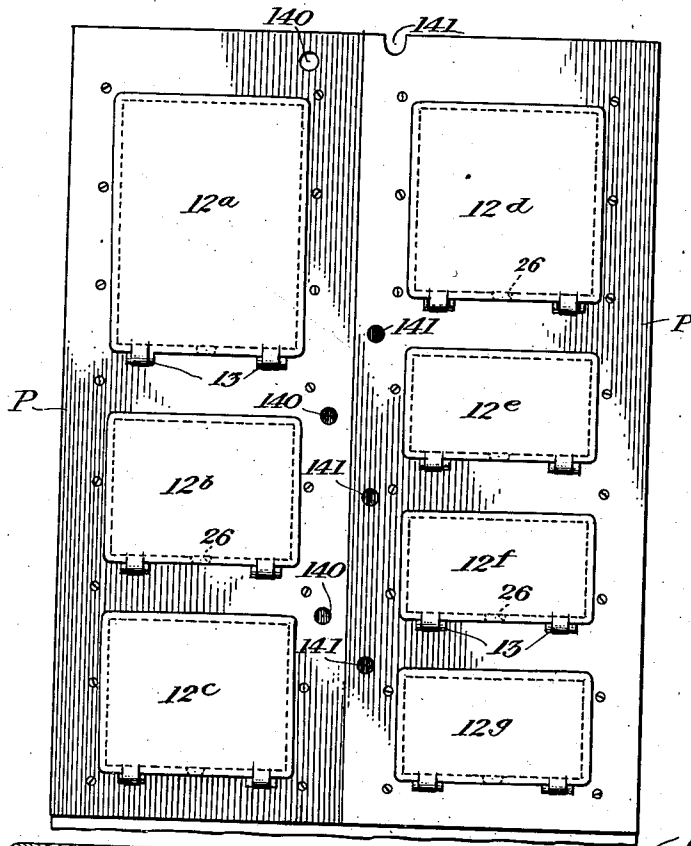


Fig. 1.

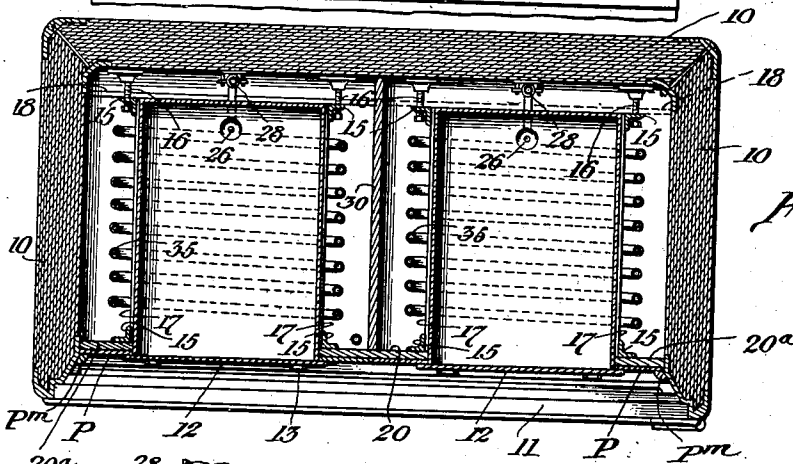


Fig. 4.

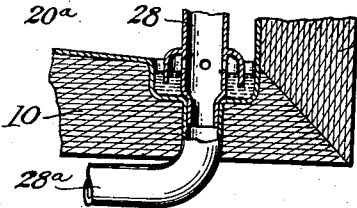


Fig. 4a.

Inventor,

Lucien L. Torrey.

334

Attorneys.

April 6, 1937.

