April 27, 1943. H. F. ZIMMERMAN 2,317,871

PORTABLE REFRIGERATOR CONTAINER

Filed Oct. 30, 1940 2 Sheets-Sheet 1

Fig. 1

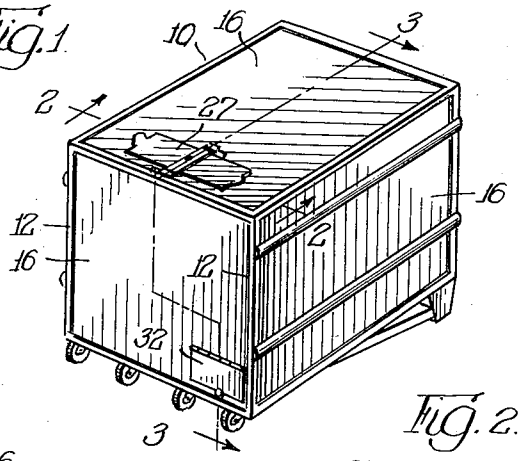


Fig. 4

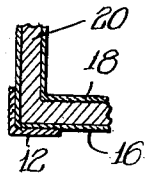
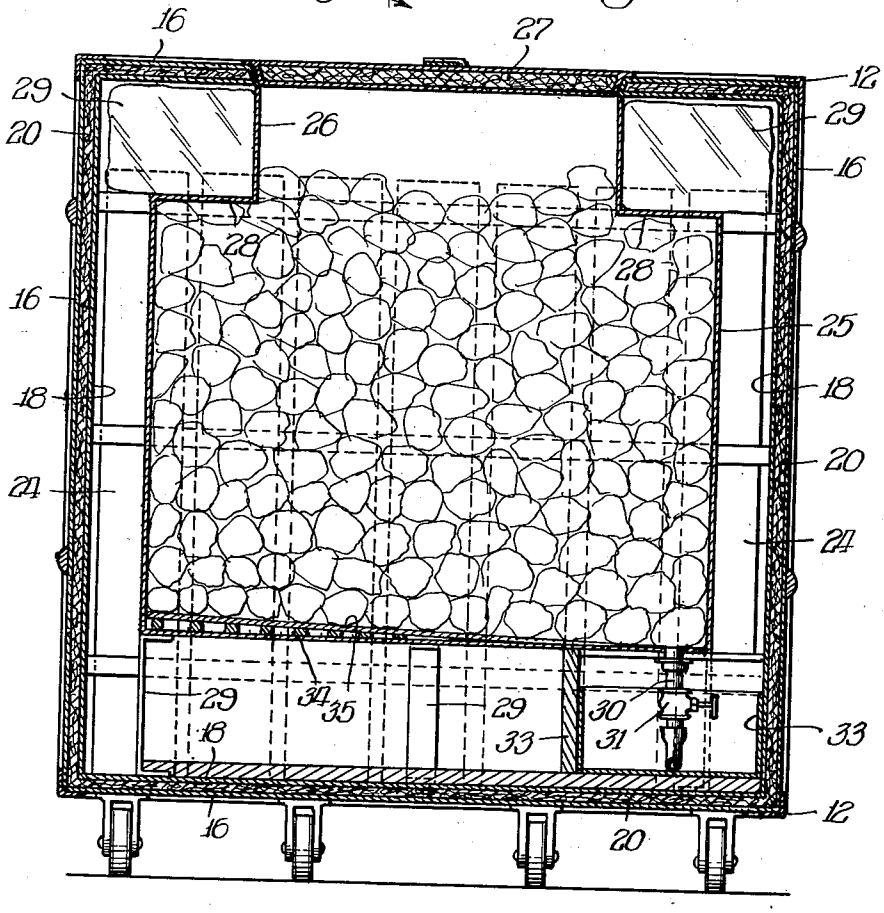


Fig. 2.



