

Sept. 16, 1941.

C. D. BONSALL

2,256,376

REFRIGERATOR CAR STRUCTURE

Filed July 24, 1939

5 Sheets-Sheet 1

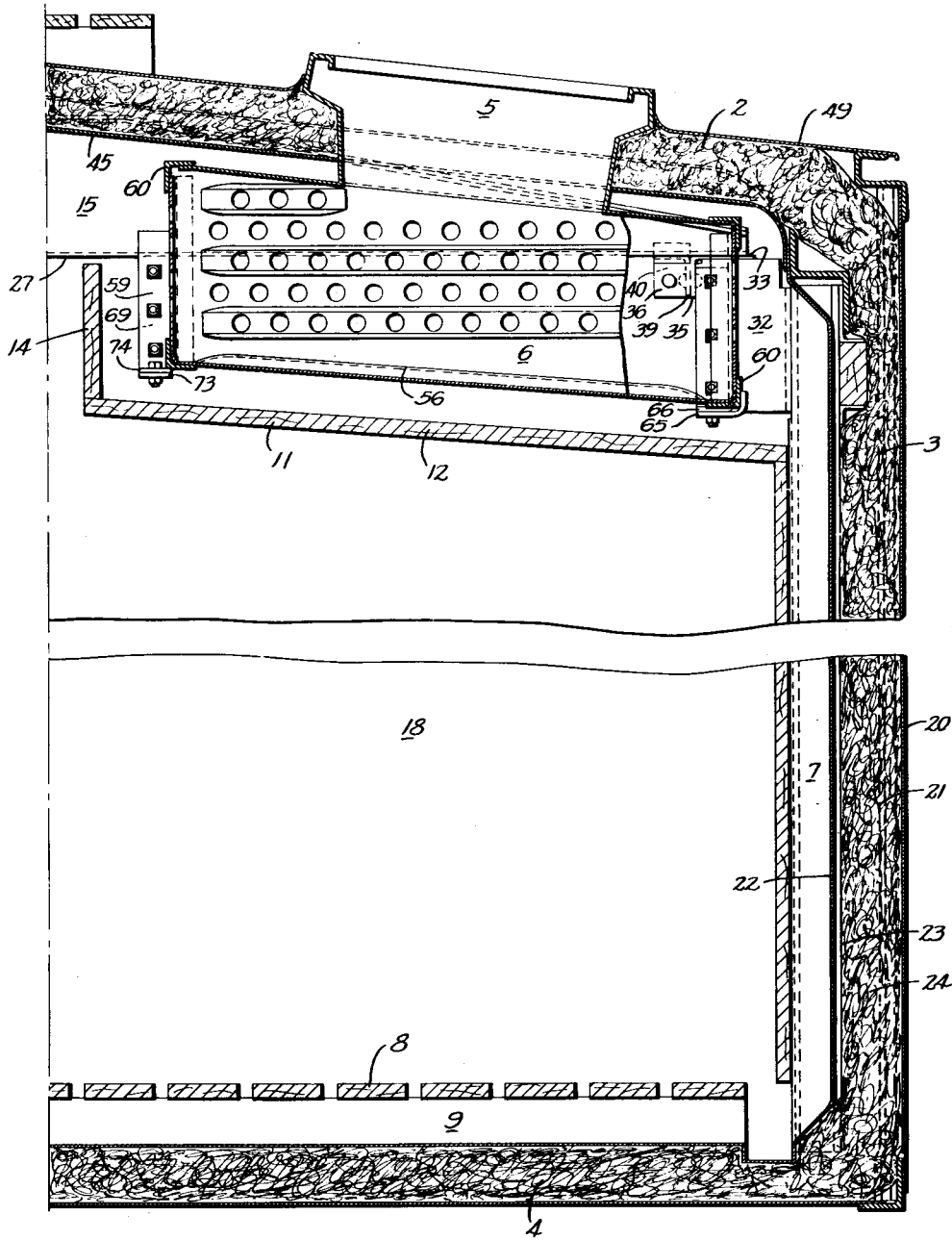


Fig. 1

Inventor:
Charles D. Bonsall
Quintan Edwards
Attorney

Sept. 16, 1941.

