July 12, 1949. J. F. MULL 2,475,715

REFRIGERATOR CAR

Filed Feb. 18, 1948

Fig. 1.

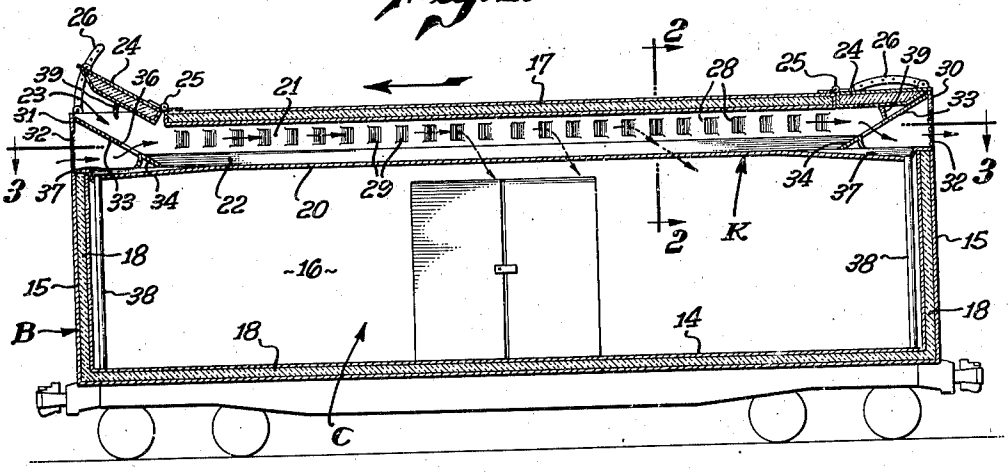


Fig. 2.

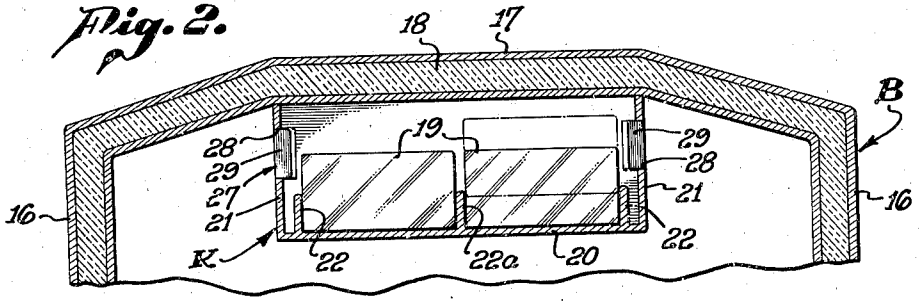


Fig. 3.

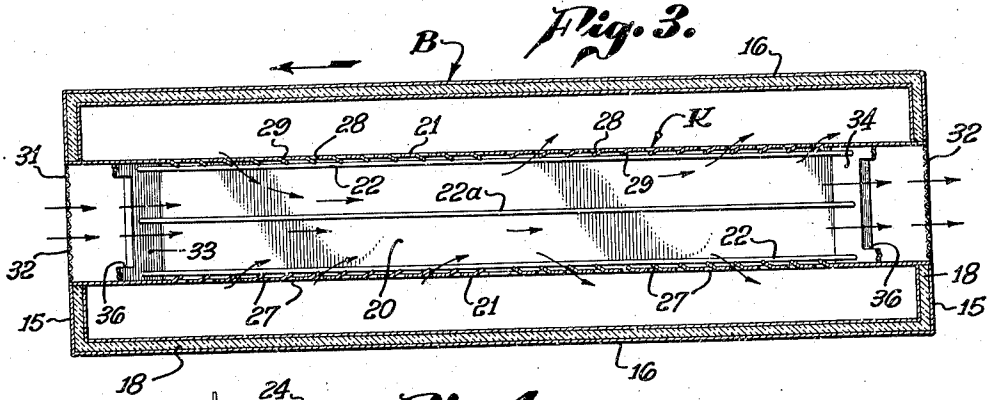
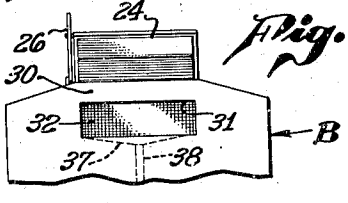


Fig. 4.



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Patented July 12, 1949 2,475,715

UNITED STATES PATENT OFFICE

2,475,715

REFRIGERATOR CAR

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Application February 18, 1948, Serial No. 9,220

8 Claims. (Cl. 62—15)

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My invention relates to refrigerator cars, and it has for a purpose the provision of refrigerator car which utilizes the traveling movement of the car to produce convection circulation of air currents therein to obtain a relatively uniform and desired low temperature substantially throughout the lading compartment of the car.