L. L. TORREY

2,075,838

MECHANICAL REFRIGERATOR APPARATUS

Filed Dec. 3, 1932

3 Sheets-Sheet 2

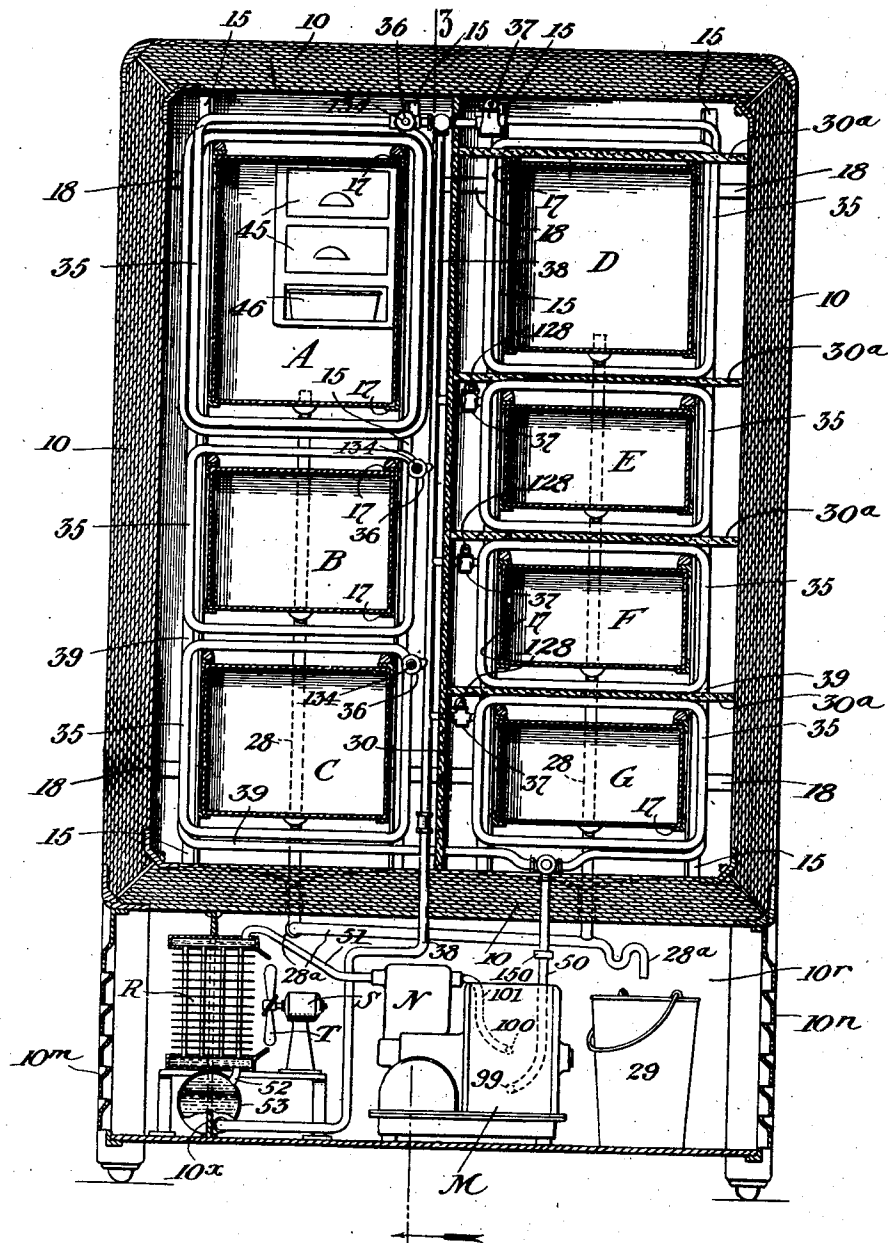


Fig. 2.

Inventor,
Lucien L. Torrey.

By *Andrew M. M. M.*
Attorneys.

April 6, 1937.

