

Dec. 26, 1939.

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2,184,810

REFRIGERATOR CAR

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2 Sheets-Sheet 1

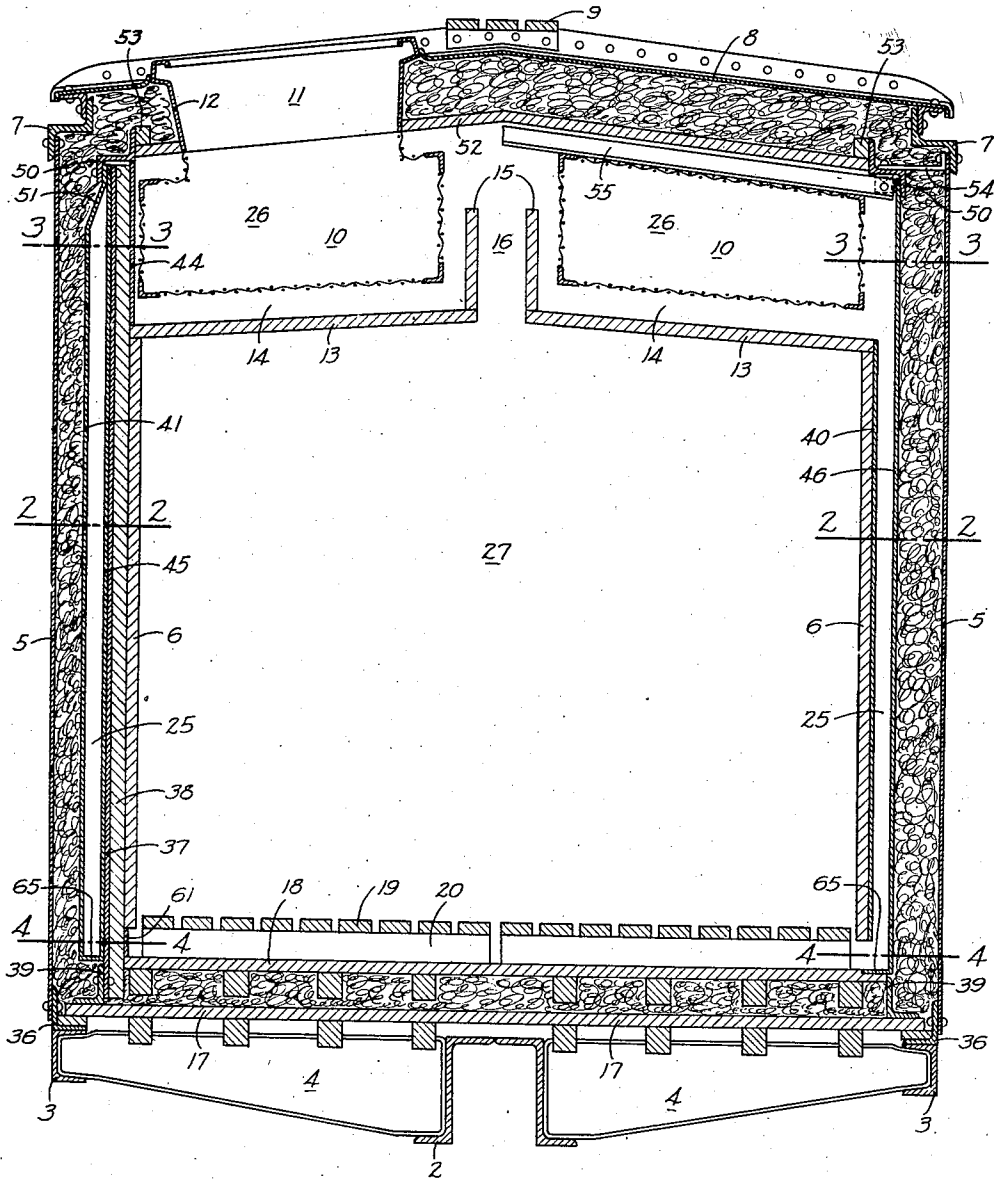


Fig. 1

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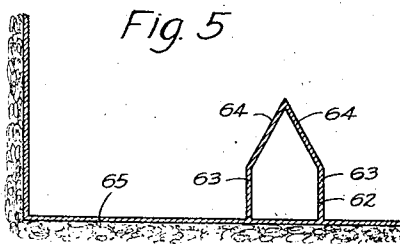
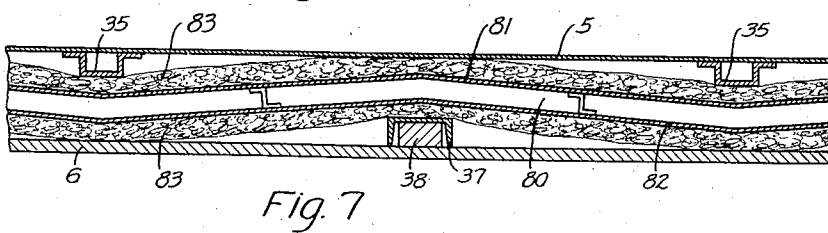
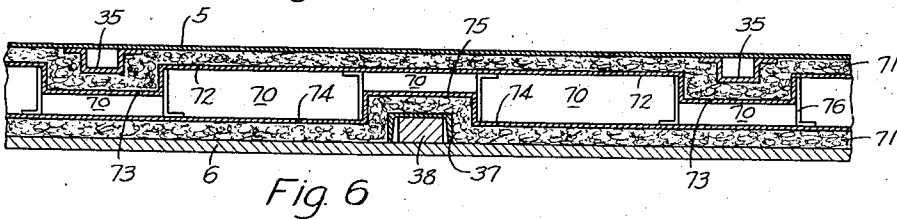
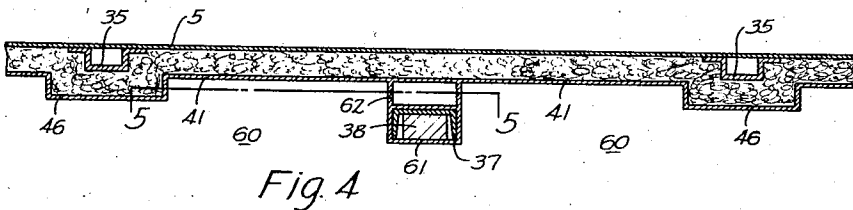
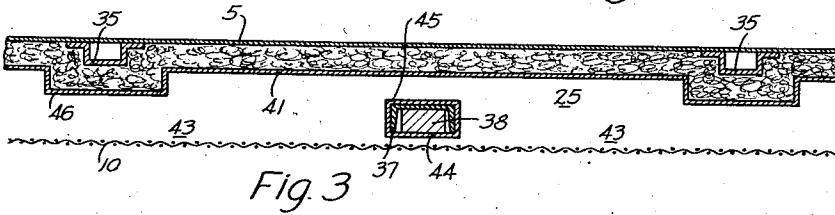
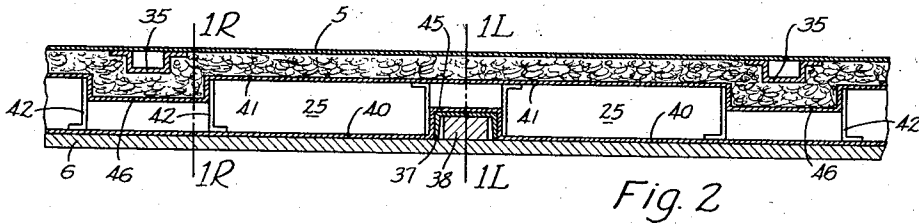
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REFRIGERATOR CAR

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,184,810

REFRIGERATOR CAR

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6 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 or heating means depending upon the prevailing outside temperature.

This invention applies particularly to cars in which the cooling means, preferably containers for water ice, eutectic ice, brine or dry ice, are suspended immediately below the ceiling 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 refrigerant compartment and the space under the floor rack to provide a path for the circulation of air. The path is from the refrigerant compartment downwardly through the aforementioned flues, through the space under the floor rack, and upwardly through the lading compartment to the refrigerant compartment.

It is an object of this invention to provide a flue extending continuously longitudinally of the car. This arrangement eliminates many obstructions found in conventional interrupted flues and provides more efficient refrigeration by reason of greater freedom of circulation.

