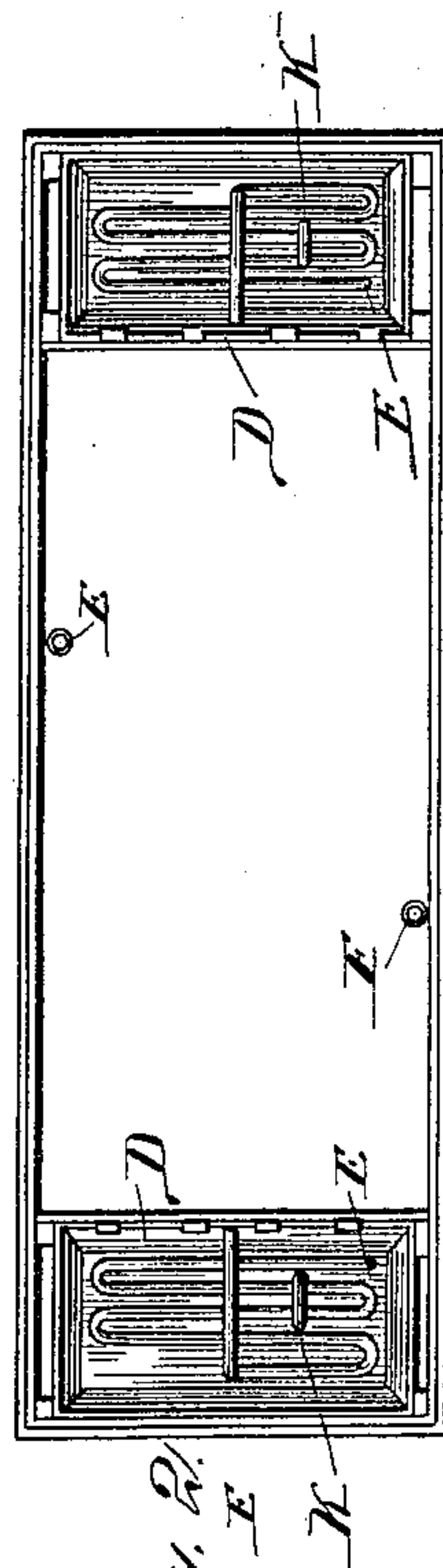
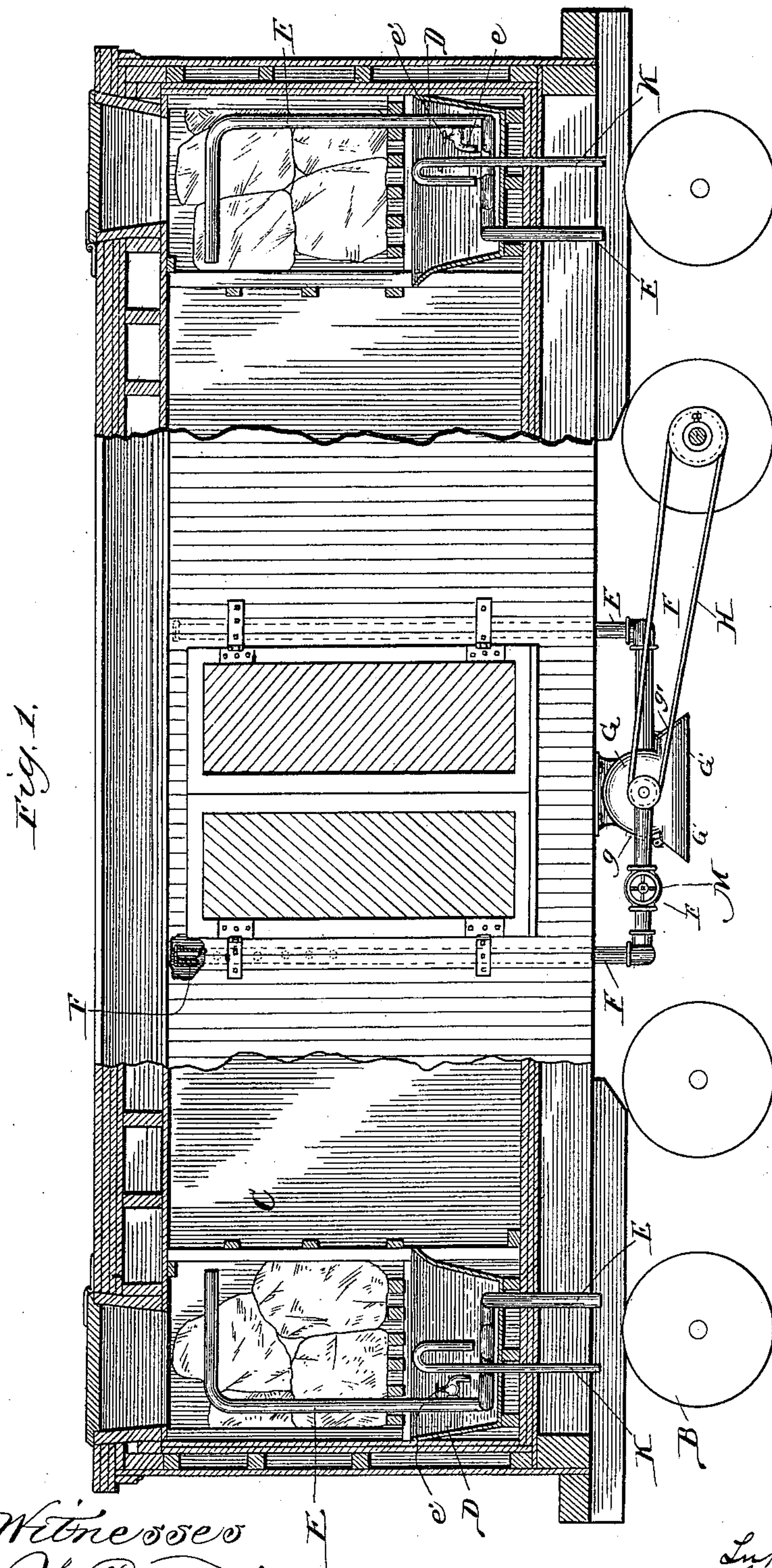