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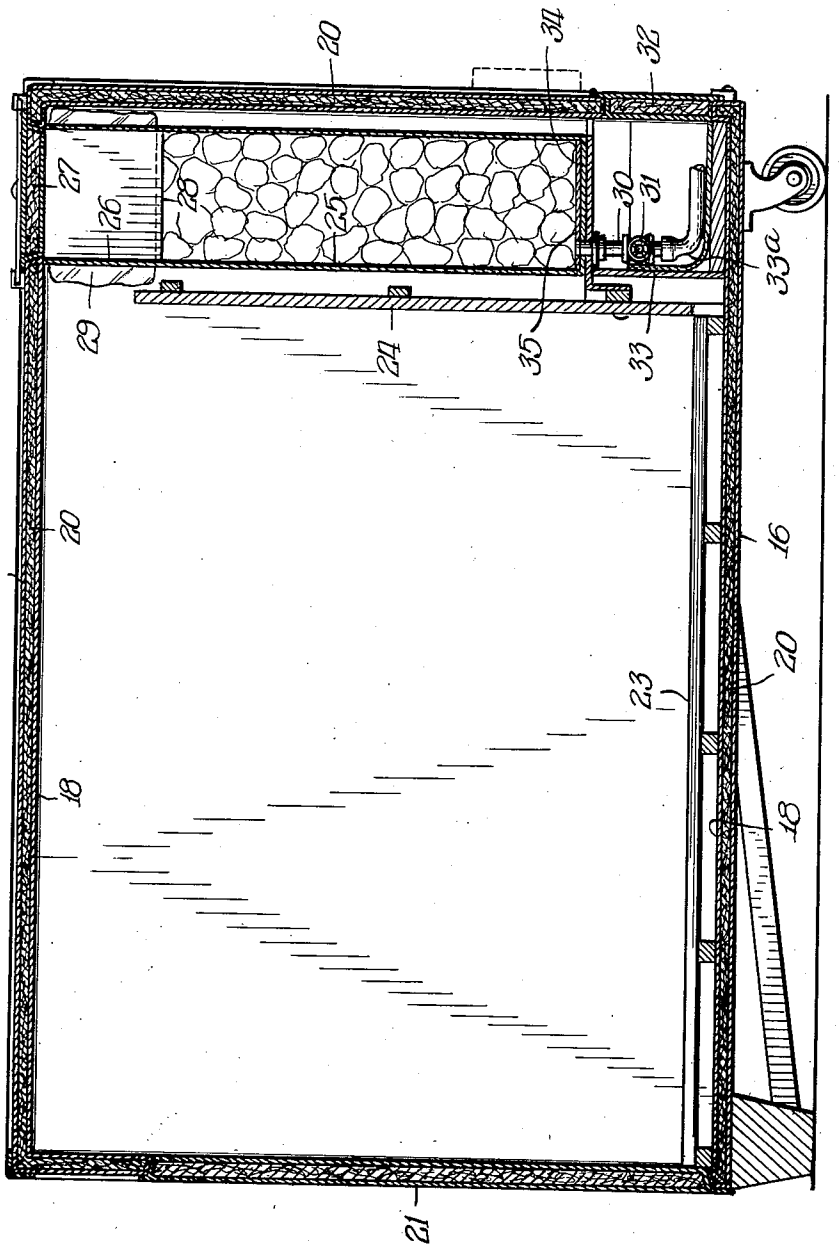


Fig. 3.

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UNITED STATES PATENT OFFICE

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PORTABLE REFRIGERATOR CONTAINER

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4 Claims. (Cl. 62—91.5)

The present invention relates to improvements in portable refrigerator containers and more particularly to containers useful in railway, truck, ship and airplane transportation of perishable goods which must be kept at a substantially constant rate of temperature above or below the freezing point.

Heretofore refrigerator freight cars have been widely used for transporting perishable goods from one place to another with wet ice bunkers used as the medium for keeping the goods from freezing in the winter and from spoiling in the summer. Refrigerator cars are relatively more expensive than ordinary freight cars and can operate economically only with carload lots.

In recent years there has been a tremendous advance in frozen foods but there has been a great problem created in transporting these frozen foods without spoiling. The ordinary refrigerator car cannot achieve nor maintain a temperature sufficiently low for the shipment of this class of perishable goods. Moreover, shippers of perishable goods, whether frozen or not, have been handicapped by the relatively high freight charges for less than carload lots.

When smaller chests or containers have been used with ice or brine as the refrigerant, difficulty has been found in draining the brine mixture off at the end of the trip or for recharging. If the drain pipe extends exteriorly of the container, moisture seeps into the insulation around the pipe and destroys its insulating value and creates sour and distasteful odors. The drain pipe is also subject to breakage and damage in moving the container from place to place. In such structures, switching of cars will often dislodge other goods in a freight car causing them to knock against projecting portions of a container such as a drain pipe, damaging or breaking it. Should the drain pipe become broken, the brine mixture may leak out, destroying other goods in the car.

Where solidified carbon dioxide, such as "dry ice" has been inserted within containers heretofer used there has been a loss of efficiency in confining its main effect to a small portion of the container and freezing goods at that part while permitting spoiling of foods at other points. The present invention has overcome these difficulties and provides an efficient structure that may be used in transporting less than carload lots of perishable goods whether frozen or unfrozen and utilizing either ice, brine or solidified carbon dioxide as the refrigerant.

One object of the present invention is to provide a structure that will maintain substantially predetermined temperatures for long periods of time for use in the shipment of perishable goods.