Another object of the invention is to utilize the wall space more effectively by extending the flue continuously longitudinally of the car. If the refrigeration is to be effective, the flue must have a certain required cross-sectional area in a horizontal plane or a plane normal to the direction of air flow in the flue. Since an uninterrupted flue has a greater effective length, it may have correspondingly less width to provide the same area. It is a further object, therefore, to provide a flue of less width. The space thus saved may be used to increase the insulation of the wall, to increase the inside width of the car, or to decrease the outside width of the car.

It is another object of the invention to provide a wall having insulation of uniform thickness throughout. This is the most efficient arrangement consistent with having a wall of minimum thickness.

A further object of the invention is to provide a barrier to prevent infiltration of air through the walls. Railway trains now travel at high speeds and the consequent air pressure against the walls of the cars tends to force air through the walls. A flue extending uninterruptedly the

length of the car provides a very effective barrier against this infiltration.

Another object of the invention is to space the walls of the flue apart by spacers having their large dimension parallel with the flow of air so as not to restrict said flow.

It is a further object to provide a completely insulated flue. The circulating air leaves the refrigerant compartment at a very low temperature and, if the refrigeration is to be efficient, the air must reach the lading compartment without having been substantially warmed. Insulation on both sides of the flue insulates the air from influences outside and inside the car and insures air entering the lading compartment at a low temperature.

In the drawings:

Fig. 1 is a transverse section of a refrigerator car embodying my invention, the left half being on line 1L—1L and the right half on line 1R—1R of Fig. 2.

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

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a section on line 5—5 of Fig. 4. Figs. 6 and 7 show modified constructions.

The usual parts of a refrigerator car are shown in Fig. 1, such as center sill 2; side sills 3; cross members 4 of the underframe; side sheathing 5; side lining 6; side plates 7; roof 8; running board 9; refrigerant containers 10; hatches 11; hatch frames 12; partitions 13 which provide passages 14 under the containers 10; center walls 15 which form the duct 16; sub-floor 17; floor 18 and floor rack 19 which provides the space 20. Flues 25 are provided to communicate between the refrigerant compartments 26 and the space 20, said refrigerant compartment 26 being below the ceiling 52 and above the partition 13. The flues 25 provide a path for the cold air to circulate from the refrigerant compartment 26 to the lading compartment 27 and also provide a draining means for melted refrigerant when an open type bunker is used and for condensation when a solid tank is used.

In Fig. 2 the side sheathing 5 is supported by outer frame members 35 which are supported preferably by angles 36 mounted upon the side sills 3. The inner frame members 37 are arranged in staggered relation to the outer frame members 35 and are supported by and insulated from the underframe of the car. The inner frame members 37 are shown channel-shaped with nailing strips 38 secured thereto, the frame members 37 being supported by continuous angles

or clips 39 mounted upon the sub-floor 17. Other constructions in which the inner frame members are supported from the side sills 3 may be preferable. The lining 6 is preferably secured to the nailing strips 38.

The flue 25 which is positioned between the sheathing 5 and the lining 6 is preferably formed from relatively thin metallic sheets 40—41 offset 45—46 away from the frame members 35—37. The sheets 40 are spaced apart by spacers 42 which preferably comprise vertically disposed plates which restrict air flow through the flue 25 but very little.

Fig. 3 is a section adjacent the refrigerant compartment 26 showing one wall of the container 10. The sheet 40 extends upwardly only to the partition 13 to allow an opening 43 adjacent the container 10 for communication between the refrigerant compartment 26 and the flue 25. Auxiliary members 44 are placed against the inner frame members 37 adjacent the refrigerant containers 10 to protect said frame members from moisture due to the refrigerant.

The inner frame members 37 and the side wall flue sheets 40—41 are connected to inner side plates 50 which are preferably Z-bars. The sheet 41 has a sloping upper portion 51 converging to the plane of the offset portion 46, thus facilitating attachment to the inner side plate 50. The ceiling 52 may be secured to the inner side plate 50, preferably by nailing strips 53. Clips 54 extend between the inner side plate 50 and the outer side plate 7 to stabilize the car structure. The refrigerant containers 10 are preferably supported by members 55 extending between and secured to the inner side plates 50.

