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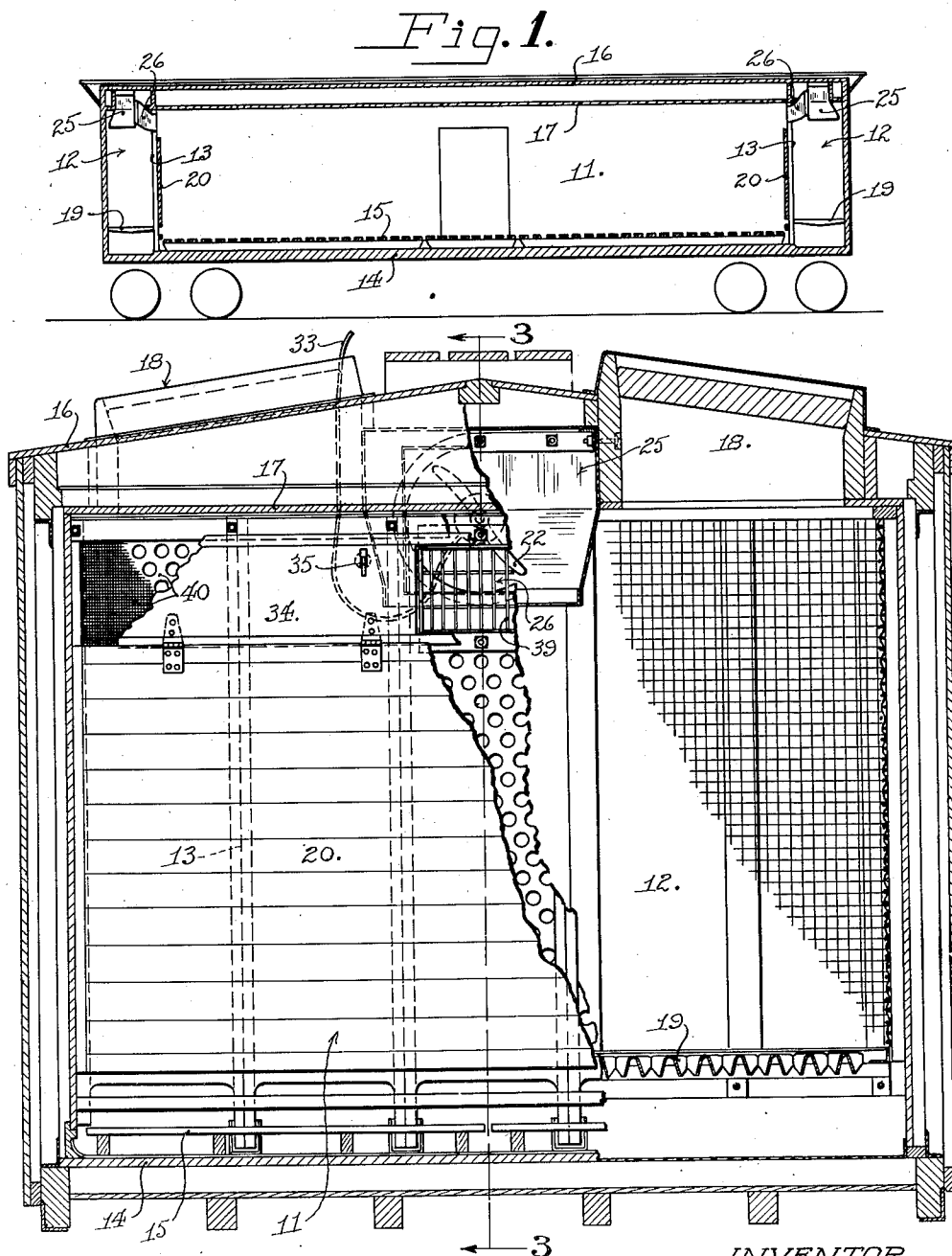
H. GIDDINGS

