

Sept. 16, 1941.

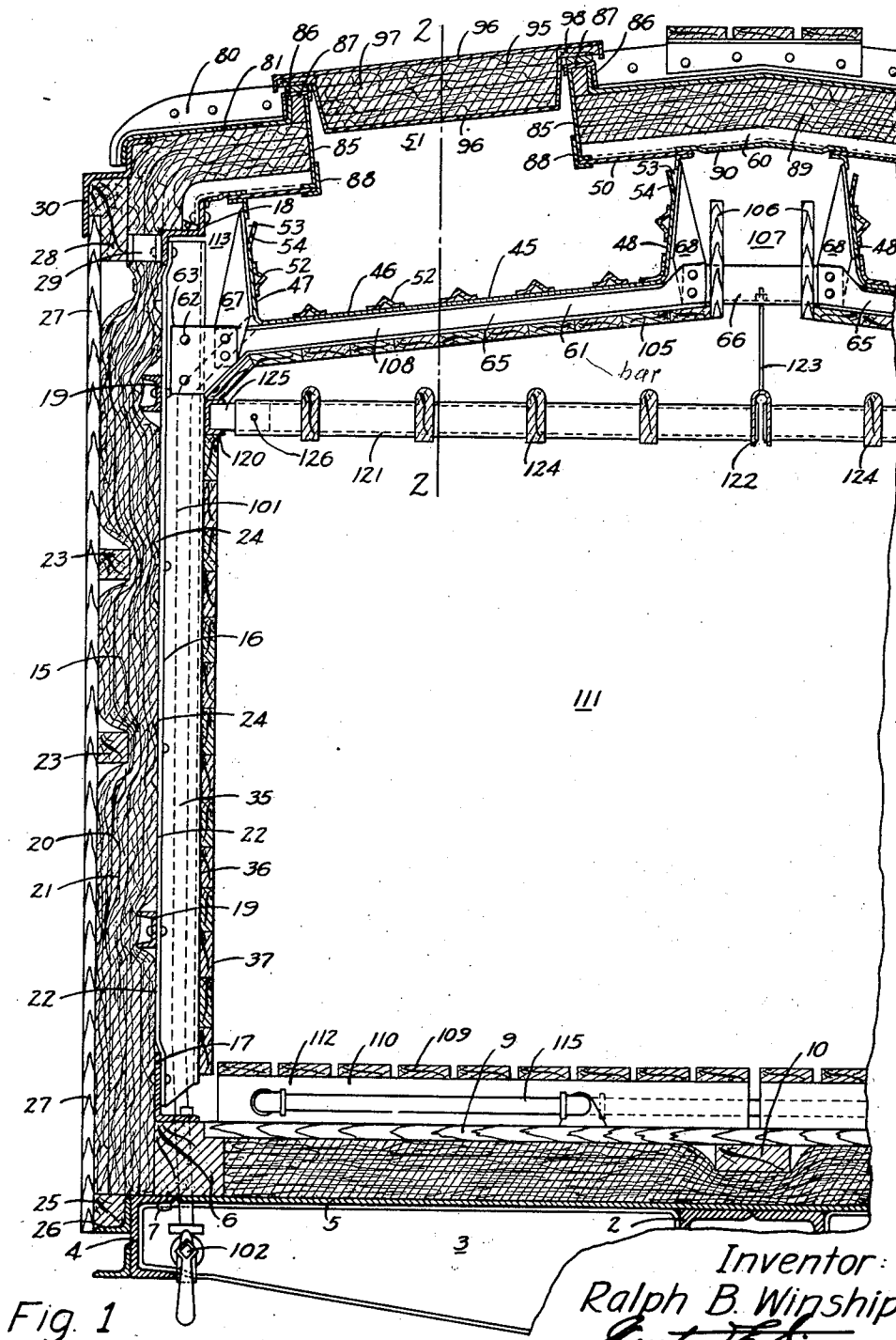
R. B. WINSHIP

2,256,182

REFRIGERATOR CAR CONSTRUCTION

Original Filed June 30, 1938

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

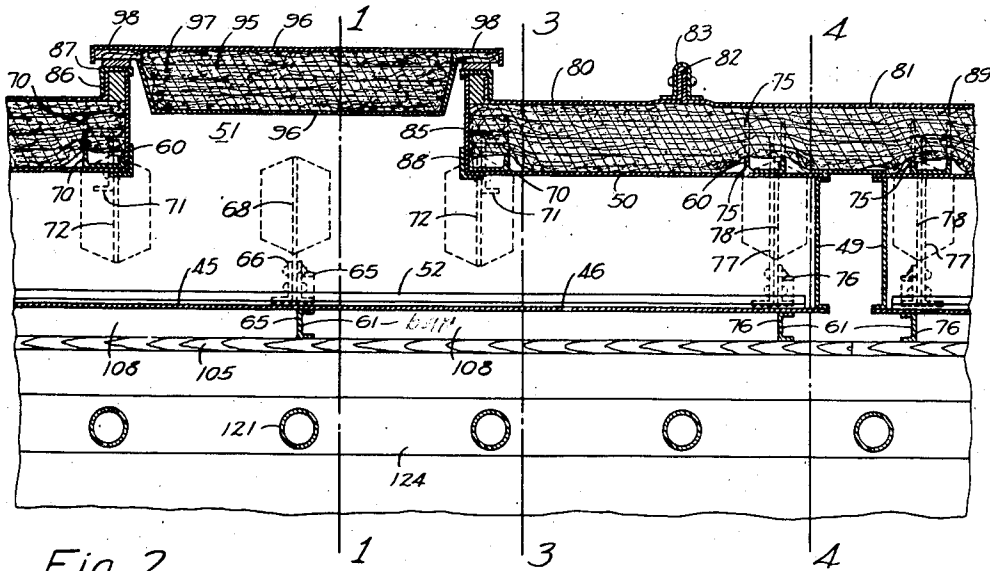


Fig. 2

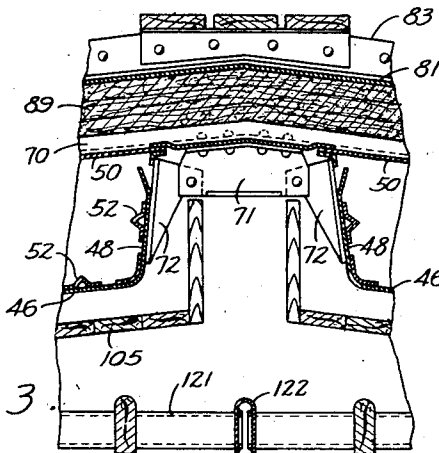


Fig. 3

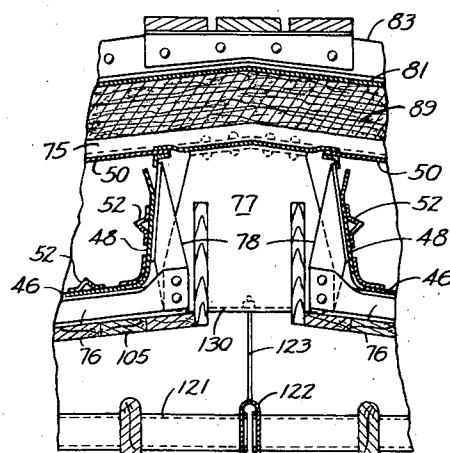


Fig. 4

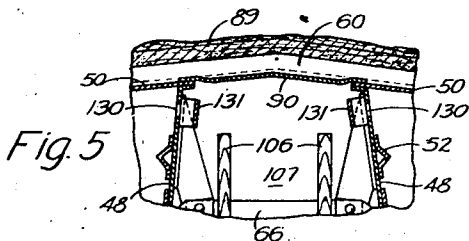


Fig. 5

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UNITED STATES PATENT OFFICE

2,256,182

REFRIGERATOR CAR CONSTRUCTION

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Original application June 30, 1938, Serial No. 216,732. Divided and this application April 28, 1939, Serial No. 270,572

7 Claims. (Cl. 105-409)

This invention relates to refrigerator cars used to transport perishable commodities at a predetermined temperature. A refrigerator car comprises a body having insulated floor, walls and roof and means for cooling in summer and heating in winter.

This invention applies particularly to cars having the cooling means suspended immediately below the ceiling of the car, said means comprising containers having a refrigerant therein, the refrigerant being pure water ice, ice mixed with salt, a brine solution or frozen brine, known as eutectic ice. It is preferable to provide a flue leading from the space surrounding the container to below the load supporting foraminous floor. The flue, which is preferably adjacent the side wall of the car, provides a path for the circulation of cooled air and also serves to drain off liquid from condensation on the tanks or from melting of the refrigerant.

