Nov. 26, 1935. W. E. CARPENTER 2,022,489

REFRIGERATED STORAGE CABINET

Filed May 11, 1935 2 Sheets-Sheet 1

Fig. 1.

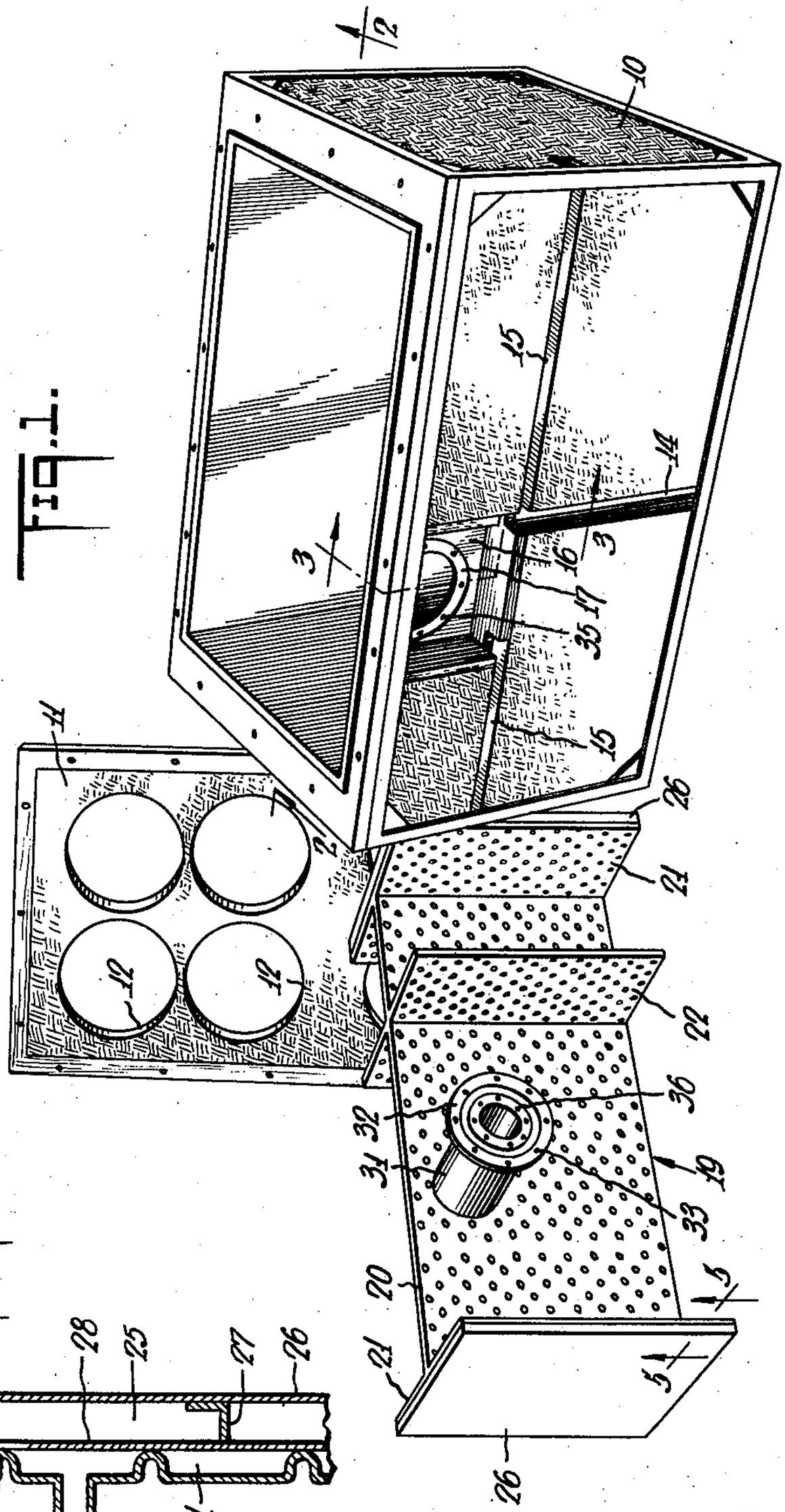
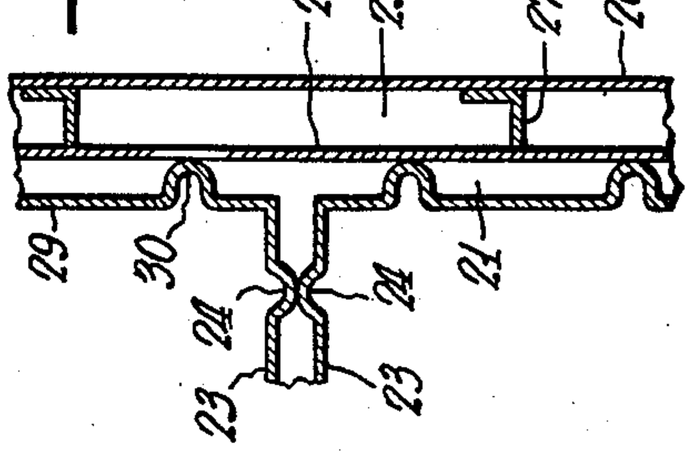