1,991,741

PRECOOLING APPARATUS FOR REFRIGERATOR CARS

Filed June 27, 1933

4 Sheets-Sheet 1



INVENTOR  
*Horace Giddings*  
 BY *T. B. B. & T. B. B.*  
 ATTORNEYS

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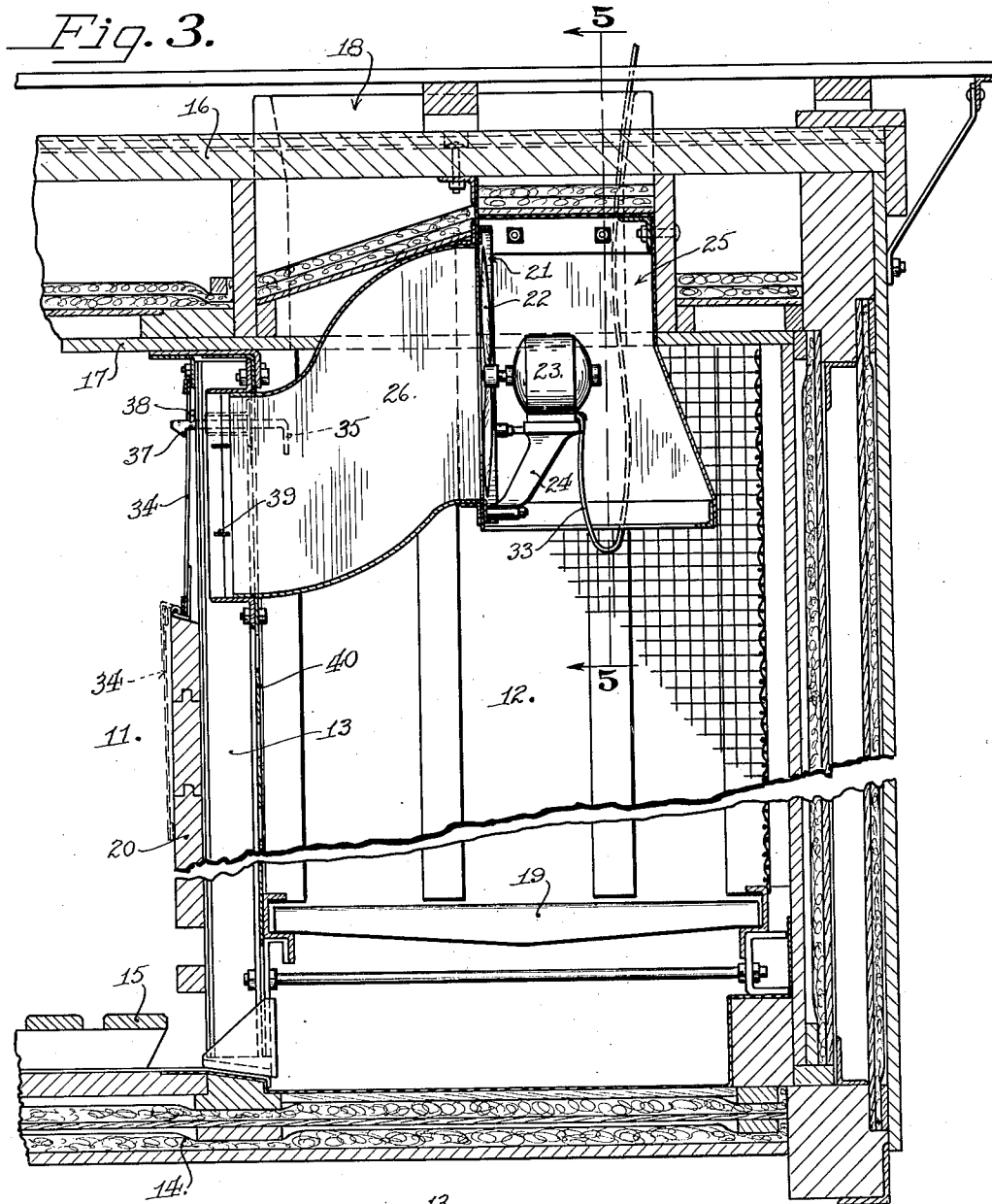
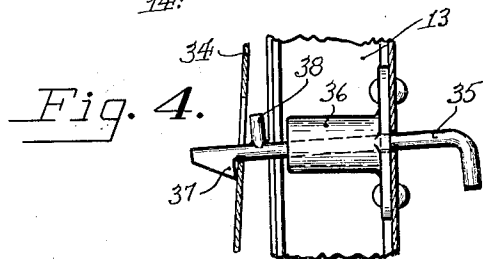
H. GIDDINGS