It is an object of this invention to build a car having bunkers suspended below the ceiling and to provide a drip pan and side flue for circulation of air and draining of liquid.

It is another object of the invention to utilize the space between the vertical side framing members or posts to accommodate the flue, thus decreasing the overall thickness of the wall. The outside width of railway cars is limited to a maximum determined by the tunnel clearances on the railroads on which they operate. The inside width is limited to a minimum determined by the sizes of boxes and crates which are shipped, therefore, with the inside and outside widths severely restricted the thickness of the wall is definitely limited. It is a great advantage, then, to place the side wall flues between the vertical posts so as not to increase the wall thickness.

Another object of the invention is to eliminate the usual side wall diagonal bracing and substitute horizontal belt rails which may be embedded in the insulation, thereby allowing the space between vertical posts free for the flue.

It is a further object of the invention to use a water proof paper or fabric as the sides of the flue. This decreases both the weight and thickness of the car wall and also facilitates construction since the paper or fabric may be secured to the wall insulation during the manufacture thereof.

Another object of the invention is to construct the refrigerant containers and associated supporting members so that they form a truss extending between the side walls of the car. The

tanks are, therefore, not only partially self-supporting but also help to support the roof of the car.

Another object is to tie the outer roof and ceiling together with metal hatch frames, thus providing a truss-like structure having greater strength and less weight.

It is another object to construct and suspend the refrigerant containers and their supporting members so that one container may be removed for repairs without disturbing either the other containers or the roof of the car.

A further object of the invention is to use the upper parts of the refrigerant containers as the ceiling of the car to support the insulation. This arrangement eliminates both the weight and space which would be required in the use of a separate ceiling.

Another object of the invention is to provide sheets of moisture-proof paper or fabric in the wall to prevent entrance of water vapor into the insulation, thus impairing the efficiency thereof.

In the drawings:

Fig. 1 is a partial transverse section of the refrigerator car on line 1-1 of Fig. 2.

Fig. 2 is a vertical longitudinal section on line 2-2 of Fig. 1.

Fig. 3 is a fragmentary section on line 3-3 of Fig. 2.

Fig. 4 is a fragmentary section on line 4-4 of Fig. 2.

Fig. 5 shows a modified construction.

The underframe of the car comprises a center sill 2; cross members (bolsters, cross-bearers and cross-ties) 3 and steel side sill angle 4. A sub-floor 5 and wooden side sill 6 are supported by the underframe of the car; the wooden sill 6 being secured to the steel sill 4 by the bolts 7. Several layers of pliable insulation 8 rest upon the sub-floor 5 and the main load supporting floor 9 is supported by the wooden side sill 6 and the stringer 10 which also serves as a cleat to hold the insulation 8 in place.

The side wall 15 of the car derives its principal support from the Z-bar posts 16 which are riveted to the metallic sub-sill 17. The sub-sill 17 is supported upon and insulated from the underframe of the car by the wooden sill 6. The posts 16 are secured at their upper ends to the inner metallic side plate 18 and braced at intervals along their length by the channel shaped belt rails 19 which are riveted to the posts 16. The side insulation 20 comprises several layers of pliable insulation 21 with a layer of water-proof material 22 secured to one face thereof.

The wooden pieces 23 function to further brace the side wall 15 and to hold the insulation 20 in place. The metallic strips 24 and the belt rails 19 also function as cleats to prevent the insulation from slipping. A wooden stringer 25 reinforced by an angle 26 and secured to the metallic sill 4 serves as the lower support for the wood sheathing 27. The upper end of the sheathing 27 is secured to the wooden piece 28 which is tied to the inner metallic side plate 18 by the brackets 29 spaced at intervals longitudinally of the car. The outer metallic side plate 30 is secured to the wooden piece 28.

Flues 35 for circulation of air are formed adjacent the wall 15 by placing on the inner side of the Z-bar posts 16 a layer of waterproof material 36. Wooden lining 37 is secured to the posts 16 on top of the paper 36 to resist the side thrust of the lading. Each flue 35 extends longitudinally of the car the distance between the posts 16 and has for its walls the layers of waterproof material 22 and 36. In addition to forming a waterproof flue, this material also serves as a barrier to prevent infiltration of water vapor into the insulation.