Fig. 5.



INVENTOR
Walter E. Carpenter
BY
Dean, Fontaine, Hirsch & Foster
ATTORNEYS

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Fig. 2.

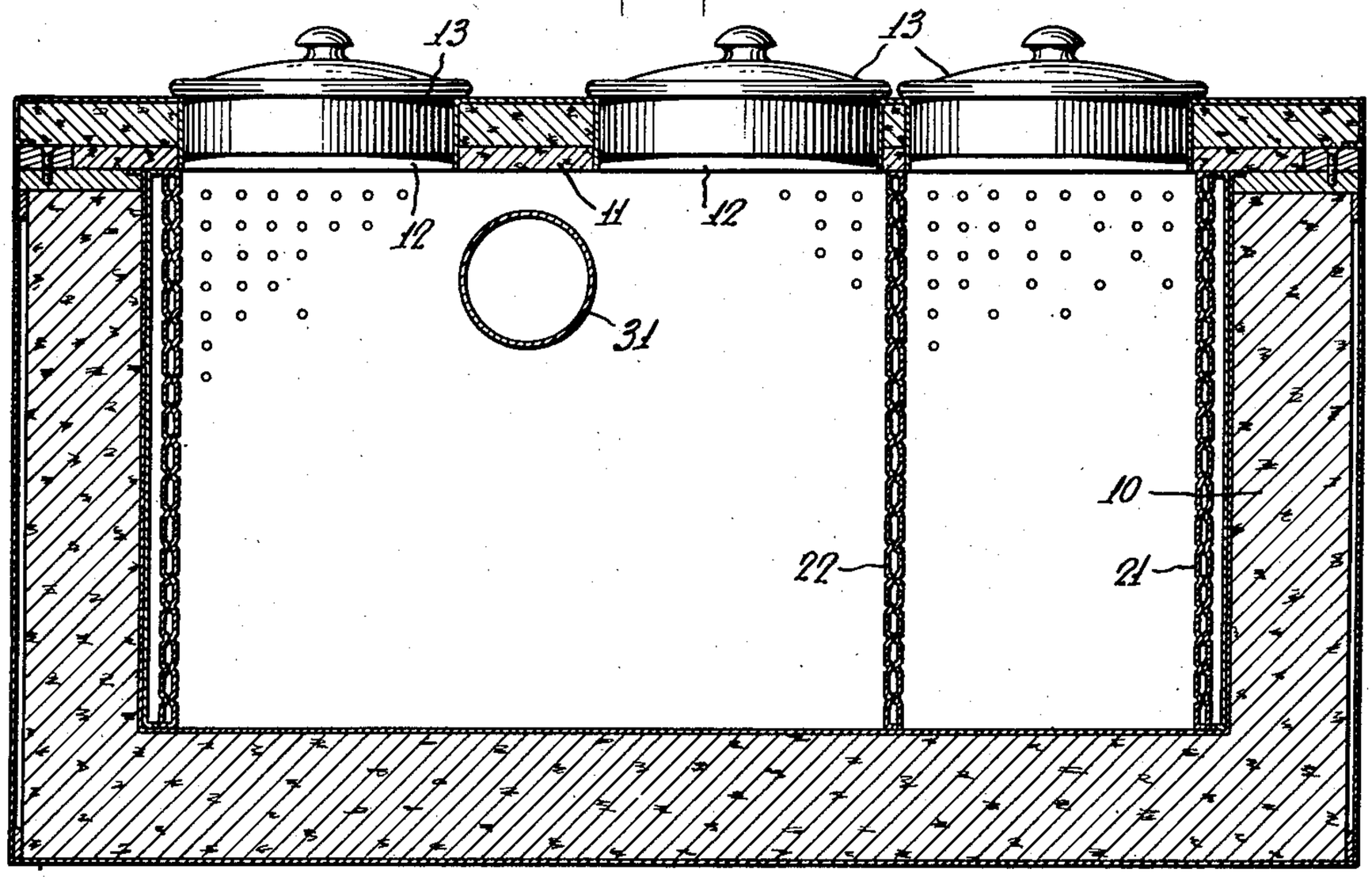


Fig. 3.

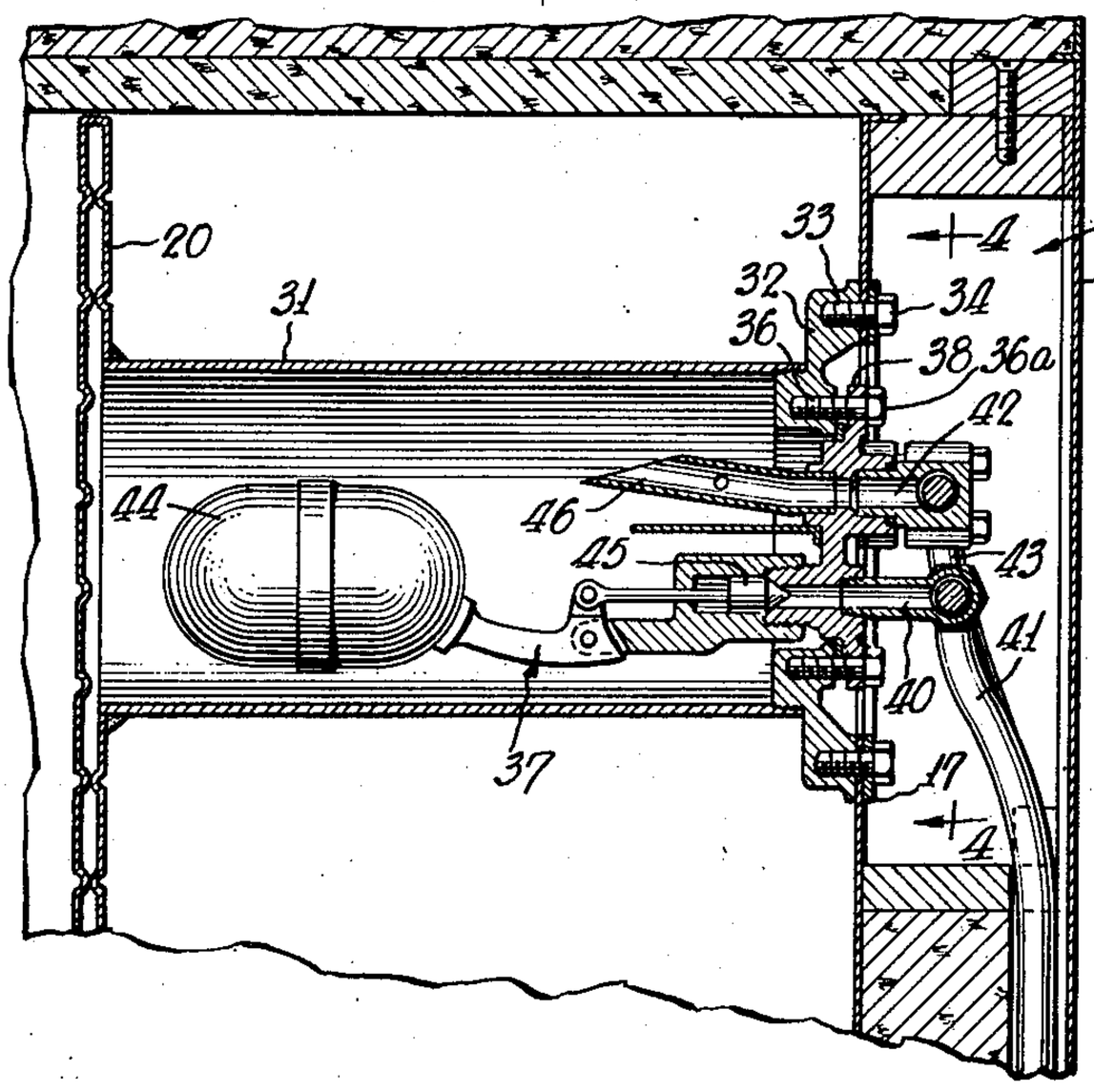
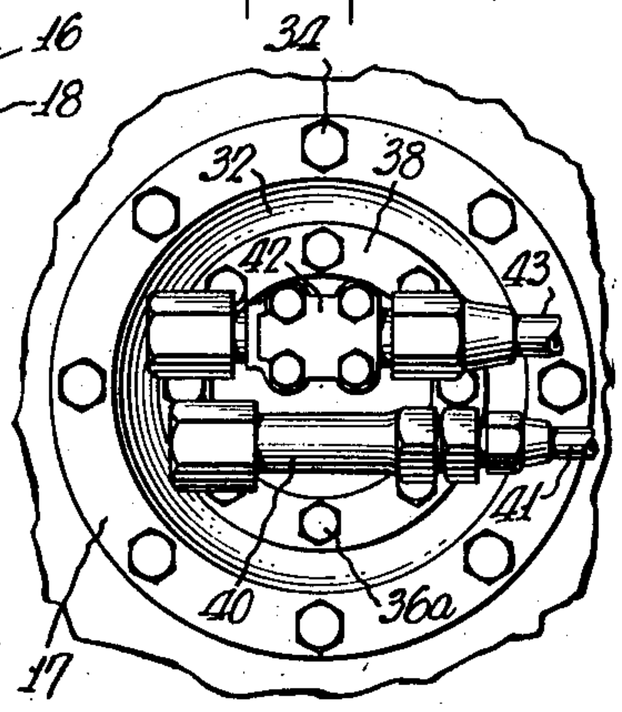