C. D. BONSTALL

2,256,376

REFRIGERATOR CAR STRUCTURE

Filed July 24, 1939

5 Sheets-Sheet 2

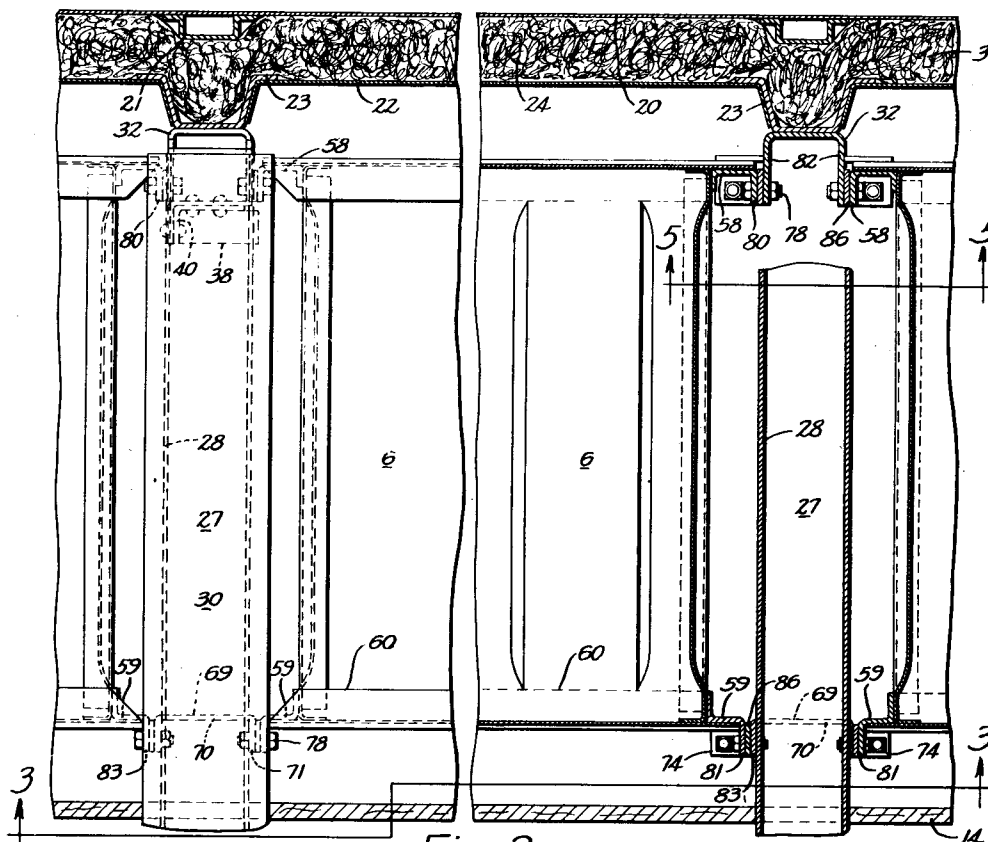


Fig. 2

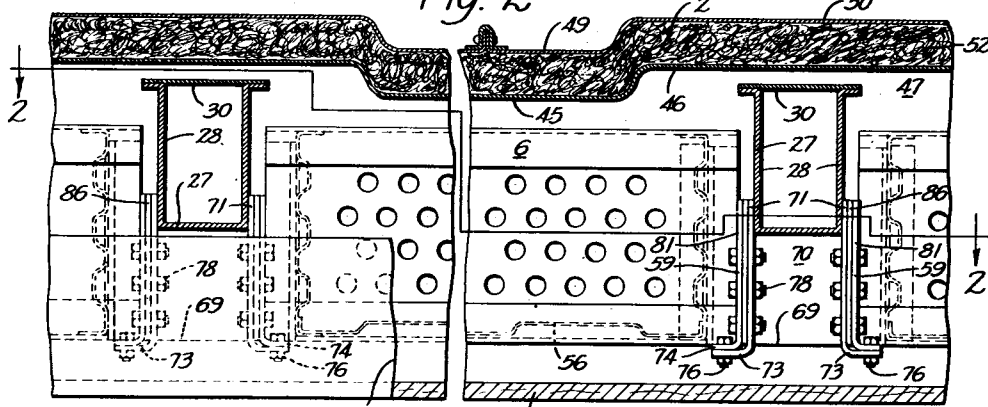


Fig. 3

Inventor:
Charles D. Bonsall
Anton Ed. Sisson
Attorney

Sept. 16, 1941

C. D. BONSELL

2,256,376

REFRIGERATOR CAR STRUCTURE

Filed July 24, 1939

