Oct. 28, 1941. K. E. ZEIDLER 2,260,503

REFRIGERATOR CAR

Filed Nov. 17, 1939 2 Sheets-Sheet 1

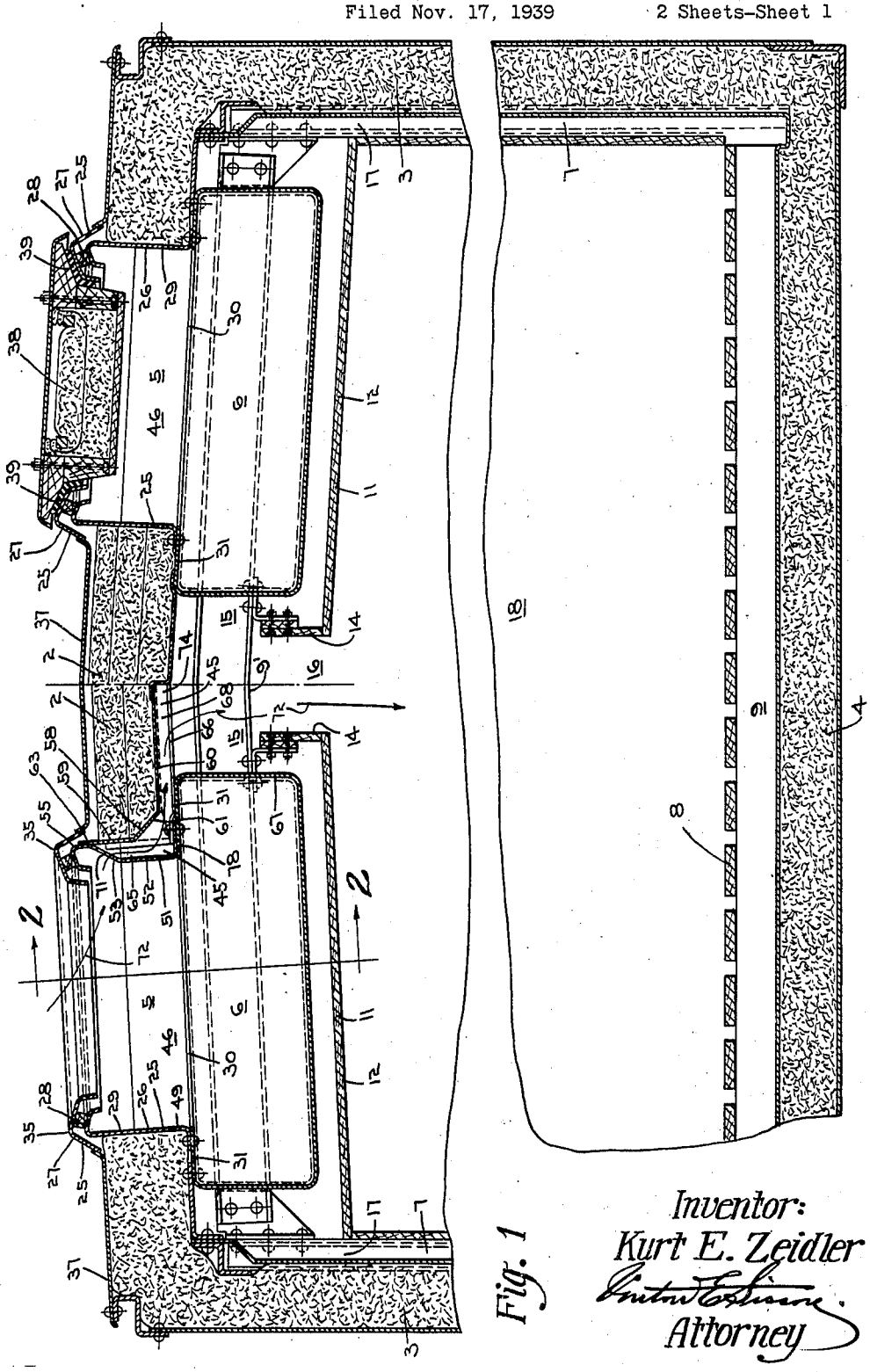


Fig. 1

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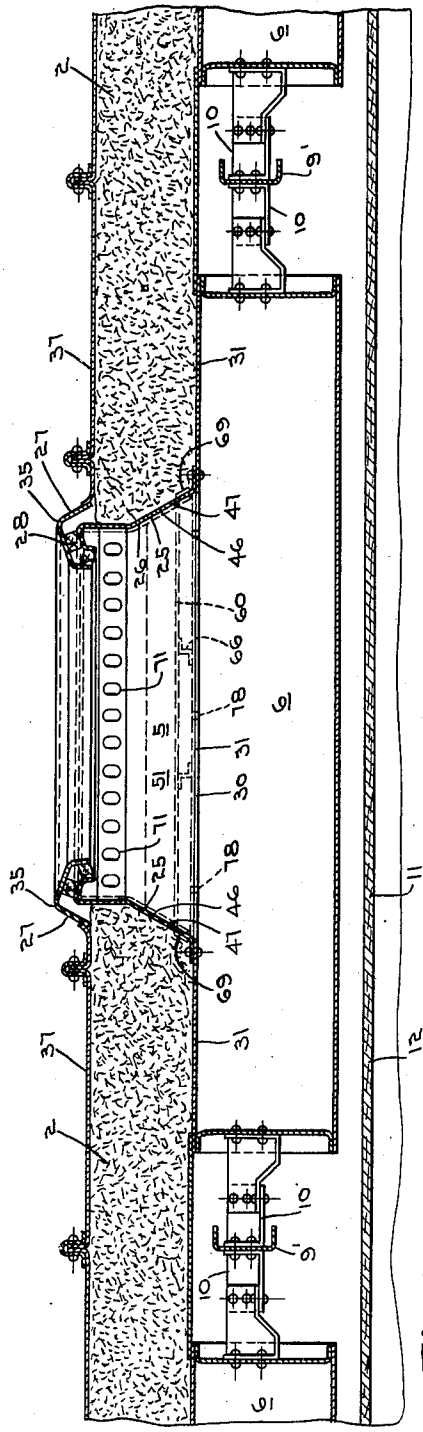


Fig. 2

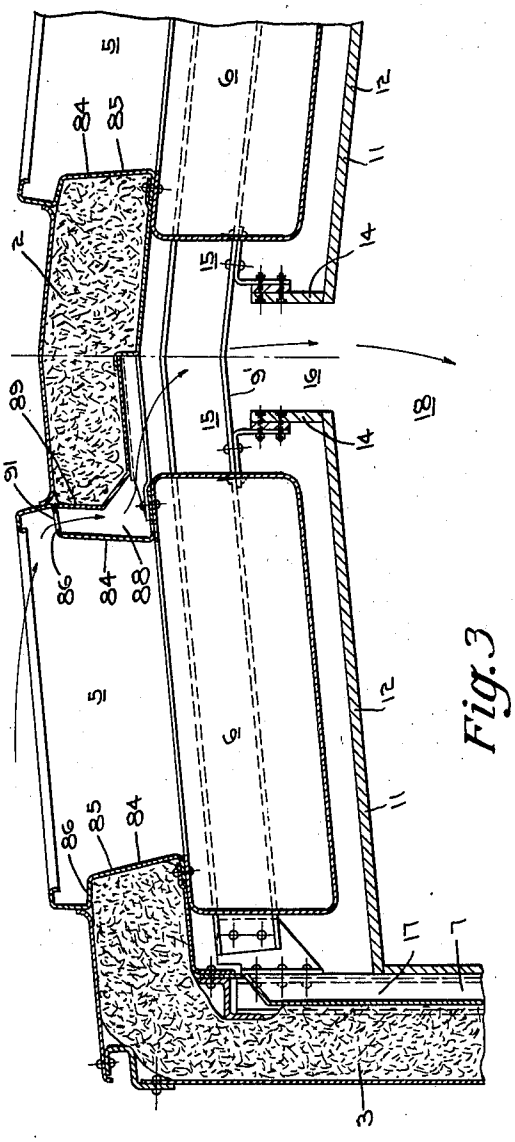


Fig. 3

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UNITED STATES PATENT OFFICE

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REFRIGERATOR CAR

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Application November 17, 1939, Serial No. 304,989

16 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 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.