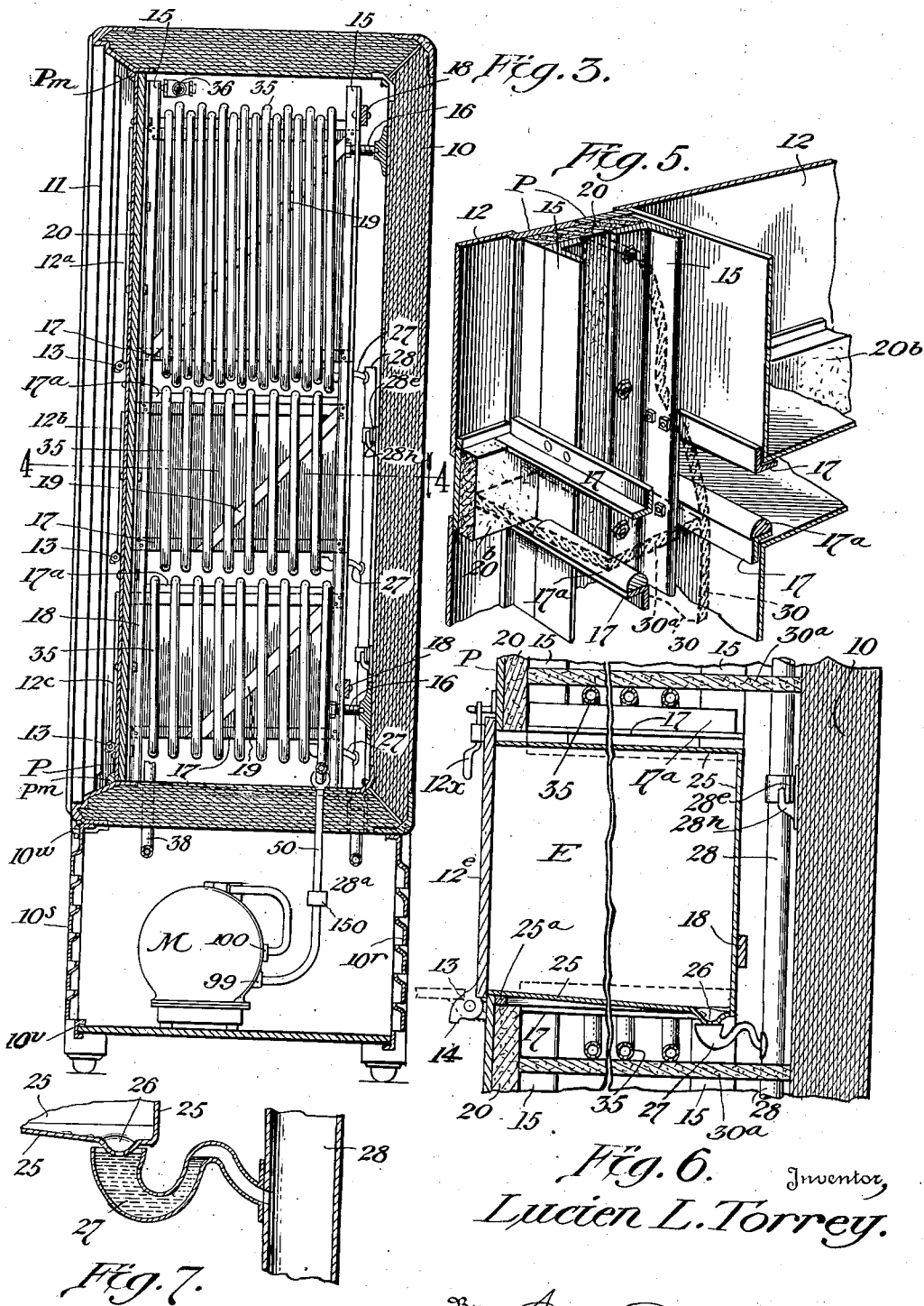
L. L. TORREY

2,075,838

MECHANICAL REFRIGERATOR APPARATUS

Filed Dec. 3, 1932

3 Sheets-Sheet 3



By *Andrew Montague*
Attorneys.

UNITED STATES PATENT OFFICE

2,075,838

MECHANICAL REFRIGERATOR APPARATUS

Lucien L. Torrey, Los Angeles, Calif.

Application December 3, 1932, Serial No. 645,602

8 Claims. (Cl. 62—116)

This invention relates to mechanical refrigerator apparatus, and more particularly concerns improvements in such devices for household employment.

Many types of such devices have heretofore been proposed, and manufactured, in the endeavor to produce a structure which is competent of responding to the varied requirements of the household, and to give economic, satisfactory and sanitary service under such varied conditions.