Fig. 4.



INVENTOR
Walter E. Carpenter
BY
Dunn, Fairbank, Hunt & Foster
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,022,489

REFRIGERATED STORAGE CABINET

Walter E. Carpenter, Belmar, N. J., assignor to The Dickerson Company, Newark, N. J., a corporation of New Jersey

Application May 11, 1935, Serial No. 20,939

15 Claims. (Cl. 62—126)

My present invention is concerned with improvements in refrigerated storage cabinets such for instance as the dispensing cabinet commonly employed in soda fountains or the like, for the storage and dispensation of bulk ice cream. The invention, however, is not limited to its usefulness in any particular type of cabinet but has a wide range of utility particularly in converting refrigerated storage compartments which have used other types of refrigerating means, into a modern dry refrigerating compartment.

A feature of the invention is the provision of a unitary refrigerating apparatus including a partition forming evaporators which may be placed in any standard cabinet having suitable heat insulating means, and which will permit the conversion of such cabinet in an effective refrigerating chamber.

More particularly the unit, in addition to the partition forming evaporator, includes a refrigerant reservoir freely communicating with the partition forming evaporator for flooding the latter, said reservoir embodying therein a removable, unitary float valve assemblage for maintaining a definite refrigerant level.

Many standard types of ice cream storage cabinets are in use, which involve can-encircling brine tanks, cooling coils in the brine tanks and a reservoir supplying refrigerant to the cooling coils. Such installations have proven highly unsatisfactory due to the fact that the brine eventually rusts or slowly seeps through the tank wetting the floor about the cabinet and causing a messy and unsanitary condition. By merely ripping out the brine tanks, cooling coils and boiler from such standard cabinets and bodily placing my improved unit in the cabinet and securing the reservoir to the cabinet by the same means previously employed for attaching the reservoir of a brine type unit to the cabinet wall, the unsatisfactory brine type cabinets may be quickly converted into dry cabinets.