Many commodities, such as potatoes and melons, can be transported safely at any temperature within a relatively wide range and, therefore, do not require either heating or refrigeration at certain seasons of the year. Some commodities, including many types of fresh fruits and vegetables, give off heat of respiration during the ripening thereof. In either of these cases it is desirable to circulate fresh air from outside the car in close contact with the commodity to carry away the heat of respiration, thereby preventing excessively high temperatures with consequent spoilage. Ventilated box cars are often used for this purpose, particularly in the southern part of the country. A car also commonly used is a combination refrigerator, heater and ventilator.

It is an object of this invention to provide a car equipped with refrigerating facilities of the overhead bunker type and which may be used when desired to ventilate or supply fresh air to the lading space of the car without making any changes in the structure thereof. A further object is to provide facilities for ventilating the car in such a manner that the ventilation facilities do not effect the efficiency of the refrigeration of the car and vice versa.

Another object is to prevent melted refrigerant from reaching the lading space of the car when the car is being refrigerated. It is a common practice to provide apertures in the containers so that ventilating air may flow through the hatches into the containers and then through the apertures, thereby entering the lading space. Rain from outside the car or melted refrigerant from the container may splash through the apertures into the lading space with consequent damage to the lading. I prevent this damage by providing a ventilating duct arranged so that liquid cannot splash from the container into the lading space. I further provide means to return any splashing liquid back to the container.

The hatch plugs or hatch covers of refrigerator cars are often partly opened during ventilation so that ventilating air may flow through the hatch into the interior of the car. In such a case rain or snow is also likely to accompany the air into the car with consequent damage to the lading. It is an object of the invention to provide means to catch the rain or snow and divert it to the refrigerant container where it will do no damage.

Another object is to insulate the outer roof sheets from the refrigerant container. When the car is being refrigerated, the refrigerant containers are cold and the exterior roof is often warm due to the sun's rays falling thereon. I provide a hatch frame in two pieces, one secured to the roof and the other to the refrigerant container with insulation interposed between the two pieces. This prevents heat conduction through the hatch frame and therefore excessive ice meltage, as well as adding to the efficiency of the refrigeration.

Other objects and advantages of my invention will be apparent from the following detailed description by referring to the accompanying drawings.

In the drawings:

Fig. 1 is a transverse section of a refrigerator car embodying my invention; the left hatch on the drawing being shown with a ventilating duct and the right hatch without such a duct.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a view similar to a portion of Fig. 1 showing a modified form of hatch frame.

The general parts of the refrigerator car shown are insulated roof 2, side walls 3, floor 4, hatches 5, refrigerant containers 6, side wall flues 7, foraminous floor rack 8 and space 9 between rack 8 and floor 4. The refrigerant containers 6 are positioned directly below the roof 2 and adjacent the side walls 3, and are supported by the carlines 9' with the brackets 10 extending outwardly therefrom. A drip pan 12 is provided below each container 6 and a par-

tition 14 is secured in an upstanding position at the edge of each drip pan 12. The drip pans 12 and partitions 14 cooperate with the roof 2 and side walls 3 to form enclosing structures 11 around the containers 6, air inlet openings 15 being provided by spacing the partitions 14 from the roof 2. The partitions 14 are spaced apart to form the warm air duct 16. Air discharge openings 17 which lead to the flues 7 are formed by spacing the drip pans 12 from the walls 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 structures 11 through the duct 16 and air inlet openings 15. The air is cooled by contact with the refrigerant containers 6 and falls by reason of its greater density through the discharge openings 17 and flues 7 to the space 9 whence it rises through the rack 8 to the lading compartment 18.