It is also a purpose of my invention to provide a refrigerator car in which the low temperature therein is obtained by the employment of only a minimum quantity of ice that can be readily introduced into the car without moving or otherwise disturbing the lading.

A further purpose of my invention is the provision of a refrigerator car which eliminates end and bottom ice bumpers, and provides a top bunker in which the ice is contained as the refrigerant, and being above the lading affords more space for the lading, thus greatly increasing the load carrying capacity of the car.

I will describe only one form of refrigerator car embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings:

Fig. 1 is a view showing in longitudinal section one form of refrigerator car embodying my invention.

Fig. 2 is an enlarged transverse sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary view showing the car in end elevation.

Having specific reference to the drawings, my invention in its present embodiment comprises a car body B including a bottom wall 14, end walls 15, side walls 16, and a top wall or roof 17, all cooperating to form a lading compartment C. Preferably the walls of the body are made double to provide a space therebetween in which is contained a suitable insulation material 18.

Suitably secured to the under side of the roof 17 and extending centrally and longitudinally of the car body is a bunker, designated generally at K, which is adapted to contain ice blocks 19, although it is to be understood that any other suitable refrigerant may be used. The bunker is substantially coextensive in length with a roof, and preferably made of metal with a bottom wall 20, and side walls 21. Rising from the bottom wall 20 are spacing members for the ice blocks 19, and these members may be in the form of flanges formed integral with the bottom. In the present instance, I provide a central spacing member 22a,

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and two side members 22, the latter being spaced from the walls 21.

As best shown in Fig. 3, all spacing members are substantially coextensive in length with the bunker, or they at least extend to hatches 23 formed in the roof 17, controlled by doors 24 hinged as at 25, and adjustable by supporting brackets 26 so that they may be opened varying distances.

As best shown in Fig. 3, the side walls 21 of the bunker K are formed at intervals along their length with louvers 27, each louver being made by cutting and interstriking the metal to provide an opening 28 and an inwardly extending baffle plate 29. As also shown in Fig. 3, each wall 21 is provided with two sets of louvers, with the louver of one set extending in the opposite direction to those of the other set for a purpose to be described hereinafter.

The ends of the bunker K terminate in vertical walls 30, each provided with an opening 31 spanned by a screen 32 to prevent dust from entering the opening. Secured to and extending downwardly from each wall 30 is an inclined chute 33, the lower edge of which abuts an inverted substantially V-shaped rib 34. Adjacent this rib the chute 33 is provided with an opening 36 the purpose of which is to allow air to pass from the end of the bunker outwardly through the opening 31.

For the purpose of draining the water from the ice blocks in the bunker and to a point exteriorly of the car body, the bottom wall 20 of the bunker at its end portions is inclined downwardly to form gutters 37 which lead to drain pipes 38. These pipes may be disposed within the lading compartment C or they may extend downwardly through the end walls 15 in order to discharge the water to a point below the car body.

In practice, when the doors 24 are open blocks of ice may be introduced into one or both ends of the bunker K through one or both of the hatches 23, the chutes 33 providing inclined planes down which the ice blocks may be slid into the bunker. The spacing of the flanges 22a and 22 is such that two channels are formed longitudinally in the bunker and each channel is of such width as to accommodate a series of ice blocks 19. The flanges 22a serve to maintain the ice blocks of one series spaced from those of the other series, while the flanges 22 not only coact with the flange 22a in holding the ice blocks against transverse movement in the bunker, but serve to space the ice blocks from the side walls 21 and also from the baffle plates 29.

Once the bunker is filled with ice blocks the doors **24** are closed thus closing the hatches **23**, and by the provision of downwardly extending lips **39** on the undersides of the doors which are curved transversely as shown in Fig. 1, air is prevented from passing upwardly around the doors when the car is in motion but deflected into the openings **36**.

With the car in motion to the left as viewed in Fig. 1, air is forced to flow inwardly of the opening **31** at the left and through the corresponding opening **36**, whence it enters one end of the bunker K. In its passage along the bunker the air is caused to travel over, between, and around the ends of the ice blocks, and thus it becomes thoroughly chilled. During its travel along the first half of the bunker the air is not permitted to pass out of the bunker because of the direction in which the baffle plates **29** along this bunker half extend, and thus the air is fully subjected to the temperature-reducing action of the ice. Upon reaching the other half of the bunker the now chilled air is divided into a multiplicity of currents which pass outwardly through those louvers that have the baffle plates **29** extending in the direction of the air flow, and then into the top of the lading compartment C.

Upon entering the top of the lading compartment the air currents, because of their low temperatures, circulate downwardly around the lading to maintain it at a nonperishable temperature, and in so doing force the warm air at the bottom of the compartment upwardly and outwardly thereof into the bunker K through those louvers at the left half of the bunker, it being understood that the exhaust of warm air from the compartment is accelerated by the inductive action of the air flowing across the openings **28** of those louvers in the first half of the bunker.