The refrigerant containers 45 are solid tanks designed for the retention of the melted refrigerant and are formed from steel plate by welding. The bottom 46 and sides 47-48 of each tank are formed from a single sheet of steel. The ends 49 and top 50 are separate pieces secured preferably by spot welding; the seams being waterproofed by solder or car cement. An opening is provided in the top sheet to communicate with the hatch 51. A plurality of stiffeners 52 are welded to the sides 47, 48 and bottom 46 of the container and extend longitudinally of the container from end to end. The stiffeners 52 function as beams to strengthen the container and as skids upon which the ice may be pushed to the ends of the container. Apertures 53 are provided near the tops of the walls 47-48 for the passage of air when it is desired to ventilate the car. Inverted louvers 54 tend to prevent the splashing of liquid from the tank through the apertures 53.

A plurality of spaced apart channel shaped carlines 60 extend between and are secured to the inner metallic side plates 18. There are preferably four carlines 60 for each container 45, one positioned on each side of the hatch 51 and one near each end of the container. A plurality of transverse bars 61 are secured to the bottom of each container 45. The bars 61 extend a short distance beyond each side of a container and are preferably positioned with one directly below the hatch 51 and one near each end of a container. Each bar 61 is secured preferably by rivets 62 and a gusset plate 63 to a post 16. The bars 61 are preferably channel spaced and have one flange thereof flattened into the plane of the web at each end of the bar to provide adequate space for rivets.

The transverse bar 65 is at the center of a container 45 directly below the hatch 51. A connecting piece 66, preferably angle shaped, connects the bars 65 of directly opposite containers. This is shown in Fig. 1. This construction provides effectively a continuous beam extending between the side posts 16 of the car. Web plates 67-68 are welded to the sides 47-48 of the container to stiffen the sides against the outward thrust of the refrigerant and to help support the sides.

Fig. 3 shows the construction at the carline 70 adjacent the hatch 51. A supporting member 71

is riveted to the carline 70 and web plates 72 are welded to the sides 48 of the containers to stiffen the sides and to provide a means to support the containers. The web plates 72 are riveted to the supporting member 71.

Fig. 4 shows the construction near the ends of the containers 45 where the carline 75 and the transverse bars 76 lie in substantially the same vertical plane. The plate 77 functions both to connect the bars 76 of directly opposite containers and to connect said bars to the carline 75. Web plates 78 welded to the sides 48 of the containers function not only to stiffen said walls but to secure the walls 48 to the bars 76 and the plate 77.

The outer roof 80 of the car extends between and is supported by the outer metallic side plates 30. The roof comprises sheets 81 extending transversely of the car and having the transverse edges thereof upturned to form upwardly projecting flanges 82. Inverted channel shaped seam caps, or carlines 83, extending between the outer metallic side plates 30 to cover the flanges 82 and are riveted thereto to provide watertight joints. Hatches 51 are provided for the deposit of refrigerant in the containers and are surrounded by hatch frames 85 formed from metallic plates. The roof sheets 81 are provided with upstanding flanges 86 surrounding the hatches 51, said flanges 86 underlying the upper parts 87 of the hatch frames 85. The lower parts of the hatch frames are secured by overlapping pieces 88 to the tops 50 of the containers 45 and to the carlines 60, therefore, the outer roof 80, hatch frames 85, carlines 60 and containers 45 cooperate to form a very strong roof structure. The tops 50 of the containers 45 also function as the ceiling of the car to support the pliable insulation 89. Small sheets 90 support the insulation 89 between containers 45. A layer of waterproof material could be placed above the containers to reduce condensation in the insulation.

A partition or drip pan 105 is provided below each container with an upright wall 106 at the inner edge thereof to provide a central duct 107. The drip pan 105 is connected to the bottom edges of the transverse bars 61 which space the drip pan 105 from the container bottom 46 to provide a passage 108 which communicates with the side wall flues 35. The lading is supported by a foraminous floor comprising spaced apart slats 109 spaced from and supported on the main floor 9 by stringers 110. The air circulates from the lading compartment 111 upwardly through the duct 107, through the passage 108 where it is cooled by contact with the container bottom 46, downwardly through the flue 35, through the space 112 under the foraminous floor and upwardly between the slats 109 to the lading compartment 111 where it is warmed by contact with the lading.

The refrigerant containers, supporting members therefor and portions of the roof structure all cooperate to form a supporting structure for the containers. Near the end of each container, the transverse bars 76 and the plate 77 are connected together to form, in effect, a lower carline member disposed below the containers 45. Said lower carline member and the upper carline 75 are tied together by the plate 77 and the containers 45, particularly the ends 49 and sides 47-48 thereof, thereby forming a container supporting structure between the side walls 15 of the car.