1,991,741

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4 Sheets-Sheet 2



INVENTOR  
*Horace Giddings*  
 BY *T. Barth & T. Barth*  
 ATTORNEYS

Feb. 19, 1935.

H. GIDDINGS

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*Fig. 5.*

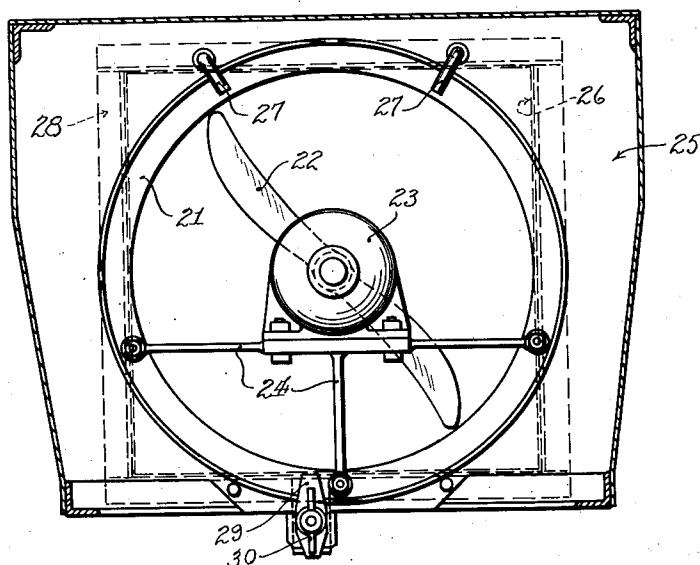


*Fig. 6.*

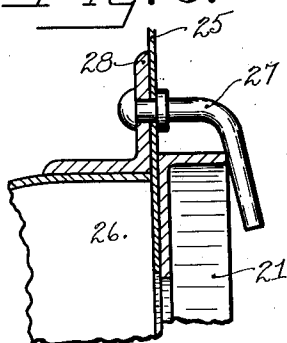
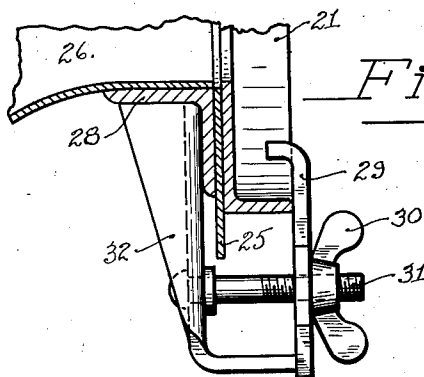


*Fig. 7.*



INVENTOR  
Horace Giddings  
BY T. Booth & T. Booth  
ATTORNEYS

Feb. 19, 1935.