The hatch frame 25 shown in Figs. 1 and 2 are each comprised of an inner piece 26 and an outer piece 27 with insulating blocks 28 interposed therebetween. The inner piece 26 consists of an upstanding jacket 29 secured to the top 31 of the container so that the jacket 29 encircles an opening 30 in the top 31 of the container 6. The jacket 29 is secured (such as by riveting or welding) to the top 31 of the container 6 in watertight relation therewith so that liquid cannot leak into the roof insulation. The outer piece 27 consists of a cap 35 overlying the jacket 29 and secured, preferably by welding, to the roof sheets 37. As shown at the right hand hatch in Fig. 1, the hatch 5 may be closed by an insulated plug 38 having a gasket 39 of sponge rubber, or other pliable material, interposed between the plug 38 and the outer piece 27 of the hatch frame 25. It should be noted from Fig. 1 that the inner piece 26 of the hatch frame is completely insulated from the outside temperature so that no direct path through metal is provided for flow of heat to the refrigerant container 6.

The left hatch frame in Fig. 1, which is also shown in section in Fig. 2, has the ventilation duct 45 associated therewith. The inner piece 26 of the hatch frame 25 is comprised of four substantially vertical sides, the sides 46 extending transversely of the car being flared outwardly at the lower part 47 thereof, as shown in Fig. 2. The side 49 remote from the ventilation duct 45 is substantially plane. The side 51 adjacent the ventilation duct 45 is offset inwardly and comprises the inwardly offset wall 52 and the inclined web 53 connecting the wall 52 to the body part 55 of the side 51. A flashing 58 is provided having a vertical portion 59, horizontal portion 60 and an inclined portion 61 connecting the horizontal and vertical portions. The vertical portion 59 is secured to the hatch frame side (at 63) in flatwise relation thereto, thereby providing the vertical leg 65 of the ventilation duct 45 between the vertical portion 59 of the flashing 58 and the offset wall 52 of the hatch frame side 51. The horizontal portion 60 of the flashing 58 overhangs the side 67 of the refrigerant container 6 and is supported by members 66, such as Z-bars, arranged as cantilever beams secured to the container 6 and overhanging the side 67 thereof. The horizontal leg 68 of the ventilating duct 45 is defined by the horizontal portion 60 of the flashing 58, the top 31 of the refrigerant container 6 and the depending marginal flanges 69—69 of the flashing 58, as is clearly shown in Fig. 2. The inclined web 53 of the hatch frame side 51 is provided with apertures 71 for flow of ventilating air into the duct 45, as shown by the arrows 72 in Fig. 1. The air flows out of the ventilating duct 45 through the opening 74 in the horizontal leg 68 of the duct 45 adjacent the refrigerant container 6. The air then flows downwardly through the air duct 16 to the lading compartment 18 of the car.

The plug 38 shown in the right half of Fig. 1 is maintained in the position shown when the car is to be refrigerated so that warm air can not leak into the refrigerant container 6, and melt the refrigerant contained therein. The plug 38 is usually hinged to the roof of the car and when it is desired to ventilate, the plug is inclined at an angle of possibly 30° so that ventilating air may flow from outside the car into the ventilating duct 45 and thence into the lading compartment 18. Any liquid, such as rain or melted snow, which might accompany the air into the ventilation duct 45 is drained through the apertures 78 into the refrigerant container 6, from where it is either drained by the means commonly provided for draining melted refrigerant or retained in the container where it will not damage the lading. During service movements of the car when the refrigerant container 6 is filled with melted refrigerant or other liquid, the liquid may splash through the apertures 71 into the ventilation duct 45, in which case said liquid is returned through the apertures 78 back to the container 6 and does not reach the lading compartment 18.