5 Sheets-Sheet 3

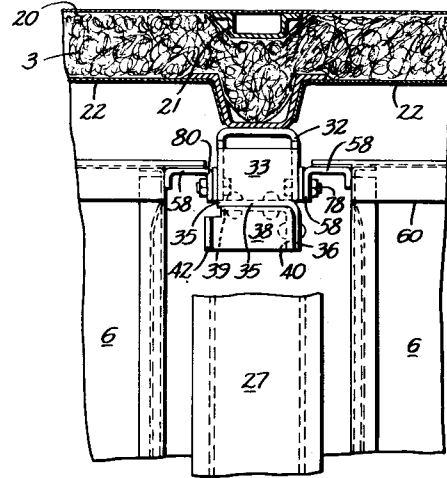
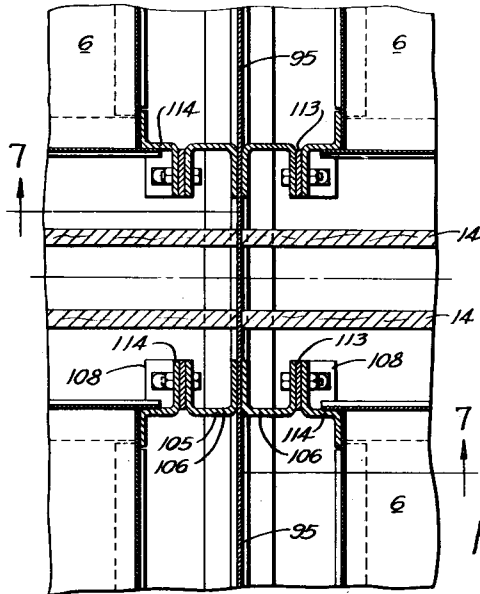


Fig. 6

Fig. 4

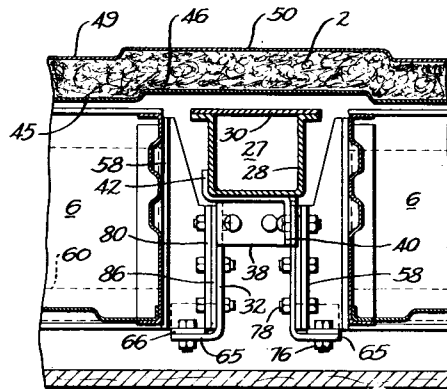
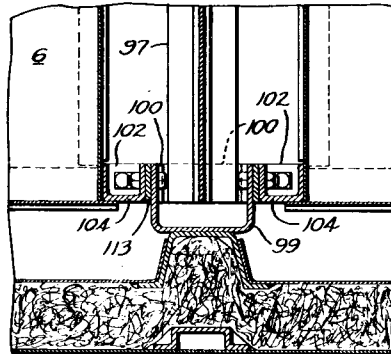


Fig. 5

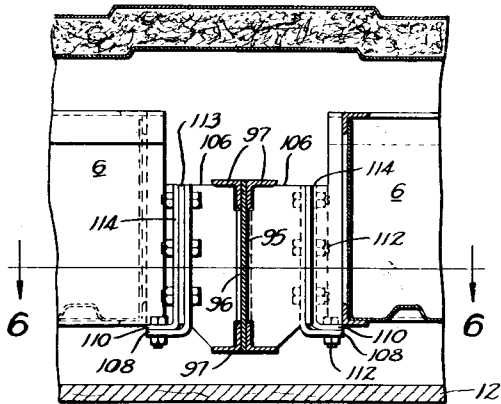


Fig. 7

Inventor:
Charles D. Bonsall

Autoulin
Attorney

Sept. 16, 1941.