H. GIDDINGS

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*Fig. 8.*

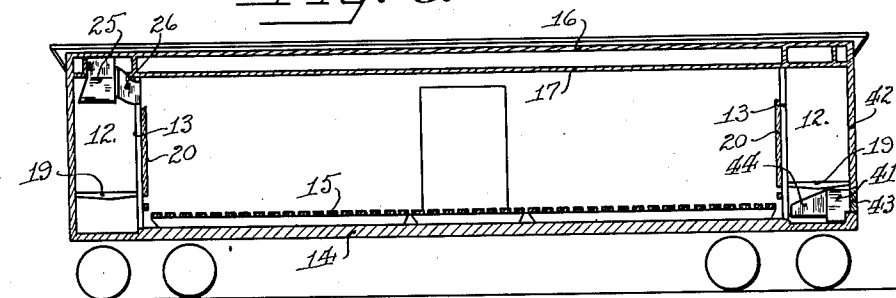


*Fig. 9.*

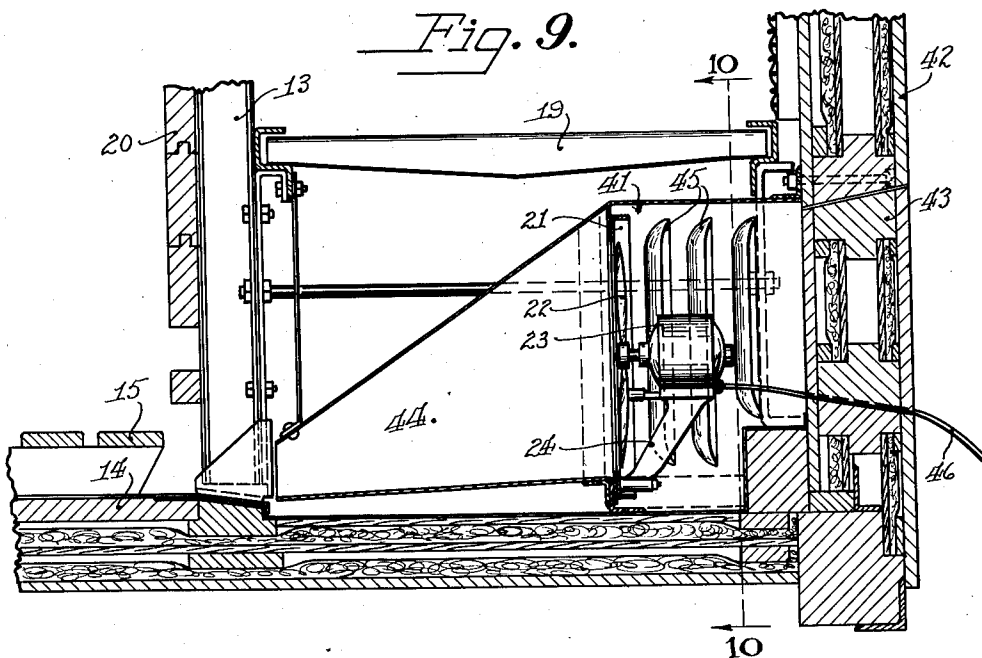
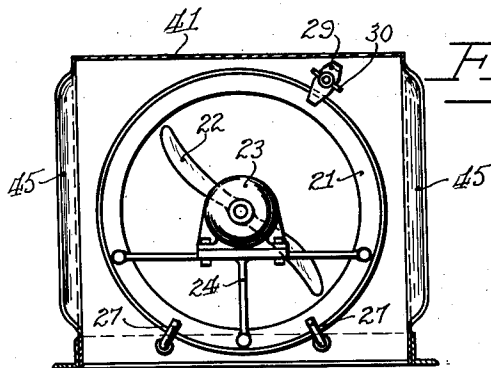


*Fig. 10.*



INVENTOR  
H. Giddings  
BY T. B. B. B. B.  
ATTORNEYS

## UNITED STATES PATENT OFFICE

1,991,741

PRECOOLING APPARATUS FOR REFRIG-  
ERATOR CARS

Horace Giddings, San Francisco, Calif.