One of the objects of the present invention is to provide a storage chamber structure for such a system, in which various food stuffs may be segregated according to their requirements of temperature for preservation and the necessities of maintaining various groups or classes of food stuffs separated from one another to prevent deterioration of one or more articles by the absorption of odors from other articles.

Another feature of the present invention is to provide a storage chamber structure of this type in which independent compartments are provided, with independent closing doors, whereby the energy values represented by the "cold" in the various compartments are not dissipated immediately upon opening a general door for the structure, along with the provision of independent means for cooling such compartments whereby they may be independently maintained at desired predetermined temperatures in substantial independence of one another.

Another feature of the present invention is the provision of a storage chamber structure comprising removable independent compartment devices, supported by a common frame, with the provision of means for cooling the same which are mounted upon the same frame.

Still another feature of the present invention is the provision of a storage chamber structure having general insulating walls and a general closing door, in conjunction with individual storage chambers and means for cooling the same to different temperatures, along with the provision of internal insulating walls to segregate chambers of higher temperature from those of lower temperature.

A still further feature of the present invention is the provision of individual storage chambers with independently sealed devices whereby the same may be drained independently without danger of the transfer of odors from one chamber to another, or from the exterior to any chamber.

With these and other objects in view as will appear in the course of the following specification and claims, an illustrative form of construction of such an apparatus is set out on the accompanying drawings, in which:

Figure 1 is a front view of an internal front closing wall, showing individual compartment doors thereon.

Figure 2 is a vertical sectional view, taken parallel to the front wall, and showing the relationship of the power-compressor plant and auxiliaries, the general storage chamber, and the individual compartments with their cooling means.

Figure 3 is a vertical sectional view substantially on line 3—3 of Figure 2.

Figure 4 is a horizontal sectional view substantially on line 4—4 of Figure 3.

Figure 4a is a detail sectional view, showing a removable connection and trap for the drainage system.

Figure 5 is a perspective view on a larger scale showing a detail of the assemblage of the frame, insulating pieces, front panel, and doors.

Figure 6 is a vertical sectional view, showing the relationship of a compartment to the general drain tube.

Figure 7 is a fragmentary view, on a still larger scale, of an individual drain for a compartment.

In these figures, a general insulating casing 10 having side, top, bottom and rear walls, each illustrated as formed of balsa plies and joined at the edges by bolted metal reinforcing and junction pieces, is provided at its front with a likewise insulated pivoted closing door 11. Spaced from this door is a face panel P (Fig. 1), illustrated as comprised of two sections each extending from top to bottom, and serving to close off within the general insulating structure a compartment within which individual storage chambers and their cooling means may be disposed. The general drain pipe 28 is preferably removable, and has its lower end received in a pocket of the bottom wall of casing 10 (Fig. 4a) and is supported at intervals along its length by ears 28e which are received by the hooks 28h secured to the rear wall of the casing 10 (Figs. 3 and 6). In Figs. 1 and 2, the structure is shown to have seven such individual storage chambers, denominated A, B, C, D, E, F, and G, which are illustrated as being of different arbitrarily selected dimensions. Each of these compartments is provided (Fig. 1) with a door 12a, 12b, 12c, 12d, 12e, 12f, or 12g having a pivotal mounting by hinges 13 (Figs. 1 and 6) to the face panel P whereby they may swing down to expose the contents of the individual compartment. The center of gravity of the door when closed tends to hold it closed, and this action may be assisted by a catch

12x if desired. At each of these hinges 13 is provided a stop lug 14 (Fig. 6) to limit the opening movement of the door and prevent it from moving beyond a substantially horizontal position at which it provides an entry shelf for the chamber.

Within the general space formed by the casing 10 and the face panel P is disposed a frame-work constituting a supporting rack. This frame-work includes the vertical posts or uprights 15 and is braced by suitable bolts 16 from the rear chamber wall 10. Extending horizontally between the rear posts 15 are pluralities of rails 17 arranged in pairs on each post so that (Fig. 2) they may receive between them the structure forming an individual storage chamber. The rails 17 are preferably in the form of angle members which form supporting members for the storage chamber structures. The supporting members are arranged in groups and constitute guide means on which the individual storage chamber structures are slidable for permitting insertion and removal of the same.