In the modification shown in Fig. 3 the four sides 84 of the hatch frame 85 are substantially symmetrical. This type of hatch frame has been used on a large number of recently built refrigerator cars and has for one of its features the substantially horizontal webs 86 which are adapted to rest upon car-lines and/or other frame members to rigidly support the hatch frames and roof structure. A ventilation duct 88 may be applied to a car having this type of hatch frame by using a flashing 89 somewhat similar to that heretofore described and by providing openings 91 in a web 86 of the hatch frame 85 for the ventilating air to enter the duct 88; otherwise the construction shown in Fig. 3 is substantially similar to that shown in Figs. 1 and 2.

Fig. 1 shows a car having a ventilating duct applied to the hatch on the left side of the car, while the right hand hatch is not provided with a ventilating duct. It is a matter of opinion among practical railroad men as to the amount of ventilating air required, and consequently the number of ducts required. It is maintained by some that the hatches adjacent the ends of the car only need be provided with ventilating ducts. Others maintain that all hatches on one side of the car only should have ventilating ducts, while still others prefer to provide ventilating ducts on all hatches. This is considered a mere matter of design and it is not intended to limit the invention to any particular arrangement.

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 having a roof, a hatch in the roof, a refrigerant container below said hatch and adapted to be loaded therethrough, a

ventilating duct associated with said roof and communicating between said hatch and the interior of the car and a relatively small aperture providing communication between said duct and said container.

2. In a refrigerator car having a roof comprising an outer sheet and a ceiling, a hatch in the roof, a hatch frame encasing said hatch, a refrigerant container below said hatch and adapted to be loaded therethrough, an opening in said ceiling, an aperture in said hatch frame and a ventilating duct communicating between said aperture and said opening.

3. In a refrigerator car having a roof comprising an outer sheet and a ceiling, a hatch in the roof, a hatch frame encasing said hatch, a refrigerant container below said hatch and adapted to be loaded therethrough, an opening in said ceiling, an aperture in the upper part of said hatch frame and a ventilating duct communicating between said aperture and said opening.

4. In a refrigerator car having a roof comprising an outer sheet and a ceiling, a hatch in the roof, a hatch frame encasing said hatch, a refrigerant container below said hatch and adapted to be loaded therethrough, an opening in said ceiling, an aperture in said hatch frame, a lip on said hatch frame overhanging said aperture and a ventilating duct communicating between said aperture and said opening.

5. In a refrigerator car having a roof comprising an outer sheet and a ceiling, a hatch in the roof, a hatch frame encasing said hatch, a refrigerant container below said hatch and adapted to be loaded therethrough, an opening in said ceiling, an aperture in the upper part of said hatch frame and a ventilating duct communicating between said aperture and said opening and comprising a substantially vertical portion associated with said frame and a substantially horizontal portion associated with the top of said container.

6. In a refrigerator car having a roof comprising an outer sheet and a ceiling, a hatch in the roof, a hatch frame encasing said hatch, a refrigerant container below said hatch and adapted to be loaded therethrough, an opening in said ceiling, an aperture in the upper part of said hatch frame, a ventilating duct communicating between said aperture and said opening and comprising a substantially vertical portion associated with said frame and a substantially horizontal portion associated with the top of said container and a relatively small aperture providing communication between said duct and said container substantially below said vertical portion.

7. In a refrigerator car having a roof comprising an outer sheet and a ceiling in spaced apart relation, spaced apart walls, a hatch in said roof adjacent each wall, a refrigerant container below each hatch and adapted to be loaded therethrough, said containers being spaced apart adjacent the center of the car to provide a flue therebetween, which flue communicates at the lower part thereof with the lading compartment of the car and a ventilating duct disposed at least partially above the level of said ceiling and providing communication between one of said hatches and the upper part of said flue.

8. In a refrigerator car having a roof, a refrigerant container below the roof, a hatch in said roof arranged for loading refrigerant into said container and a hatch frame encasing said hatch, said frame comprising an upper portion associated with the exterior of said roof, a lower portion associated with said container, an insulating hatch cover arranged to seat on substantially all of the upper portion which extends within said hatch and an insulating piece extending between said upper and lower portions.