Application June 27, 1933, Serial No. 677,837

5 Claims. (Cl. 62—24)

The present invention relates to means for circulating air successively through the refrigerating and lading compartments of refrigerator cars, and constitutes an improvement upon the apparatus for which I have applied for Letters Patent of the United States under Serial No. 624,734, filed July 26th, 1932. The objects of the invention are, in general, the same as those stated in the above mentioned application, viz:—

to accelerate the cooling of the car by forcibly circulating the air through its refrigerating and lading compartments. Such accelerated cooling is advantageous in eliminating the usual practice of pre-cooling the lading before placing it in the car; in lowering the temperature of the lading as quickly as possible; or in re-cooling the car and lading at an intermediate icing station along the route, if the interior temperature should have risen due to lack of ice.

More specifically, the principal object of the present invention is to provide removable air circulating fans, which can be easily installed in suitable mountings in the car, and removed again as soon as the pre-cooling process is completed. Under this system, each cooling or icing station is equipped with only a sufficient number of portable fans to pre-cool as many cars as may be iced and loaded at one time, thereby saving the greater cost of equipping each car with permanently installed fans. The pre-cooling process finished, the fans are removed from the cars and may be then used to pre-cool the next group or train of cars.

Other objects of the invention are to provide means for directing the forced air circulation in the most efficient manner, to provide suitable means for preventing pilfering of the lading through the air ducts, and to provide convenient mountings for the removable fans in such positions that they will not interfere with the loading or icing of the car.

The invention is herein shown and described as embodied in a railway refrigerator car using ice as the refrigerant. It will be apparent, however, that the invention may be applied, without material change, to other types of refrigerator vehicles. It should also be understood that the form, construction and arrangement of the several parts herein shown and described may be varied, within the limits of the claims hereto appended, without departing from the spirit of the invention as defined in said claims.

Reference should be had to the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional diagram of

a refrigerator car embodying a preferred arrangement of my invention.

Fig. 2 is a broken transverse section, on a larger scale, showing portions of the lading and ice compartments and the bulkhead between them, and showing also the position of one of the removable circulating fans.

Fig. 3 is a broken longitudinal section, on a still larger scale, of the same parts shown in Fig. 2, taken on the line 3—3 thereof.

Fig. 4 is a detail of the latch for holding the bulkhead gate in closed position.

Fig. 5 is a part sectional rear elevation of the removable circulating fan, showing the mounting thereof, taken on the line 5—5 of Fig. 4.

Figs. 6 and 7 are sectional details of the detachable fan securing means.

Fig. 8 is a view similar to Fig. 1 showing a modified arrangement of circulating fans.

Fig. 9 is a longitudinal section on a larger scale, of the lower right hand corner of the car shown in Fig. 8, illustrating the mounting of the fan.

Fig. 10 is a transverse section on the line 10—10 of Fig. 9.

In the drawings, the reference numeral 11 designates the lading compartment of a refrigerator car, and 12 are the ice compartments at each end thereof, separated from said lading compartment by bulkheads 13. 14 is the main floor, and 15 is the false or lading floor, consisting of spaced slats elevated a few inches above the main floor. 16 is the outer roof and 17 is the inner roof or ceiling. 18 are icing hatches in the roof, through which ice is lowered into the icing compartments, the ice resting upon grates 19. The bulkheads 13 are provided with solid pads 20 extending the full width of the car, but spaced from both floor and ceiling to provide free natural circulation of air between the ice and lading compartments. So much is common construction in refrigerator cars.

In the arrangement illustrated in Figs. 1 to 7 inclusive both ends of the car are alike. A removable air circulating fan is positioned in the upper portion of each ice compartment to force a current of cold air from the ice compartment into the upper region of the lading compartment, the warmer air returning beneath the bulkhead pad 20 to the lower portion of the ice compartment and passing upwardly through the ice to the fan.