(No Model.)

L. J. & J. T. HOPE.
REFRIGERATOR CAR.

No. 434,388.

Patented Aug. 12, 1890.



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UNITED STATES PATENT OFFICE.

LUKE J. HOPE AND JOHN T. HOPE, OF KANSAS CITY, MISSOURI; SAID LUKE J. HOPE ASSIGNOR TO SAID JOHN T. HOPE.

REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 434,388, dated August 12, 1890.

Application filed March 20, 1889. Serial No. 304,058. (No model.)

To all whom it may concern:

Be it known that we, LUKE J. HOPE and JOHN T. HOPE, citizens of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Refrigerator-Cars and Similar Chambers, of which we do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

In the construction of refrigerator-cars—such as are used for the transportation of fresh beef, fruits, and other perishable articles—it is the common practice to place chambers or racks at the ends or top of the car for the purpose of holding the ice or other refrigerant, whereby the low temperature of the air within the car is to be maintained. In the construction of cars most commonly employed the endeavor has been to exclude the outside air as much as possible, and thus render the cars approximately air-tight during the time that the perishable articles are contained therein. This construction is objectionable, for the reason that the beef or other articles thus transported when finally taken from the car for use or sale are found to decay rapidly, this being due to the long retention of the beef or other articles within the close and impure atmosphere of the car. Refrigerator-cars have also been heretofore constructed in which provision was made for a circulation of fresh air through the car, in order that the foul air arising from the perishable articles within the car might be speedily removed. In the construction of this last type of car the air-supply has been introduced into the car in such manner that it contacts directly with the ice-chamber, so that it may be reduced in temperature before it is delivered into the body of the car. This construction is defective, for the reason that the incoming volume of air, by reason of its contact with the ice-chamber, melts the ice so speedily that it becomes necessary to re-ice the car so often as to render this type of car seriously objectionable.

Our present invention has for its object to overcome the defects incident to both of the above-mentioned types of car, and with this

object in view we provide means whereby the storage-chamber of the car may be supplied with fresh air, thus obviating the objections of that type of car wherein the storage-chamber is kept practically air-tight, and we obviate the objections incident to the latter type of refrigerator-car, wherein the circulation of air has been attempted, by providing means whereby the incoming volume of air may be so reduced in temperature before it contacts with the ice or enters the storage-chamber as to avoid the danger of causing the rapid melting of the ice or refrigerating material.

Our invention consists in the various novel features of construction hereinafter described, illustrated in the accompanying drawings, and particularly defined in the claims at the end of this specification.

Figure 1 is a view in side elevation of a refrigerator-car having our improvements applied thereto, portions of one side of the car being broken away and parts being shown in vertical section. Fig. 2 is a view in horizontal section, on a reduced scale, showing the relative position of the apparatus within the car.

A designates the main body of the car, the walls of which will be constructed in any improved manner, this car being mounted, in manner well understood, upon the usual trucks. At each end of the car, or at any other desired point, will be placed suitable chambers C, wherein the ice or refrigerating-mixture will be retained. These ice-chambers may be one or more in number, and their construction and location may be varied widely without departing from the spirit of our invention. Beneath the ice-chamber C are placed deep pans D, adapted to catch the drip-water from the melting ice. While these pans are shown as located immediately beneath the ice-receptacles, it is obvious that they may be otherwise located and be provided with suitable pipes leading from the ice-receptacles thereto, and if desired a single drip-pan may be used, although we prefer to provide a pan for the drip-water at each end of the car. Within each drip-pan D is extended the chill-pipe E, this pipe being preferably bent or coiled within the pan, in order