At the front of these structures, the frame is joined to the face panel P. The junctions of at least the front posts 15 to rails 17, and the junction of the face panels P to the frame are separable so that the face panels and front posts may be removed, to leave clear the space between the upper rail for one chamber and the lower rail for the next higher chamber. These rails are supported likewise by brace members 19 (Fig. 3) serving to relieve the attachments between the rails and posts from twisting strains when the front posts have been disengaged.

Since two vertical rows of chambers are provided in the illustrated form, gaps exist between the two pairs of posts 15 provided for each row in the illustrated construction, and between these pairs and the side walls of the casing 10. These gaps are spanned at the front by an insulating piece 20 (Figs. 4 and 5) bolted to the central front posts 15; and by similar insulating pieces 20a located between the side walls and the lateral front posts 15. Horizontal bars 18 are connected to the rear posts 15 and extend between the side walls. These members therefore support the posts 15 with respect to the side walls and prevent lateral movement of these posts, while permitting the frame assembly to be withdrawn after removal of the securing means for the face panel P. The front insulation pieces 20 and 20a are likewise secured directly to this face panel P itself. To assist in insulating the space behind the face panel, horizontal insulation pieces 20b are provided (Figs. 5 and 6).

Slidable into each double pair of rails 17 are the individual storage chamber structures, which may be referred to as cans, and are indicated generally as A, B, C, D, E, F, and G in Fig. 2. As shown in the drawings, each of these cans has top, bottom, side and end walls 25, but is open at the front. Each can is received through an opening in the face panel which is normally closed by a door (Figs. 1 and 6). Each opening is of slightly greater vertical dimension than the corresponding can, and each can is provided in this illustrated form with the stop bar 25a beneath its bottom and spaced from the front edge a distance corresponding to the thickness of the face panel P. The can thus may be slid into position while its front end is raised, and the stop bar 25a will then clear the lower edge of the opening in the face panel P, and upon lowering this bar will thereafter prevent the removal of

the can until its front edge has again been lifted. Correspondingly the raising and lowering movement of the rear or inner end of the can permits the engagement of its discharge point 26, or its withdrawal, in respect to the liquid seal tube 27 which prevents the passage of odors into or out of the particular chamber, but adapted to discharge any dew or liquid into a general drain pipe 28 (Figs. 2, 4, 6, and 7). When the can is withdrawn it may be readily scoured and cleaned by means available in the household. Further, when the cans are withdrawn access is afforded to the parts of the frame, valves, and bracing bolts 16. Two drain pipes 28 are illustrated, each having a separable connection to a sealed conduit 28a located beneath the general storage chamber and leading to a readily accessible location for a drip pail 29 (Fig. 2). The face panel P is prevented from normal withdrawal from the casing by the removable moulding strips Pm (Figs. 3 and 4).

Since only dew is separated, a very small pail capacity is sufficient as it is not necessary to handle the large volume of water as is the case with an ice refrigerator. It is preferred to have the bottom wall 10 concave and leading at its lowest point or points to the separable connections which provide seals, so that any dew separated externally of the cans is likewise passed through conduit 28a to the drip pail 29.

Since it is intended that the chambers A, B, and C shall be cooled to a lower temperature than the compartments D, E, F, and G, a vertical insulating partition 30 is provided within the general space, extending from the back wall 10 to the insulating piece 20 behind the face panel P (Fig. 4) whereby to prevent the chambers assuming the same temperature. Likewise, the chambers (and their cooling means as described hereinafter) may be separated from one another by the horizontal insulating partitions 30a illustrated between the chambers in the right-hand row in Fig. 2, extending from the insulating pieces 20b adjacent the face panel to the rear wall of casing 10, and from the vertical partition 30 to the side wall, to restrict heat transmission between chambers and their cooling means.