C. D. BONSCALL

2,256,376

REFRIGERATOR CAR STRUCTURE

Filed July 24, 1939

5 Sheets-Sheet 4

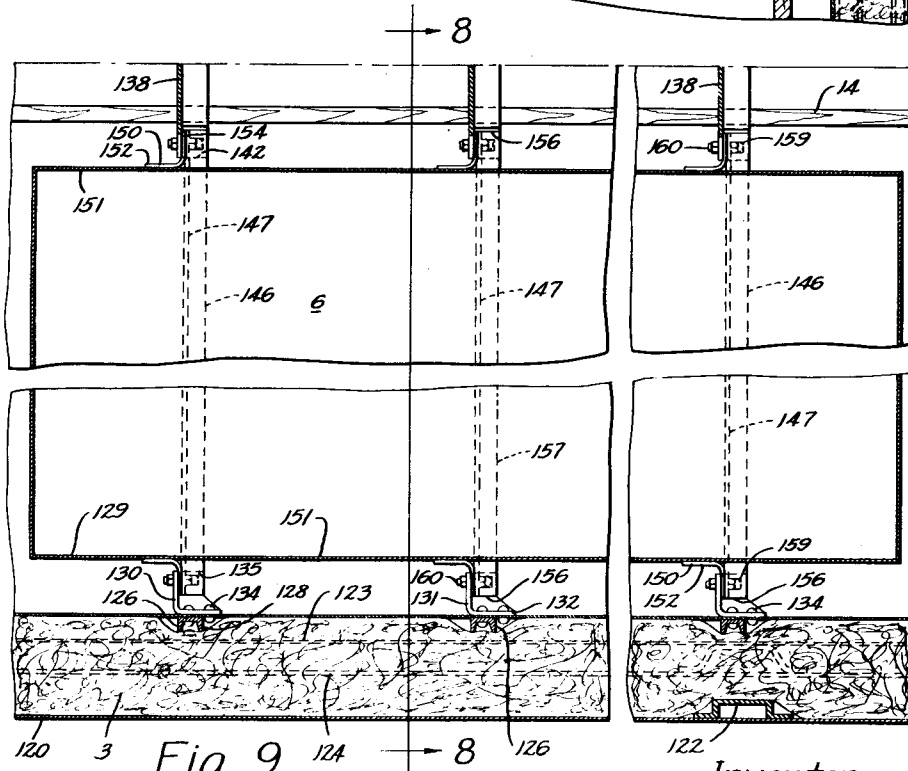
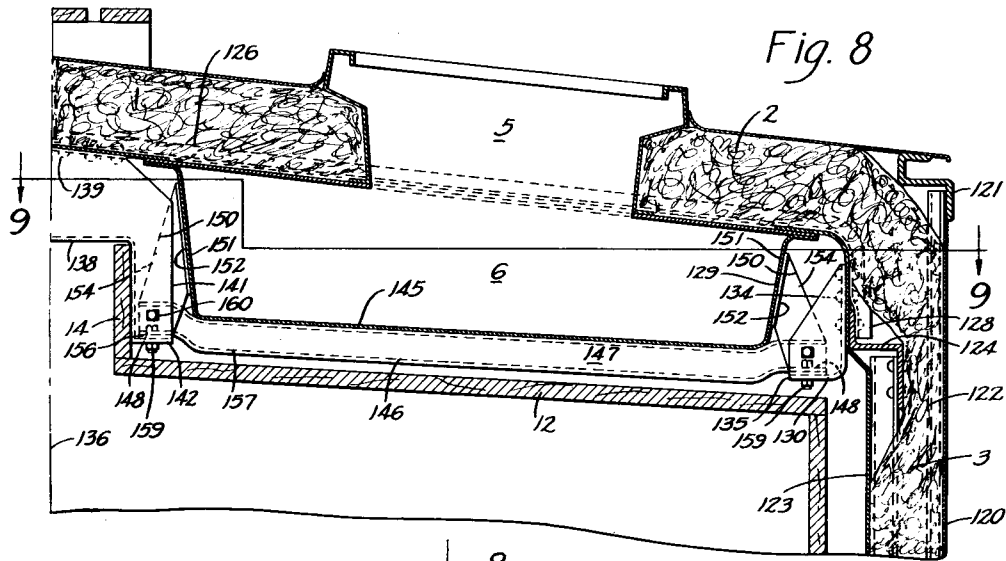


Fig. 9

Inventor:
Charles D. Bonsall
Charles D. Bonsall
Attorney

UNITED STATES PATENT OFFICE

2,256,376

REFRIGERATOR CAR STRUCTURE

Charles D. Bonsall, Pittsburgh, Pa., assignor to
Standard Railway Devices Company, a corporation of Delaware

Application July 24, 1939, Serial No. 286,138

13 Claims. (Cl. 62—17)

This invention relates to refrigerator cars used to transport perishable commodities at a predetermined temperature. The essential features of a refrigerator car are an insulated body to prevent or retard ingress of heat during warm weather and egress of heat during cold weather and a cooling means and a heating means to be used during warm and cold weather respectively.