Fig. 4 shows a section of the wall near the floor. The sheet 40 extends downwardly only to the floor rack 19 to provide an opening 60 for communication between the flue 25 and the space 20. Lower auxiliary members 61 protect the frame members 37 from moisture. A baffle plate 62 having vertical portions 63 and sloping portions 64, as shown in Fig. 5, divert the flow of air and moisture from behind the frame member 37 to the opening 60. The flues 25 are provided with bottom portions 65 to prevent moisture from entering the insulation.

Fig. 6 shows a construction in which the flue 70 is between the sheathing and lining 6 and has insulation 71 on each side thereof. The sheet 72 forming the outer wall of the flue 70 has offset portions 73 adjacent the outer frame members 35 and the sheet 74 forming the inner wall has offset portions 75 adjacent the inner frame members 37. Thin spacers 76 space the sheets 72—74 apart without materially restricting the air flow.

In Fig. 7 the flue 80 is formed by sheets 81—82 having a substantially wave-like shape to allow the use of insulation blankets 83 of substantially constant thickness.

There are several advantages to the construction herein disclosed. By extending the flue 25 continuously longitudinally of the car, it is possible, in order to obtain equal flue area, to decrease the width, i. e., the distance between the sheets 40 and 41. By offsetting the sheets 40—41 around the frame members 35—37 it is possible to obtain the most efficient use of wall space, i. e., the greatest flue area consistent with a uniform insulation thickness. The advantage in insulating both sides of the flue is that the circulating air is warmed but little as it flows downwardly through the flue, therefore, it reaches the lading compartment 27 at a low temperature and

vides very efficient refrigeration. The spacers 42 in Fig. 2 and 76 in Fig. 6 are preferably clips made of thin material spaced intermittently throughout the flues so as not to interfere with air flow.

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 refrigerant compartment near the roof and a floor rack spaced above the floor to provide a space therebetween, a wall comprising a sheathing, a lining supported by frame members and insulation between said sheathing and said lining, and a flue within said wall communicating between said compartment and said space and being substantially continuous longitudinally of the car, said flue being adjacent said lining and being offset away from said frame members.

2. In a refrigerator car having a refrigerant compartment near the roof and a floor rack spaced above the floor to provide a space therebetween, a wall comprising a sheathing supported by outer frame members, a lining supported by inner frame members and insulation between said sheathing and said lining, said inner frame members being staggered relative to said outer frame members, and a flue within said wall communicating between said compartment and said space and being substantially continuous longitudinally of the car, said flue being adjacent said lining and being offset away from said frame members.

3. In a refrigerator car having a refrigerant compartment near the roof and a floor rack spaced above the floor to provide a space therebetween, a wall comprising a sheathing supported by outer frame members, a lining supported by inner frame members and insulation between said sheathing and said lining, said inner frame members being staggered relative to said outer frame members, and a flue within said wall communicating between said compartment and said space and being substantially continuous longitudinally of the car, said flue having parts of said insulation on each side thereof and being offset away from said frame members.

4. In a refrigerator car having a refrigerant compartment near the roof and a floor rack spaced above the floor to provide a space therebetween, a wall comprising a sheathing, a lining and insulation between said sheathing and said lining, and a flue within said wall communicating between said compartment and said space and being substantially continuous longitudinally of the car, said flue comprising metallic sheets spaced apart by relatively thin spacers so as not to restrict the flow of air through said flue said spacers being positioned remote from said frame members so as not to impair the insulation of said wall.

5. In a refrigerator car having a refrigerant compartment near the roof, and a floor rack spaced above the floor to provide a space therebetween, a wall comprising a sheathing supported by outer frame members, a lining supported by inner frame members, and insulation between said sheathing and said lining, said inner frame members being staggered relative to said outer frame members, and a flue within said wall com-

communicating between said compartment and said space and being substantially continuous longitudinally of the car, said flue being offset inwardly adjacent said outer frame members and outwardly adjacent said inner frame members.

5 6. In a refrigerator car having a refrigerant compartment near the roof, and a floor rack spaced above the floor to provide a space therebetween, a wall comprising a sheathing, a lining,

frame members, and insulation between said sheathing and said lining, and a flue within said wall communicating between said compartment and said space and being substantially continuous longitudinally of the car, said flue being relatively thin adjacent said frame members and relatively thick between said frame members.

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