Each of the cans, being independently mounted on its rails 17, is also provided with an independent cooling coil 35 which surrounds the rails for the particular can and rests on the mounting bars 17a. Each coil obviously may be easily inserted and removed, when front posts 15, face panel P and insulation pieces 20, 20a are withdrawn, by simply pulling it forward along the guide rails 17 (see Fig. 3).

Each of these coils is provided with an independent expansion valve 36 or 37 (Fig. 2) whereby liquid refrigerant may be released from a high pressure conduit 38 into the corresponding coil for evaporation therein. The evaporated refrigerant may thence pass to the gaseous refrigerant return pipes 39, 50 and back to the compressor.

It will particularly be noted that by regulating the expansion valves independently of one another, the individual chambers may be maintained at predetermined and closely regulated temperatures. The expansion valves 36 are preferably of the vacuum operated type, so that refrigeration is proceeding in these coils at all times, and they may be brought to very low temperatures. The temperature of the upper chamber A, for example, is preferably maintained around 18° F., so that water may be quickly

frozen in ice trays 45 of the usual type, and other articles requiring a similar temperature may be stored in the tray 46 or otherwise in this chamber. Preferably, the next lower chamber B in this left-hand column is maintained at a temperature of around 16° F., so that it is adapted for the storage of products requiring a temperature below the freezing point of water, but because of their odor or for like reasons being unsatisfactory to maintain in the same chamber with freezing water or a jelly, for example, located in the chamber A. Such articles are cheeses, etc.

The lowest chamber C in the left-hand column may be maintained at a temperature of around 14° F., and thus will serve for long time storage of frozen meats, fish, and like products which must not be raised to the melting point of their juices.

The chambers in the right-hand column may similarly be graded in temperature with the highest temperature, in the upper chamber D, of the order of 40° F., for example, so that it may be employed for the storage of fruits or vegetables which will not endure a lower temperature or the dehydration of a lower temperature. The other chambers E and F have successively lower temperatures, while the lowest chamber G is preferably maintained at 30° F. It will be seen that in each row, the lowest temperature is maintained in the lowest chamber, so that convection currents within the general compartment are largely eliminated.

Thus it will be noted that all of the chambers on the left are maintained at temperatures below the freezing point of water, while those at the right are preferably maintained at higher temperatures. Therefore, no frost separation occurs on the walls of these latter chambers when air is admitted thereto and the collecting dew is rapidly discharged through the individual drains 26 thereof. Since each of these drains is substantially sealed, odors do not pass from one can or chamber to another.

Since temperatures below the freezing point of water may vary considerably without damage to the frozen product so long as the temperature is maintained at the freezing point of the product, a vacuum-operated expansion valve 36 is highly satisfactory for continuous refrigeration of high degree in each of these chambers. On the other hand, the temperatures in the chambers D, E, F, and G must be closely regulated and maintained, and hence it is preferred to employ thermostatically operated expansion valves 37 for each of these chambers.

The power-compressor plant for manufacturing liquid refrigerant is shown in Figs. 2 and 3 to comprise a motor structure M, a compressor structure N connected thereto, an air condenser R having a fan T driven by an independent electric motor S. The gaseous refrigerant passing from the return conduits 39 enters a common return conduit 50, and thus passes ultimately into the compressor N where it is raised to a high pressure and receives an increment of temperature. Leaving the compressor N by the conduit 51, this compressed hot gaseous refrigerant is cooled in condenser R so that it condenses and then passes by a liquid refrigerant conduit 52 into the receiver 53. The liquid refrigerant exists therein under the high pressure of the system, and thus is raised in the liquid refrigerant conduit 38 in proportion as it is permitted to escape

through the various expansion valves 36 and 37.

As shown in Figs. 2 and 3, a housing is provided beneath the insulating casing for the reception of the apparatus for producing liquid refrigerant. This housing comprises a bottom wall for supporting the elements of this apparatus, and the end walls 10m, 10n which are apertured, with the provision of louvres in the illustrated form, for the passage of the air employed for cooling the compressed gaseous refrigerant. Rear and front walls 10r, 10s are employed for cooling the compartment to provide an air conduit for this air. These walls may likewise be provided with louvres (Fig. 3) at either side of the vertical partition 10x (Fig. 2) which compels this air to flow over the condenser surfaces, by reason of the action of the fan T. Preferably (Fig. 3) the front wall 10s is formed as or provided with a door structure including the bottom clip pieces 10v and the top catch 10w so that this front wall may be removed to afford access to the mechanical parts and to the pail 29 so that these parts may be inspected, removed and replaced as desired.