This invention applies particularly to cars in which the cooling means, preferably containers for water ice, eutectic ice, brine or dry ice, are disposed immediately below the roof of the car. The lading is supported in spaced relation to the floor by a foraminous rack. Flues, preferably associated with the side walls of the car, communicate between the cooling means and the space under the floor rack to provide a path for the circulation of air. The path is from the cooling means downwardly through the aforementioned flues, through the space under the floor rack, upwardly through the lading compartment thereby cooling the lading, and finally to the cooling means from where the cycle is repeated.

The refrigerant used in a car of this type usually weighs as much as several tons so that it is essential that the structure supporting the refrigerant have considerable strength. In addition to the dead weight of this mass there are dynamic forces of great magnitude, both vertically and horizontally, which are caused by acceleration and deceleration of the car and by sudden starting and stopping as well as swaying of the car. The hazards in a car of this type due to the above conditions are particularly great because of the danger of the containers dropping from their overhead position onto the lading.

It is also essential, in addition to having the tanks securely supported, to have them supported so that they may be readily removed and replaced. Damage to the tanks may be caused by the shifting of the great mass of refrigerant or by the impact which occurs when large pieces of refrigerant are dropped through the hatches into the containers. Corrosion is another factor which necessitates the containers being readily removable and replaceable. Salt, which is often used with the refrigerant, has a very corrosive effect on many materials and often results in rapid deterioration.

It is an object of the invention to support the containers on a solid base; that is, one in which the weight of the refrigerant and the refrigerant container is supported by substantially horizontal

surfaces resting upon other such surfaces. This is considered an improvement over a construction in which the containers are supported by the shear strength of bolts or rivets. Another object is to provide means for bracing the refrigerant containers against the lateral thrusts which occur due to the inertia of a shifting refrigerant in the container. A further object of the invention, in addition to bracing the containers against horizontal and vertical thrusts, is to provide means by which the containers may be lowered vertically out of position after a relatively small lateral movement thereof.

Drip pans, which are usually disposed below the containers, commonly have, for a purpose to be hereinafter described, partitions upstanding therefrom at certain edges thereof. It is essential for the protection of the lading from liquid that the joint between the drip pans and the partitions be watertight. An object of the invention is to provide carlines for supporting the containers, said carlines being disposed near the roof of the car so that substantially all of the aforementioned partitions are below the carline, thereby eliminating the necessity of a watertight joint between the partitions and carlines.

In the drawings:

Fig. 1 is a transverse section through a refrigerator car embodying my invention.

Fig. 2 is a plan section of the car shown in Fig. 1, the left part of Fig. 2 being above the container and the right part of Fig. 2 being a section through the container and carline.

Fig. 3 is a longitudinal section of the upper part of the car shown in Figs. 1 and 2 as indicated by the line 3—3 in Fig. 2.

Fig. 4 is a plan view similar to a portion of Fig. 2 but having part of the carline broken away to show the details of the attachment thereof to the side wall of the car.

Fig. 5 is a section on line 5—5 of Fig. 2.

Figs. 6 and 7 are horizontal and vertical sectional views, respectively, of a car equipped with a modified form of carline.

Fig. 8 is a transverse section of the upper part of a refrigerator car embodying a modified form of my invention.

Fig. 9 is a plan section through the tank of the refrigerator car shown in Fig. 8.

Fig. 10 is a plan view from above the tank showing another modification of my invention.

Fig. 11 is a longitudinal section of the car shown in Fig. 10 as indicated by the line 11—11 in Fig. 10.

The general parts of the refrigerator car shown

are insulated roof 2, side wall 3, floor 4, hatch 5, refrigerant container 6, side wall flue 7, foraminous floor rack 8 and space 9 between rack 8 and floor 4. A refrigerant container 6 is positioned directly below the roof 2 and adjacent the side wall 3. A drip pan 12 is provided below the container 6 and a partition 14 is secured in an upstanding position at the edge of the drip pan 12. The drip pan 12 and partition 14 cooperate with the roof 2 and side wall 3 to form an enclosing structure 11 around the container 6, an air inlet opening 15 being provided by spacing the partition 14 from the roof 2. An air discharge opening 17 which leads to the flue 7 is formed by spacing the drip pan 12 from the wall 3.