My improved replacement unit which permits such conversion, is of extremely practical, rugged, durable construction, inexpensive to manufacture and convenient to install. While it is exceptionally useful for converting brine type cabinets into dry type cabinets, it may of course be built into a new cabinet at the factory. When used as new equipment, or when used to replace other equipment, it may always be bodily removed with expedition and facility for the purpose of inspection, repair or replacement of parts.

The invention may be more fully understood from the following description in connection with the accompanying drawings wherein:—

Fig. 1 is a perspective disassembled view showing a standard type of refrigerating cabinet from which the brine tanks and cooling coils have been removed, and the standard cover of the cabinet also removed. My improved unit consisting of the partition forming evaporation attached reservoir is shown apart from but ready to be placed in the cabinet, and the float valve is shown separate from the reservoir. In this view, the back plate of the cabinet, which conceals the channels for the refrigerant pipes, has been omitted.

Fig. 2 is a vertical longitudinal sectional view through a cabinet with my improved refrigerating unit in position,

Fig. 3 is a considerably enlarged vertical sectional view through the reservoir and the float valve unit, taken approximately on the line 3—3 of Fig. 4,

Fig. 4 is an end elevational detail on the line 4—4 of Fig. 3, and

Fig. 5 is an enlarged transverse sectional detail on the line 5—5 of Fig. 1 and illustrating a slight modification.

Fig. 1 illustrates a standard type of cabinet commonly used in connection with refrigerated brine systems. In this view the brine tanks and their cooling coils, and the reservoir which supplies the cooling coils, have been removed from the cabinet. The cabinet, indicated generally at 10, may have its side walls and bottom walls of any suitable insulating material, and the cabinet top 11, also of insulating material, is provided with the usual hatches 12 through which cans of ice cream may be lowered into position in the cabinet. These hatches are normally closed by insulating covers 13 (Fig. 2).

The rear wall of the cabinet is conventionally provided at the exterior thereof with a number of channels or grooves 14 extending in various directions from and communicating at their ends with a relatively deep recess 16 in the rear wall of the cabinet. Any of these grooves may accommodate the inlet and outlet ducts for refrigerant, depending upon which way these ducts may afford the shortest path to a compressor and condenser (not shown) and the purpose of the recess 16 is to provide access to the refrigerant connections between the ducts or conduits and the receiver which, in the standard brine type of system, is located on the inside of the box and secured by bolts or otherwise to an anchor ring 17 fixed in the inner wall of the recess 16. Of

course, when the back plate 18 (Fig. 3) of the cabinet is secured in position, the recess 16 and the grooves 14 and 15 will be concealed from view.

My improved partition forming evaporator follows in general constuction the type of evaporator illustrated in my copending application Serial No. 9,188, filed March 4, 1935. This evaporator, indicated generally at 19, includes a plurality of vertically extending, internally connected, thin, hollow, plate-like sections. Typically, one section 20 of the evaporator extends longitudinally of the cabinet between two rows of ice cream cans (not shown) therein. Transversely disposed evaporator sections 21 communicate with each end of the longitudinally extending section 20, and one or more additional evaporator sections 22 are adapted to be disposed betwen adjacent cans of the same row.

Preferably, each hollow plate-like evaporator section, all of which are intercommunicating, consists of a pair of closely spaced sheet metal members 23, 23 (Fig. 5) having their edges welded together, and each formed with a staggered series of complementary indentations 24, 24 which abut and are spot-welded together. The purpose of connecting the two sheets at a plurality of points is to adequately strengthen the relatively thin gauge sheets against separation under the internal gas pressures to which the evaporator sections are subjected.