The removable fan is preferably of the type having an angle iron mounting ring 21, Figs. 2, 3, and 5, surrounding the blades 22, the electric

motor 23 being supported by a suitable bracket 24 secured to said ring 21. The fan is positioned in a box like sheet metal housing 25 which is permanently secured to the roof frame between the ice hatches 18. The front wall of the housing has a circular opening against which the fan ring 21 is mounted. A short duct 26 extends forwardly and downwardly from the front of said housing and terminates at the bulkhead, between the upper edge of its solid portion 20 and the car ceiling. The bottom of the housing is open, and is slightly narrowed laterally, as shown in Figs. 2 and 5, to prevent interference with the ice as it is lowered through the hatches, and enlarged rearwardly, as shown in Fig. 3, to provide sufficient area for free air flow. The top, sides and rear of the housing are closed.

The fan is held against the front wall of the housing by any suitable quick detachable means. For example, I have shown a pair of bent lugs 27, Figs. 5 and 6, fixed to the upper member of a rectangular frame 28, said frame serving as the connection between the housing and the duct 26. A removable or rotatable lug 29, Figs. 5 and 7, is held by a wing nut 30 upon a stud 31 extending from a bracket 32 secured to the lower member of said frame 28. In installing the fan, it is first lowered through one of the hatches 18 into the ice compartment, and then lifted up through the open bottom of the housing 25. The top of its frame ring 21 is pushed up beneath the fixed lugs 27, and the movable lug 29 is turned to engage the bottom of said ring 21 and set up tight by the nut 30. Power is supplied to the fan motor by a flexible cable 33, Figs. 2 and 3, leading out through the hatch 18.

The space between the ceiling 17 and the top of the solid bulkhead pad 20, on both sides of the duct 26, is temporarily closed, during operation of the fan, by solid gates 34, Figs. 2 and 3, hinged to the top of said bulkhead pad. These gates, when closed, prevent air from passing from the lading compartment to the ice compartment above the bulkhead pad, so that, when the fan is running, the air must pass into the ice compartment beneath said pad, thence upwardly through the ice, by which it is cooled, thence back into the lading compartment through the housing 25 and duct 26, and finally downwardly through the lading. When the forced circulation is ended and the fan removed, the gates 34 are opened, to permit free natural circulation of air, in the reverse direction.

Each gate 34 is held shut by a latch shown in Figs. 3 and 4, comprising a shank 35 passing loosely through a guide 36 secured to one of the posts of the bulkhead 13. The outer end of the shank extends through a slot in the gate, and has opposite lugs 37 and 38 on each side of said gate. When in normal position, as illustrated, the end-most or bottom lug 37 engages the outside of the gate and holds it closed.

The gates are closed, before the car is loaded, from the lading compartment side. The fan is likewise installed, from the ice compartment, before the car is iced. Then when the car is iced and loaded, the fan is operated for a sufficient time to lower the temperature in the lading compartment to the desired point. This pre-cooling melts the ice sufficiently to enable the operator to enter the ice compartment and remove the fans. He also opens the gates 34, from the ice compartment, by lifting the latch shanks 35 to engage their upper lugs 38 with the inside faces of the gates, and pushing them outwardly. The gates

thereupon drop open by gravity. Thus there is no necessity for climbing over the lading to open the gates.

The outlet end of the duct 26 is provided with a permanent grating 39, Figs. 2 and 3, to prevent pilfering of the lading through said duct and the ice compartment. The space above the bulkhead pad, on either side of said duct, is similarly protected by the screened or perforated front wall 40 of the ice compartment.

In the arrangement of my invention described above, both ends of the car are alike, cold air entering the upper portion of the lading compartment from both ends and warmer air leaving its lower portion from both ends. In some cases, however, particularly in short cars, it is desirable to force cold air into the upper portion of the lading compartment at one end and into its lower portion at the other end. This is illustrated diagrammatically in Fig. 8. The left hand end of the car is the same as that shown in Fig. 1, with the fan in the upper portion of the ice compartment, discharging its cold air into the upper portion of the lading compartment through the duct 26. At the right hand end, however, a removable fan is placed in the lower portion of the ice compartment beneath the ice grate 19, and is arranged to blow cold air into the lower portion of the lading compartment beneath the bulkhead pad 20.