Air circulation is as follows: Air in the lading compartment 18 is warmed by contact with the lading and rises to enter the enclosing structure 11 through the air inlet opening 15. The air is cooled by contact with the refrigerant container 6 and falls by reason of its greater density through the discharge openings 17 and flue 7 to the space 9 whence it rises through the rack 8 to the lading compartment 18. Cars of this type usually have a row of refrigerant containers near each wall and directly below the roof so that air flowing from the lading compartment flows between the containers disposed on opposite sides of the car.

In the form of my invention shown in Figs. 1-5, inclusive, the side walls 3 of the car comprise outer sheathing 20, outer posts 21, inner sheet 22, inner posts 23 and insulation 24 between the outer sheathing 20 and the inner sheet 22. Carlines 27 for supporting the refrigerant containers 6 preferably comprise a channel-shaped member 28 and a cover plate 30 secured to the top of the channel 28, the carlines 27 extending between and being secured to the side walls 3 of the car. Means for supporting the carlines consist of channel-shaped brackets 32 secured to the inner posts 23. A plate 33 is secured to the top of each bracket 32, preferably by welding, and is provided with a depending flange 35 and a transversely extending refflange 36 on the flange 35. Another member 38 comprises depending flanges 39, 40 which are secured to the flange 35 and refflange 36, respectively, of the plate 33 and an upstanding flange 42 disposed in flatwise relation to one side of the carline 27. The carlines 27 are preferably disposed closely adjacent the roof 2 of the car and the ceiling 45 is provided with upwardly projecting panels 46 above the carlines 27 to provide recesses 47 to accommodate the carlines 27. The outer roof sheet 49 may also have upwardly projecting panels 50 aligned with the panels 46 of the ceiling 45, the panels in the ceiling and outer roof sheet cooperating to help hold the roof insulation 52 in place.

A refrigerant container 6 is preferably formed of sheet metal and may be provided with stiffening corrugations 56 on the several sides and bottom as shown in the drawings. The container may also be provided with holes on certain sides thereof for air flow therethrough or for escape of melted refrigerant. Corners of the container 6 may be provided with stiffening members, such as the vertical channel shaped members 58 at the side of the container 6 adjacent the side wall 3 of the car and the Z-shaped members 59 at the side of the container adjacent the center of the car. Horizontal reinforcing members may be angles 60 such as are shown along the horizontal edges of the container 6.

As shown in Fig. 5, the brackets 32 which are

secured to the inner side posts 23 are provided with outwardly projecting, substantially horizontal shelves 65. The channel-shaped reinforcing members 58 are provided with substantially horizontal feet 66 which rest upon the shelves 65, thereby providing a solid support for the container 6. As shown in Figs. 2 and 3, vertically disposed channel-shaped brackets 69 are provided depending from the carlines 27, the webs 70 of the brackets 69 preferably being notched so that the flanges 71 thereof lap the carlines 27 in flatwise relation thereto. The flanges 71 may be secured to the carlines by some means, such as welding. The brackets 69 also have outwardly projecting, substantially horizontal shelves 73 and the Z-shaped reinforcing members 59 have substantially horizontal feet 74 to engage the shelves 73, thereby supporting the container 6. Bolts 76 are preferably provided to secure together the feet 66, 74 and shelves 65, 73 and additional bolts 78 provided to secure certain vertical legs 80, 81 of the reinforcing members 58, 59 to the flanges 82, 83 of the brackets 32, 69. Shims 86 may be provided between the reinforcing members 58, 59 and the brackets 32, 69, which shims should be of the thickness required to provide the container 6 with a snug fit between the carlines 27.

When it is desired to remove the containers 6 it is necessary only to remove the bolts 76, 78, move the containers laterally toward the center of the car a distance slightly greater than the width of the shelves 65, 73, the width of the shelves being that dimension shown on Fig. 1. It should be noted that the containers are then free to be lowered in a vertical direction to the floor of the car. Containers may be replaced by movements in reverse order.

It is quite important to the refrigerating efficiency of a car of this type that the top of the partition 14 be at a considerably higher level than the opening 17 to the flue 7. It is equally important that the joint between the partition 14 and the drip pan 12 be watertight to prevent leakage from the container 6 to the lading; for this reason, the carlines 27 are disposed closely adjacent the roof 2, the ceiling 45 being provided with a panel 46 and the brackets 32, 69 for supporting the containers 6 being arranged in a depending position from the carlines 27.