9. In a refrigerator car having a roof, a refrigerant container below the roof, a hatch in said roof arranged for loading refrigerant into said container, a hatch frame encasing said hatch, said frame comprising an upper portion associated with the exterior of said roof, a lower portion associated with said container and an insulating piece extending between said upper and lower portions, said lower portion being secured to said container in water-tight relation therewith, and an insulating hatch cover adapted to seat on the part of said upper portion in contact with said insulating piece.

10. In a refrigerator car having a roof, a refrigerant container below the roof, a hatch in said roof arranged for loading refrigerant into said container, a hatch frame encasing said hatch, said frame comprising an upper portion associated with the exterior of said roof, a lower portion associated with said container and an insulating piece extending between said upper and lower portions and an insulating hatch cover adapted to seat on the part of said upper portion in contact with said insulating piece.

11. In a refrigerator car having a roof comprising an outer sheet and ceiling in spaced apart relation, a pair of spaced apart refrigerant containers disposed below said roof and above the lading compartment of the car, a hatch in said roof above each of said containers for loading refrigerant into the containers, a duct between said containers extending upwardly from the upper part of the lading compartment, and a ventilating duct disposed at least partially above the level of said ceiling and arranged to communicate between one of said hatches and said first mentioned duct.

12. In a refrigerator car having a roof comprising an outer sheet and ceiling in spaced apart relation, a pair of spaced apart refrigerant containers disposed below said roof and above the lading compartment of the car, a hatch in said roof above each of said containers for loading refrigerant into the containers, a duct between said containers extending upwardly from the upper part of the lading compartment, and a ventilating duct disposed at least partially between said outer sheet and said ceiling and arranged to communicate between one of said hatches and said first mentioned duct.

13. In a refrigerator car having a roof comprising an outer sheet and ceiling in spaced apart relation, a pair of spaced apart refrigerant containers disposed below said roof and above the lading compartment of the car, a hatch in said roof above each of said containers for loading refrigerant into the containers, a duct between said containers extending upwardly from the upper part of the lading compartment, a ventilating duct disposed at least partially above the level of said ceiling and arranged to communicate between one of said hatches and said first mentioned duct, and means to drain liquid from said ventilating duct to one of the refrigerant containers.

14. In a refrigerator car having a roof comprising an outer sheet and ceiling in spaced apart relation, a pair of spaced apart refrigerant

containers disposed below said roof and above the lading compartment of the car, a hatch in said roof above each of said containers for loading refrigerant into the containers, a duct between said container extending upwardly from the upper part of the lading compartment, a ventilating duct arranged to communicate between one of said hatches and said first mentioned duct, said ventilating duct comprising a tortuous passage to retard flow of liquid therethrough, and means to drain liquid from said ventilating duct to one of the refrigerant containers.

15. In a refrigerator car having a roof comprising an outer sheet and ceiling in spaced apart relation, a pair of spaced apart refrigerant containers disposed below said roof and above the lading compartment of the car, a hatch in said roof above each of said containers for loading refrigerant into the containers, a duct between said container extending upwardly from the upper part of the lading compartment, a ventilating duct arranged to communicate between one of said hatches and said first mentioned duct, said ventilating duct comprising a plurality of angularly disposed parts to retard flow of liquid therethrough, and means to drain liquid from said ventilating duct to one of the refrigerant containers.

16. In a refrigerator car having a roof comprising an outer sheet and ceiling in spaced apart relation, a pair of spaced apart refrigerant containers disposed below said roof and above the lading compartment of the car, a hatch in said roof above each of said containers for loading refrigerant into the containers, a duct between said container extending upwardly from the upper part of the lading compartment, a ventilating duct arranged to communicate between one of said hatches and said first mentioned duct, means to retard flow of liquid through said ventilating duct, and means to drain liquid from said ventilating duct to one of the refrigerant containers.

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