Another object of this invention is to provide a structure that will permit the shipment of perishable goods in ordinary unrefrigerated freight cars and in less than carload lots.

A further object is to provide a strong durable refrigerator container that is portable, will withstand rough treatment, and may be used for perishable goods whether frozen or not.

A still further object is to provide a refrigerator container that may be easily drained when refrigerated by a liquid mixture without possible injury to the insulating material of the container and with little or no loss of internal temperature during draining and recharging.

In the drawing

Fig. 1 is a perspective view of the rear, top and side portions of a container of this type;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged fragmentary view through one corner of the container.

To accomplish the objects of this invention applicant preferably provides a container of rugged construction such as a reinforced welded sheet steel exterior and a watertight interior wall spaced from the exterior wall by an ample amount of insulating material that may be of many well-known types. Preferably a substantially large radiating or reflecting means for the refrigerant, such as ice, brine or solidified carbon dioxide, is provided to cause a uniform distribution and circulation of properly conditioned air. As shown in the drawing, this may be established through the medium of a brine tank that may be properly spaced from the container walls for air circulation purposes. Protection should be afforded to the tank and reflecting surface to prevent roughly handled goods from damaging them.

For draining the brine tank, preferably the discharge tube terminates within the container proper itself so that no pipes extend through the insulated walls to destroy or contaminate the insulation and the tube thus is also protected from damage. Drainage is afforded through a separate small insulated opening in the container by which change of temperature in the container is reduced to a minimum. To prevent a draft from passing through the container

should the large door be opened during drainage, baffling, insulating or draft checking means are mounted therearound in proper relation to the drain pipe and opening.

With reference to Figs. 1 and 4 of the drawings it will be seen that the container is constructed of heavy angle iron uprights 12 and cross-members 14 to the interior of which are welded or otherwise secured the sheet steel plates 16. The inner walls of the container are formed of other steel sheets 18 properly supported and insulating material 20 fills the spaces between sheets 16 and 18 to make a completely insulated box.

A large opening is provided at one end of the container for the entry and removal of goods to be shipped therein, and this is normally closed by a heavily insulated door 21 supported on hinges. Resting upon the floor of the container is a raised slatted wooden floor member 23 to keep goods from resting in water or touching the container as such contact prevents free circulation of refrigerated air. Similar slatted members may be placed on the side and end walls to insure proper circulation of air in, around and among the goods at all times. It has been found that where the goods touch the container walls, thus shutting off circulation, there may be some spoilage of the goods at the point of contact regardless of the refrigerant used or the qualities of the insulation.

At the end of the container opposite the door 21 is positioned the refrigerating means formed, as shown, as an ice bunker 25 which may be made generally rectangular in shape with the relatively narrow neck or charging portion 26 attached to the top side of the container around the edges of a hatch or opening closed by the insulated door 27. The bunker 25 is spaced from the interior wall of the container to permit free circulation of air entirely around the same except at its junction with the hatch opening. A slatted or perforate protecting wall 26 is mounted in front of the bunker 25 and spaced therefrom to insure circulation of air between the bunker and the goods stacked in front of the wall 24 for transportation.

The use of the narrow neck portion 26 not only affords a smaller charging part, thus saving in temperature loss when the hatch 24 is opened, but also permits the formation of supporting means or shoulders 28 upon which solidified carbon dioxide 29 may be mounted for maintaining extremely low temperatures within the container through the rapid absorption of heat from the tank in intimate contact therewith. When this last mentioned material is used as a refrigerant it is placed on the shoulders 26 in intimate contact with the metal of the tank 25 at both the shoulders 28 and the neck 26. Because of the large metallic area of the tank 25, the refrigerating not only effectively cools through circulation of air around it, but by cooling the tank through absorption of heat therefrom, it creates a relatively large extended cooled area, thus more evenly and rapidly distributing the cooled air throughout the same through circulation and further absorption.

CO_2 gas given off by the "dry ice" is heavier than air and consequently travels downwardly within the container. Applicant prefers, therefore, to place the support for the "dry ice" relatively high in the container and with respect to the extended tank heat absorption area in intimate contact therewith. The protecting wall 26 may extend upwardly sufficiently high enough to permit the "dry ice" to be inserted upon the shoulders 28 from the interior of the car and to hold the same in place against the jolting and rocking motion of a car.

Where applicant's radiating medium 25 is not used with solidified carbon dioxide and the package is merely placed on the floor or on the goods, portions of the container are found to be extremely cool while other portions are relatively warm. Even temperatures are more easily maintained throughout the entire container by the use of the extended conducting heat absorbing surface in contact with the supporting means described.