Thus by virtue of a car constructed in accordance with my invention there is produced, when the car is in motion, convection circulation of air currents therein to obtain a relatively uniform and desired low temperature throughout the entire lading compartment to effectively preserve the perishable goods in the compartment against spoiling.

As will be understood, the trailing end of the bunker must of necessity have an air outlet in order that the desired air flow will be produced in the bunker when the car is in motion. When the car is moving to the left as when viewed in Fig. 1, that air not directed into the lading compartment by the louvers, can exhaust to atmosphere through the openings **36** and **31** at the trailing end of the bunker. Manifestly, the amount of air so exhausted is relatively small, and thus the refrigerating loss is correspondingly small.

As the two ends of the car are identical in construction, the cooling system provided by my invention is operable in the manner above described regardless of the direction of motion of the car, air entering at one opening **31** or the other depending upon the direction of car movement. Further, because the ice bunker is situated at the top of the lading compartment and accupies a minimum of space therein, the lading capacity is greatly increased over refrigerator cars having end bunkers.

It will be noted that the spacing members **22** and **22a** are of such height that as the ice blocks **19** melt to substantially one half of their original height new ice blocks can be supplied to the bunker and superimposed on the half melted

blocks as indicated by the broken lines in Fig. 2 and the members will serve to hold the new blocks in fixed position transversely of the bunker. It will be understood that to maintain the lading compartment at the required low temperature to preserve perishable foods against spoiling, it is necessary from time to time to add new ice blocks.

Although I have herein shown and described only one form of refrigerator car embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of my invention and the spirit and scope of the appended claims.

I claim:

1. In a refrigerator car having a body: a bunker for block ice beneath and extending lengthwise of the roof of said body; hatches in said roof at the ends thereof leading to the ends of said bunker and through which block ice can be loaded into the bunker; said hatches having bottom walls inclined downwardly to the ends of said bunker down which block ice can be slid to the bunker.

2. In a refrigerator car having a body: a bunker for block ice beneath and extending lengthwise of the roof of said body; hatches in said roof at the ends thereof leading to the ends of said bunker and through which block ice can be loaded into the bunker; said bunker having in its ends openings for circulating air lengthwise therealong under traveling movement of the car in either direction; and means for directing the air so circulated from the bunker into the lading compartment of said body.

3. In a refrigerator car having a body: a bunker for block ice beneath and extending lengthwise of the roof of said body; hatches in said roof at the ends thereof leading to the ends of said bunker and through which block ice can be loaded into the bunker; said bunker having in its ends openings for circulating air lengthwise therealong under traveling movement of the car in either direction; and louvers in said bunkers for directing the air so circulated outwardly of the bunker into the car body.

4. In a refrigerator car having a body: a bunker for block ice beneath and extending lengthwise of the roof of said body; hatches in said roof at the ends thereof leading to the ends of said bunker and through which block ice can be loaded into the bunker; said bunker having a bottom wall and side walls extending upwardly to said roof; said bunker at its ends open to atmosphere so that under traveling movement of the car in either direction air will be caused to circulate lengthwise of the bunker; and louvers in said side walls for directing air from said bunker into the car body.

5. In a refrigerator car having a body: a bunker for block ice beneath and extending lengthwise of the roof of said body; hatches in said roof at the ends thereof leading to the ends of said bunker and through which block ice can be loaded into the bunker; said bunker having a bottom wall and side walls extending upwardly to said roof; said bunker at its ends open to atmosphere so that under traveling movement of the car in either direction air will be caused to circulate lengthwise of the bunker; and two sets of louvers in each of said walls, the louvers of one set reversely disposed with respect to those of the other set to direct air from said bunker into the car body according as the car body moves in one direction or the other.

6. In a refrigerator car having a body: a bunker

for block ice beneath and extending lengthwise of the roof of said body; hatches in said roof at the ends thereof leading to the ends of said bunker and through which block ice can be loaded into the bunker; said bunker having in its ends openings for circulating air lengthwise therealong under traveling movement of the car in either direction; means for directing the air so circulated from the bunker into the lading compartment of said body; and means for utilizing the air circulated lengthwise of said bunker for inducing air flow out of the lading compartment.

7. In a refrigerator car having a body: a bunker for ice beneath and extending lengthwise of the roof of said body, with openings at the ends thereof; hatches in said roof at the ends thereof leading to the ends of said bunker, said hatches having bottom walls inclined downwardly to the ends of said bunker, and formed with openings providing passages leading to the openings in said bunker ends; and doors for closing said hatches.

8. In a refrigerator car as embodied in claim 7, wherein said doors have members on their undersides which in the closed position of said doors block air flow upwardly to the latter and direct it into said wall openings.

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