While an illustrative form of construction of the invention has been set forth on the accompanying drawings, it is obvious that the features of the invention are not limited to this single form of construction, but that the invention may be employed in constructive embodiments widely differing therefrom, within the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a refrigerating apparatus, a heat insulating casing, a framework mounted in said casing and including uprights and a plurality of supporting members extending between said uprights and secured thereto, said supporting members being arranged in groups to provide guide means, independent refrigerating chambers slidably mounted on said guide means, and refrigerating means carried by said guide means for cooling said chambers.

2. In a refrigerating apparatus, a heat insulating casing, a face panel for closing said casing and having a plurality of apertures therethrough, a framework mounted in said casing and connected to said face panel, said framework including uprights and groups of supporting members extending between said uprights for providing guides in alignment with said apertures, independent refrigerating chambers slidably mounted on said guides, and refrigerating means supported by said guides for cooling said chambers.

3. In a refrigerating apparatus, a heat insulating casing, a framework mounted in said casing and including uprights and a plurality of supporting members extending between said uprights and secured thereto, said supporting members being arranged in groups to provide guide means, independent refrigerating chambers slidably mounted on each of said guide means, and independent refrigerating means for each of said chambers including refrigerating coils surrounding said guide means and carried thereby.

4. In a refrigerating apparatus, a heat insulating casing, a framework mounted in said casing and including uprights and a plurality of supporting members extending between said uprights and secured thereto, said supporting members being arranged in groups to provide guide means, heat insulating walls dividing said casing into a plurality of compartments with a group of said

supporting members disposed in each compartment, independent refrigerating chambers slidably mounted on said guide means, and independently controlled refrigerating coils disposed in each of said compartments and carried by said guide means for independently cooling each of said chambers.

5. In a refrigerating apparatus, a heat insulating casing, a framework mounted in said casing and including uprights and a plurality of supporting members extending between said uprights and arranged in groups for providing guide means, a face panel for closing said casing and having a plurality of apertures therethrough, independent refrigerating chambers mounted on said guide means and accessible and removable through one of said apertures, and means for holding said framework and said face panel against movement relative to the casing.

6. In a refrigerating apparatus, a heat insulating casing, a plurality of independent refrigerating chambers removably mounted in said casing, independent refrigerating means for each of said chambers, each of said chambers having a sloping bottom floor terminating at a collection point whereby dew may flow thereto, a main drain pipe mounted in said casing, and independent liquid sealed drainage devices connecting the said collection points to said drain pipe, said drainage devices permitting removal of said chambers independently of movement of said main drain pipe.

7. In a refrigerating apparatus, a heat insu-

lating casing, a face panel for closing said casing and having a plurality of apertures therethrough, a framework mounted in said casing and connected to said face panel, said framework including uprights and groups of supporting members extending between said uprights for providing guides in alignment with said apertures, independent refrigerating chambers slidably mounted on said guides and removable through said apertures, refrigerant conducting means surrounding said guides and supported thereby for cooling said chambers, and an independent door for each of said apertures, each said door being mounted on said face panel whereby to close the aperture when a refrigerating chamber is inserted or removed.

8. In a refrigerating apparatus, a heat insulating casing, a framework mounted in said casing and including uprights and a plurality of supporting members extending between said uprights and arranged in groups for providing guide means, a face panel for closing said casing and having therethrough a plurality of apertures, independent refrigerating chambers mounted on said guide means and accessible and removable through one of said apertures, independent refrigerant conducting devices surrounding and carried by each of said guide means, and means for removably connecting said face panel to said casing whereby, upon removal thereof, an individual refrigerant conducting device may be removed from the casing.

LUCIEN L. TORREY.