The tank may be supported spaced from the floor of the container by the leg members 29. Adjacent one end of the tank 25 is the downwardly depending tank drain member 30 having the shut-off valve 31 mounted therein. As shown this drain member or pipe 30 terminates within the container proper and does not pass through any wall of the same adjacent the insulation where water of condensation or leaks around its edges might destroy the insulation or create foul odors.

Access to the drain pipe 30 is had through a small opening in the wall of the container closed by the insulated door 32 and a flexible hose member may be attached to the pipe 30 that may be withdrawn through the door 32 for drawing off the brine mixture at the end of a trip or for recharging the tank. By confining the pipe 31 within the container it will not be carelessly knocked off or damaged by striking against some object while the container is moved from place to place about a dock, wharf or railway car.

To prevent escape of air from the container when the drain door 32 is opened, baffling means is provided adjacent the door and pipe 31. This may be done by placing baffle boards 33 around the drain pipe 31 adjacent the door 32 so that there is no path for air to flow from the container out the door 32 should the door 21 be opened at the same time and so that air from the exterior of the container cannot reach the refrigerating compartment proper of the container when the door 32 is open. By the use of these baffling boards 33 a baffle or drain compartment is formed around the drain pipe to which access may be had only from the exterior of the container except where drastic repairs or overhauling are necessary. By the use of this compartment the door 32 need not be sealed or locked to prevent pilfering of goods within the container. The top of the compartment is preferably not insulated so that condensation on the tank or drain member may drop towards the floor of the drain compartment and may flow out the door 32 by means of the sloping tray member 33a. It may be covered by a condensation collecting tray (not shown) acting as a further baffle, if so desired.

For ease in draining the tank 25 and yet for ease of installation in mass production the bottom of the tank may be formed with a regular squared bottom member 34 having a false draining bottom 35 therewithin sloping downwardly toward the drain opening 31 forming a sloping inner drain wall member. Thus support for the tank may be figured upon a normal rectangular tank and yet efficient drain facilities will be provided. Small ribs or studs 36 may be used to mount the member 35 in its sloping position.

With reference to Fig. 3 it will be noted that

the drain door 32 is shown as hinged at the top rather than at the side. If through carelessness the door 32 is not latched shut, it will swing downwardly and hold itself substantially closed. It may be so mounted and weighted that the maximum amount of the door remaining open or extending beyond the exterior wall 16 of the container will nevertheless be within the outward projection of the adjacent upright 12 to protect the door from injury or damage. Thus if the upright 12 will pass an object, the door 32 will pass the same object without being torn off While the door might be hinged at its side, care must be taken to fasten the same or it may be broken or damaged in moving the container.

For the sake of simplicity the support of the inner walls 18 from the walls 16 is not shown. It will be understood that this is in a manner that will break up any paths of heat conductivity. For the same reason, at the openings closed by the doors 21, 27 and 32 respectively the outer sheet material is shown as joined with the inner sheet material. Since this forms no part of the present invention this is shown in this manner. In actual use wood, rubber, or other non-conductors of heat would be inserted at these places between these walls to insure against loss of heat through conduction.

Various modifications of structure, without departing from the scope and spirit of the invention, will be apparent to those skilled in the art from a study of this description and the drawings. All such modifications are intended to be included within the scope of the appended claims.

I claim:

1. In a portable refrigerator container having insulated walls, a large opening for the insertion and removal of goods in one of the walls and a relatively small opening for the insertion of ice in another wall, an ice tank having a large metallic heat conducting surface mounted in said container spaced from said insulated walls and said goods, said tank having a neck portion adapted to fit into said ice opening and a substantially larger body portion for receiving and holding an ice charge through said neck portion, and supporting means for solid carbon dioxide formed in said tank exteriorly thereof for holding solid carbon dioxide in intimate heat absorbing contact with said surface.

2. In a portable refrigerator container having insulated walls and a large opening for the insertion and removal of goods in a side wall and a smaller opening in the top side wall for the insertion of ice with insulated doors for said openings, an ice tank mounted in said container spaced from the insulated walls and from said goods, said tank having a watertight connection with said ice opening, a drain member extending downwardly from said tank and terminating within said insulated walls, and a baffle chamber mounted around said drain member, said baffle chamber having an opening through one of said insulated walls for access to said drain member from the exterior of said container, and an insulated door closing said chamber opening.

3. A portable refrigerator as defined in claim 2 wherein the door for the baffle chamber opening is hinged at its top to tend to swing closed at all times.

4. In a refrigerator container having insulated walls and an ice bunker, a drain member for said ice bunker terminating within said container and spaced from said insulated walls, a baffle member mounted adjacent said drain member and isolating the same from the remainder of the container, one of said insulated walls having an opening adjacent said drain member for access from the exterior of the container, and a door for said opening.

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