The mounting of the removable fan beneath the ice grate is illustrated in Figs. 9 and 10. A housing 41 is permanently installed in the bottom of the ice compartment, against the end wall 42 of the car. A door 43 in said end wall provides access to the interior of said housing for the installation and removal of the fan. The housing has an aperture in its front wall, communicating with a funnel like duct 44 which leads forwardly and has a low wide mouth directing the air beneath the bulkhead pad 20. The top of the housing is closed, to keep out drip from the melting ice, and its sides are provided with air inlet apertures in the form of louvers 45.

The fan itself is the same as that described above, having a frame ring 21, blades 22, and motor 23 supported by a bracket 24 from said ring. Moreover, it is removably mounted against the front wall of the housing 41 in the same manner as described above, by fixed bent lugs 27 and a movable lug 29 held by a wing nut 30, (Fig. 10). Current is supplied by a flexible cable 46 led out between the door 43 and its jamb.

The use of the arrangement shown in Fig. 8 is similar to that shown in Fig. 1. Installation and removal of the fan beneath the ice grate is somewhat easier, because it is not necessary to enter the ice compartment at any time. Moreover, no gates need be provided above the bulkhead pad, that space being always open.

I claim:—

1. In a refrigerator car having a lading compartment and a refrigerating compartment at each end thereof; housings permanently mounted in the end regions of the car, the housing at one end being near the top and the housing at the other end being near the bottom, and said housings having openings to provide air passages between said refrigerating and lading compartments; and removable power driven fans mounted in said housings to force air through said passages.

2. In a refrigerator car having a lading compartment, an adjacent refrigerating compartment, and a bulkhead therebetween, said bulk-

head being spaced from the floor and roof of the car to permit free circulation of air between said compartments; a housing in the upper portion of the refrigerating compartment, said housing having an air inlet from said refrigerating compartment and an air outlet into the lading compartment above said bulkhead; a fan in said housing; swinging gates for temporarily closing the space between said bulkhead and the roof of the car, except for the outlet of said housing, to cause all the air moved by said fan to circulate through said housing and beneath said bulkhead, said gates being swung to open into the lading compartment; and means for opening said gates from the refrigerating compartment.

3. In a refrigerator car having a lading compartment and a refrigerating compartment at each end thereof; a housing in the upper portion of one refrigerating compartment, said housing having openings into said refrigerating and lading compartments respectively and forming an air duct therebetween; a power driven fan in said housing, said fan being removable through one of said openings; a second housing in the lower portion of the other refrigerating compartment, said second housing forming an air duct between the last mentioned compartment and the lading compartment, and having an opening through a wall of the car; a power driven fan in said second

housing, removable through said wall opening; and a door for closing said wall opening.

4. In a refrigerator car having a lading compartment and a refrigerating compartment at each end thereof; an air duct connecting the lading compartment with one refrigerating compartment near the top of the car; a second air duct connecting the lading compartment with the other refrigerating compartment near the bottom of the car; and power driven fans in said ducts for circulating air between said refrigerating and lading compartments.

5. In a refrigerator car having a lading compartment and a refrigerating compartment at each end thereof; bulkheads separating said compartments, said bulkheads being spaced from the floor and roof of the car; ice supporting grates in said refrigerating compartments; a housing permanently mounted in one refrigerating compartment beneath the grate therein, said housing having air openings communicating respectively with said refrigerating compartment and said lading compartment beneath the bulkhead; a door in the wall of the car providing access to the interior of said housing; and a power driven fan in said housing for creating a circulation of air between said compartments, said fan being removable through said door.

HORACE GIDDINGS.