Near the center of the containers 45, upper car-

lines 70 are disposed on each side of the hatch 51. The transverse bars 65 are connected together at the center of the car by the connecting piece 66 to form, in effect, a lower carline member disposed below the containers 45 and in a vertical plane disposed between the vertical planes through the upper carlines 70. The container walls 47-48 are secured to the lower carline member by the web plates 67-68, respectively, and the walls 48 are connected to the upper carlines 70 by the web plates 72. The containers 45, the walls 48 in particular and the walls 47, to a limited extent, thereby form a tie between the upper and lower carlines and provide cooperation therebetween to support the containers.

The refrigerant containers are constructed and supported so that any container may be removed without disturbing other containers or the roof structure. After the drip pan has been removed all rivets are readily accessible.

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.

This is a division of my application, Serial No. 216,732 filed June 30, 1938.

I claim:

1. A wall structure for a refrigerator car comprising a metallic sill forming part of the under-frame of the car, a wooden sill mounted upon and secured to said metallic sill, a metallic sub-sill mounted upon and secured to said wooden sill, an inner metallic plate, a plurality of spaced apart vertical posts extending between and secured to said metallic sub-sill and inner metallic plate, insulating material outside of the posts and supported thereby, an outer metallic plate, a wooden piece secured to the inside of the outer metallic plate, a plurality of spaced apart brackets connecting said inner metallic plate and said wooden piece, a wooden stringer mounted on the outside of said metallic sill, and an outer sheathing extending between and secured to said wooden piece and stringer.

2. A wall structure for a refrigerator car comprising a metallic sill forming part of the under-frame of the car, a wooden sill mounted upon and secured to said metallic sill, a metallic sub-sill mounted upon and secured to said wooden sill, an inner metallic plate, a plurality of spaced apart vertical posts extending between and secured to said metallic sub-sill and inner metallic plate, insulating material outside of the posts and supported thereby, an outer metallic plate, means to connect said inner and outer plates, an outer sheathing, and means to secure said sheathing to said outer plate and said metallic sill.

3. A refrigerator car having spaced apart walls as defined in claim 2 in combination with inside

carlines extending between and supported by said inner metallic plates, inside roof sheets spanning the spaces between the inside carlines, outside carlines extending between and supported by said outer metallic plates, outside roof sheets spanning the spaces between the outside carlines, and insulating material between the inside and outside roof sheets and extending continuously between said walls.

4. A refrigerator car having spaced apart walls as defined in claim 2 in combination with inside carlines extending between and supported by said inner metallic plates, inside roof sheets spanning the spaces between the inside carlines, outside carlines extending between and supported by said outer metallic plates, outside roof sheets spanning the spaces between the outside carlines, hatch frames connecting the inside and outside roof sheets, and insulating material between the inside and outside roof sheets and extending continuously between the hatch frames and between said walls.

5. A refrigerator car structure comprising spaced apart inner side plates, inside carlines extending between and secured to said inner side plates, refrigerant containers partially supported by the inside carlines wherein the tops of said containers constitute inside roof sheets, spaced apart outer side plates, outside carlines extending between and secured to said outer side plates, outside roof sheets extending between the outside carlines, insulation between the inside and outside roof sheets and supported by said inside roof sheets, hatch frames secured to the tops of said containers and to the outside roof sheets whereby the outside roof structure also partially supports the refrigerant containers.

6. A wall structure for a refrigerator car comprising a metallic sill supported by the under-frame of the car, a wooden sill mounted upon said metallic sill, a metallic sub-sill mounted upon said wooden sill, an inner metallic plate, a plurality of spaced apart substantially vertical posts extending between and secured to said metallic sub-sill and inner metallic plate, insulating material outside of said posts, an outer metallic plate, an outer sheathing, and means to secure said sheathing to said outer plate and said metallic sill.

7. A wall structure for a refrigerator car comprising a metallic sill supported by the under-frame of the car, a metallic sub-sill, insulating means arranged to secure said sub-sill to said metallic sill, an inner metallic plate, a plurality of spaced apart substantially vertical posts extending between and secured to said metallic sub-sill and inner metallic plate, insulating material outside of said posts, an outer metallic plate, means to connect said inner and outer plates, an outer sheathing, and means to secure said sheathing to said outer plate and said metallic sill.

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