In the modification shown in Figs. 6 and 7 the carline 95 is substantially an I-beam comprising a vertically disposed plate or web 96 with the angles 97 secured to the upper and lower edges thereof. The channel-shaped bracket 99 which is secured to the side wall 3 has a U-shaped cradle-like piece 100 secured thereto, which piece forms a support for an outer end of the carline 95. The bracket 99 is formed with outwardly projecting shelves 102 which are substantially similar to the shelves 65 described in reference to Figs. 1-5, and the reinforcing members 104 of the containers shown in Figs. 6 and 7 are also substantially similar to the members 59 of Figs. 1-5. The supporting bracket 105 adjacent the center of the car comprises a vertically disposed channel shaped member 106 secured to each side of the carline 95, each channel having an outwardly projecting shelf 108 which forms a support for a foot 110 of the Z-bar reinforcing member 114. The bolts 112 and shims 113 are the same as described in reference to Figs. 1-5, as is the method of removing and replacing containers.

In the modification shown in Figs. 8 and 9, the

side wall 3 comprises outer sheathing 120, outer sideplates 121, posts 122, inner sheet 123 and inner sides plates 124. Channel-shaped carlines 126 having depending ends 128 extend between the inner side plates 124 and are secured thereto. Brackets 130 for supporting the side 129 of a refrigerant container 6 adjacent the side wall 3 of the car are secured to the inner side plates 124 and the depending ends 128 of the carlines 126. Each bracket 130 comprises a transversely extending plate 131, a vertically disposed flange 132 which is secured to an inner side plate 124 (and carline 126) by some means, such as rivets 134 and a substantially horizontal shelf 135. At the center of the car, preferably extending on both sides of the center line 136 thereof, gussets 138 are secured to the carlines 126 by the rivets 139 through flanges of the gussets or by other means. Each gusset 138 has a depending portion 141 which is provided with a substantially horizontal shelf 142 for supporting a container 6. The upstanding partition 14 may also be supported by the depending portions 141.

A refrigerant container 6 is preferably formed of sheet metal with the bottom 145 thereof reinforced by a plurality of spaced apart, transversely extending channel members 146, the channel members 146 being disposed with their webs 147 vertical and having their ends formed as horizontal feet 148. Reinforcing members 150 may be secured to the sides 151 of the container 6, which reinforcing members 150 comprise angles having one leg 152 secured to the container 6 and the other leg 154 disposed in flatwise relation to the webs 147 of the channel reinforcing members 146. The angle reinforcing members 150 have substantially horizontal feet 156 which lie between the shelves 142 and the flanges 157 of the channel reinforcing members, thereby providing a very rigid footing upon which the container rests. Bolts 159 are preferably provided to secure together the shelves 135, 142, flanges 157 and feet 156. Other bolts 160 extending in a horizontal direction resist lateral thrusts resulting from the mass of refrigerant in refrigerant containers.

In order to remove a container 6, it is necessary only to remove the bolts 159, 160, move the container 6 laterally toward an end of the car a distance slightly more than the width of the shelves 135, 142 and then lower said container in a vertical direction to the floor of the car.

In the modification shown in Figs. 10 and 11, the carlines 165 are channel-shaped members having their webs 166 vertical, the carlines 165 being secured to the inner posts 168 by the angle clips 169. Each carline 165 has secured thereto on each side thereof outwardly projecting brackets 170 for supporting the containers 6. Each bracket 170 comprises a substantial horizontal, shelf-like portion 171, an upstanding flange 173 in flat-wise relation to the web 166 of the channel 165 and another upstanding flange 174 disposed transversely to the channel 165.

The containers 6 have secured to the ends thereof brackets 177 having substantially horizontal foot portions 178 arranged to engage the brackets 170 and upstanding flanges 179 engaging the transversely disposed flanges 174 of the brackets 170. The brackets 177 also have upstanding flanges 181 in flat-wise relation to the ends 182 of the containers 6 for attachment thereto. The foot portions 178 of the brackets 177 are preferably disposed above the lower ends of the attaching flanges 181 and connected there-

to by upwardly and outwardly sloping sections 184 so as to permit the carlines 165 to be disposed near the roof 2 and the attaching flanges 181 to have a relatively large width. Panels 46, 50 may be provided in the ceiling 45 and outer roof sheets 49 respectively to provide recesses 47 for the carlines and to hold the insulation 52 in place. In order to remove the containers, it is necessary only to remove the rivets 186 through the brackets 170, 177 and move the containers laterally toward the center of the car a relatively small distance, after which they may be lowered vertically to the floor of the car.