Preferably, although not necessarily, each end section 21 constitutes the inner wall of chambers 25 formed by welding flat flanged plates 26 to the end sections 21. The chambers 25 are adapted to contain a freezable brine such as "Eutectic ice" or similar material, and the plates 26 which complement the evaporators to form these chambers are preferably braced by angle irons or other reinforcing means 27. With the form of invention shown in Fig. 5 the outermost metal sheet 28 of each end evaporator section 21 has no indentations therein, but its companion sheet 29 is more deeply indented as at 30 so that it may be spot-welded to the sheet 28. Thus, the "Eutectic ice" chambers have smooth inside walls.

Between one of the partition forming evaporator sections 22 and one of the sections 21 of the evaporator proper, the section 20 communicates with the inner end of a refrigerant reservoir or "boiler" consisting of a relatively massive tube 31. This tube is horizontally disposed, with its axis at right angles to section 20 and is preferably welded within an opening in the partition forming evaporator section 20 as seen in Fig. 3. To prevent this tube from interfering with the introduction of cans into the cabinet, extra spacing of certain hatchways is afforded. Screwed into the outer end of this tube is a metal adaptor ring 32 having openings or threaded recesses 33 therein adapted to register with openings in the anchor ring 17. Thus, through the medium of the ring 32 the entire evaporator unit may be readily connected to the wall of the cabinet by simply passing the screws 34 through the openings 35 in the ring 17 and into the prepared sockets 33 in the ring 32.

The ring 32 is likewise provided with a series of sockets 36 disposed inwardly of the periphery of the tube, and a standard float valve 37, such as that illustrated in the disassembled view of Fig. 1 and in greater detail in Fig. 3, may be readily secured in position to close the central opening in the ring 32 by passing screws 36a through the openings in the flange 38 of the circular mounting plate for the float valve assemblage 37 and into the sockets 36 of the ring 32. The ring 32 is, in effect, an adaptor to permit the coupling of the tube 31 to the anchor ring 17 and to permit the mounting of the float valve unit within the tube 31.

The float valve unit may be of entirely conventional construction, having an inlet fitting at 40 for attachment to the refrigerant inlet conduit 41, and having an outlet fitting at 42 for attachment to the refrigerant outlet conduit 43. The flow of liquid refrigerant into the tube is controlled by a float 44 actuating a needle valve 45, and the flow of gases from the tube above the liquid level therein, is through an outlet pipe 46 communicating with the outlet fitting 42.

The operation of the device will be more or less self-evident from the foregoing description but may be briefly summarized as follows:—

The partition forming evaporator is flooded from the receiver or boiler 31 in which the liquid level is always maintained constant, the gases being drawn off through the pipe 46. The purpose of using the additional eutectic ice chambers is to render the refrigerating cycles less frequent, the eutectic ice or brine becoming frozen during the operation of the compressor and slowly melting during the time that the compressor is idle.

In applying my improved unit to an ice cream cabinet lined with brine tanks and having cooling coils in the brine tanks, the cabinet cover 11 is removed and the brine tanks and cooling coils and the reservoir which supplies refrigerant to the cooling coils are removed. The inner metal lining of the tank which will have been somewhat corroded by contact with the refrigerant, may be repainted with aluminum paint. My improved unit is bodily inserted into the cabinet and secured to the anchor ring. The float valve unit may then be bodily inserted into the tube and secured, the standard inlet and outlet ducts 41 and 43 coupled to the float valve unit, the cover 11 replaced, the back plate 18 which has also been originally removed reapplied, and the system ready for operation as soon as the refrigerant is flooded into it. Ordinarily, in converting a cabinet, the original refrigerant will be withdrawn and stored until my new unit is in position, and then pumped back into the unit. The operation of converting the cabinet may be accomplished with expedition and facility.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which apparatus in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed refrigerant reservoir com-

municating at its inner end with one of said sections.

2. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a refrigerant reservoir communicating at one end with one of said sections, the other end of said reservoir being fixed to the wall of the cabinet.

3. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, the outer end of said reservoir being fixed to the wall of the cabinet, and refrigerant supply and take off connections for said reservoir accessible from the exterior of said cabinet.

4. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, the outer end of said reservoir being fixed to the wall of the cabinet, and refrigerant supply and take off connections for said reservoir accessible from the exterior of said cabinet, a unitary float valve assemblage secured in the outer end of said reservoir to close said end, said fittings being carried by said float valve assemblage.

5. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, an annular adaptor element fixed at the outer end of the tube including an outer portion to be secured to the cabinet wall and an inner portion to receive a removable closure plate.

6. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, an annular adaptor element fixed at the outer end of the tube including an outer portion to be secured to the cabinet wall and an inner portion to receive a removable closure plate, a closure plate removably mounted in said adaptor element, a float valve assemblage carried by said mounting plate and disposed within the reservoir.

7. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, an annular adaptor element fixed at the outer end of the tube including an outer portion to be secured to the cabinet wall and an inner portion to receive a removable closure plate, and fittings to receive refrigerant conduits carried by said plate and inaccessible from the interior of said cabinet.

8. An evaporator and reservoir unit for refrigerated storage cabinets including a partition-forming evaporator including a plurality of upstanding intercommunicating hollow plate like members and a refrigerant reservoir communicating freely at one end with one section of the evaporator for flooding the latter and adapted to have its other end anchored to the cabinet wall.

9. An evaporator and reservoir unit for refrigerated storage cabinets including a partition-forming evaporator including a plurality of upstanding intercommunicating hollow plate like members and a horizontally disposed refrigerant reservoir communicating freely at one end with one section of the evaporator for flooding the latter and adapted to have its other end anchored to the cabinet wall, an adaptor member carried by said last mentioned end of the reservoir having means to mount a removable closure plate and means concentric therewith for attachment to the cabinet wall.

10. An evaporator and reservoir unit for refrigerated storage cabinets including a partition-forming evaporator including a plurality of upstanding intercommunicating hollow plate like members and a horizontally disposed refrigerant reservoir communicating freely at one end with one section of the evaporator for flooding the latter and adapted to have its other end anchored to the cabinet wall, an adaptor member carried by said last mentioned end of the reservoir having means to mount a removable closure plate and means concentric therewith for attachment to the cabinet wall, a closure plate removably secured to said adaptor member, a liquid inlet and gas outlet fitting mounted exteriorly of said closure plate.

11. An evaporator and reservoir unit for refrigerated storage cabinets including a partition-forming evaporator including a plurality of upstanding intercommunicating hollow plate like members and a horizontally disposed refrigerant reservoir communicating freely at one end with one section of the evaporator for flooding the latter and adapted to have its other end anchored to the cabinet wall, an adaptor member carried by said last mentioned end of the reservoir having means to mount a removable closure plate and means concentric therewith for attachment to the cabinet wall, a closure plate removably secured to said adaptor member, a liquid inlet and gas outlet fitting mounted exteriorly of said closure plate and a float valve assemblage carried by and bodily removable with said plate and disposed within the reservoir and controlling the admission of refrigerant thereto.

12. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, at least one of said partition forming members constituting a wall of a compartment adapted to contain a freezable brine.

13. An evaporator and reservoir unit for refrigerated storage cabinets including a partition-forming evaporator including a plurality of upstanding intercommunicating hollow plate like members and a horizontally disposed refrigerant reservoir communicating freely at one end with

one section of the evaporator for flooding the latter and adapted to have its other end anchored to the cabinet wall, certain of said partition-forming members constituting the inner walls of thin vertical compartments adapted to contain a freezable brine.

14. A refrigerating storage cabinet having hatchways in its top and a flooded partition-forming evaporator disposed within said cabinet and including a plurality of vertically disposed thin hollow intercommunicating plate like sections, a horizontally disposed tubular refrigerant reservoir communicating at its inner end with one of said sections, an annular adaptor element fixed at the outer end of the tube including an outer portion to be secured to the cabinet wall and an inner portion to receive a removable closure plate, and a float valve assemblage carried by and bodily removable with said plate and disposed within the reservoir and controlling the admission of refrigerant thereto.

15. An evaporator and reservoir unit for refrigerated storage cabinets including a partition-forming evaporator including a plurality of upstanding intercommunicating hollow plate like members and a refrigerant reservoir communicating freely at one end with one section of the evaporator for flooding the latter.

WALTER E. CARPENTER.