The accompanying drawings illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof, within the scope of the claims, will occur to persons skilled in the art.

I claim:

1. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between said carlines, brackets fixedly secured to said carlines having outwardly projecting substantially horizontal shelves and members secured to said container having substantially horizontal feet which rest upon said shelves to support said container, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

2. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between said carlines, brackets secured to said carlines having outwardly projecting substantially horizontal shelves and stiffening members secured to said container having substantially vertical legs spaced from said container and substantially horizontal feet which rest upon said shelves to support said container, said legs being secured to said brackets to resist horizontal inertia thrusts of the container, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

3. In a refrigerator car, a wall, spaced apart carlines, a refrigerant container between said carlines having a side adjacent said wall, means to secure one end of each of said carlines to said last mentioned wall, brackets secured to said carlines remote from said wall, said means and said brackets having outwardly projecting substantially horizontal shelves and members secured to said container having substantially horizontal feet which rest upon said shelves to support said container, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

4. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between said carlines, brackets fixedly secured to said carlines having outwardly projecting substantially horizontal shelves and substantially vertical flanges and members secured to said container having substantially horizontal feet which rest upon said shelves to support said container and flanges which engage said first-mentioned flanges to resist horizontal inertia thrusts of the container, said feet and shelves being arranged to be disengaged upon lateral movement of said container

after which said container may be moved vertically out of position.

5. In a refrigerator car, a wall, a roof, spaced apart carlines near said roof each secured at one end thereof to said wall, a refrigerant container between said carlines having its bottom at a substantially lower elevation than said carlines, brackets depending from and secured to said carlines, said brackets having outwardly projecting substantially horizontal shelves and members secured to said container having substantially horizontal feet which rest upon said shelves to support said container, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

6. In a refrigerator car, a wall, a roof, spaced apart carlines near said roof each secured at one end thereof to said wall, a refrigerant container between said carlines having its bottom at a substantially lower elevation than said carlines, brackets secured to said carlines having outwardly projecting substantially horizontal shelves and members secured to said container comprising substantially horizontal feet connected to said container by upwardly and outwardly inclined sections, said feet resting upon said shelves to support said container, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

7. In a refrigerator car having a wall and a roof, spaced apart carlines near said roof each secured at one end thereof to said wall, a refrigerant container between said carlines, a drip pan below said container, a partition upstanding from said drip pan below said carlines and means to support said container from said carlines, said means comprising brackets secured to said carline and members extending upwardly and outwardly from said container engaging said brackets.

8. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between vertical planes passing through said carlines, brackets fixedly secured to said carlines having laterally extending shelves, and members secured to said container having feet supported by said shelves, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

9. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between vertical planes passing through said carlines, brackets fixedly secured to said carlines having laterally extending substantially horizontal shelves, and members secured to said container having sub-

stantially horizontal feet engaging said shelves to support said container, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

10. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between vertical planes passing through said carlines, brackets fixedly secured to said carlines having laterally extending shelves, and members secured to said container having feet at least partially complementary to said shelves and supported thereby, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

11. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between vertical planes passing through said carlines, brackets fixedly secured to said carlines having laterally extending shelves, and members secured to the end walls of said container having laterally extending feet supported on said shelves, said feet and shelves being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

12. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between vertical planes passing through said carlines, brackets fixedly secured to said carlines having laterally extending parts comprising shelves and flanges disposed in angular relation, and members secured to said container having laterally extending feet at least partially complementary with said parts and supported thereby, said feet and parts being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

13. In a refrigerator car, a wall, spaced apart carlines each secured at one end thereof to said wall, a refrigerant container between vertical planes passing through said carlines, brackets fixedly secured to said carlines having laterally extending parts comprising shelves and flanges disposed in angular relation, and members secured to the end walls of said container having laterally extending feet at least partially complementary with said parts and supported thereby, said feet and parts being arranged to be disengaged upon lateral movement of said container after which said container may be moved vertically out of position.

CHARLES D. BONSALL.