to increase the amount of surface-exposure to the drip-water within the pan, and the lower end of this chill-pipe leads outside the car, while its upper end extends preferably
 5 up through the ice-receptacle and terminates at a suitable distance beneath the roof of the car. It will be readily understood, however, that the chill-pipe E need not extend through the ice-chamber, (although such construction
 10 is preferable,) and if desired one or more chilling-chambers may be substituted for the coiled or bent portions of the chill-pipe within the drip-water pans without departing from the spirit of our invention. The purpose of
 15 these chill-pipes E is to deliver into the body of the car the supply of fresh air, and it is plain that by thus causing the volume of fresh air to pass through the drip-water within the pans D or in contact therewith the tem-
 20 perature of the air before it is delivered to the ice-receptacle, and before it passes into the body of the car, will be reduced to such extent that it will not cause the rapid melting of the ice or raise the temperature of the
 25 car. Thus, for example, if the ice chamber or receptacle contains a mixture of salt and ice, as is often the case, the water within the pan D will be considerably lower than thirty de-
 30 grees above zero, and air passing through the chill-pipes will be approximately this temperature, so that when it reaches the ice-chamber it will not serve to melt the ice.

At suitable points within the body of the car are placed eduction-pipes F, one or more
 35 in number, whereby the air will be taken from the car, these pipes being provided with suitable perforations to admit the air, and having their lower ends connected with an appropriate exhaust-fan G, that will be driven
 40 in well-known manner by suitable gearing—as, for example, a belt or chain H leading from the axle of the fan to the axle of the car. We prefer to employ two eduction or
 45 exhaust pipes F, oppositely connected to the fan, and leading from opposite sides of the car, so that an exhaust from the car will be more uniform than if a single eduction-pipe
 50 were used. The details of construction of the exhaust-fan and the means of gearing the same to the car-axle may be varied, and indeed any other suitable form of air-exhausting mechanism may be employed instead of
 55 the fan without departing from the spirit of our invention. We prefer also to cover the openings of the exhaust-pipes F with suitable wire-gauze or other fine-mesh screens, in order to prevent the entrance of flies or other insects into the storage-chamber of the car.

From this construction as thus far defined
 60 it will be seen that when the car is in motion the rotation of the car-axle will cause the movement of the exhaust-fan, thereby producing a partial vacuum within the body of the car, which in turn will cause the external air to enter through the open lower ends
 65 of the chill-pipes E, and as this air passes through the portions of these pipes within

the drip-pans it will be reduced in temperature before it is delivered into the body of the car. We prefer to provide the chill-pipes
 70 E with suitable short dip-pipes *e*, leading therefrom and dipping into the drip-pans in such manner that when the waste water reaches a certain point within the pans it will
 75 escape through the lower portions of the chill-pipes, and will thus aid in cooling the incoming volume of air by direct contact therewith, and at the same time prevent the entrance of dust through the pipes. This construction,
 80 however, while advantageous, is not essential to the broad feature of our invention. We also prefer to place within the drip-pans suitable waste-pipes K, the upper portions of
 85 which dip within the water in such manner as to convey away the water when the pans are practically full; and we prefer, also, to provide the escape-pipes *e* with suitable stop-cocks,
 90 which may be closed when the entire escape of the waste water through the drip-pipes K is desired. Thus it will be seen that if at
 95 any time it is desired to cause the waste water to discharge entirely through the drip-pipes K it is only necessary to turn the stop-cocks *e'* in such manner as to shut off the escape of water through the pipes *e*. Our pur-
 100 pose in thus providing supplemental drip-pipes K is to avoid all danger in extremely-cold weather of the freezing of the waste water within the bottom portion of the chill-pipe in such manner as to impede the introduction
 105 of the fresh-air supply through these pipes.

In the construction of exhaust-fan shown the casing of the fan is provided with a double discharge-pipe G', the opposite openings
 110 of which are closed by the flap-valves *g* and *g'*, that open outwardly. The blades of the fan will force the air as it is exhausted from the car-body through the rear branch of the discharge-pipe G', thereby lifting the flat
 115 valve of such branch of the pipe, while the valve at the end of the opposite branch is closed until the direction of travel of the car is reversed and the fan-blades revolved in the opposite direction. This construction of fan and fan-casing we do not claim herein, as
 120 we propose to embody the same in a separate application for Letters Patent.

If desired, one or both of the exhaust-pipes F may be provided with a vacuum-valve M, adapted to open inwardly, (automatically,) so
 125 that if the car be run at an exceptionally-high speed, thereby causing the fan to exert an abnormal suction or exhaust from the body of the car, the vacuum-valve will open inwardly, so as to admit air to the fan and prevent the
 130 formation of such a vacuum (or partial vacuum) within the car as would be injurious. This vacuum-valve may be of any of the well-known types of relief or gage valves in which a spring of predetermined force is used to
 135 regulated the inward movement or lifting of the valve from its seat.

It will be readily understood that the details of construction above set out may be va-

ried within wide limits without departing from the spirit of our invention; and it will also be understood that our invention, while especially applicable to refrigerator-cars, can
5 be applied also with advantage to other types of refrigerating-chambers.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

10 1. In a refrigerator car or chamber, the combination, with the chamber for ice or other refrigerant and a drip-pan for catching the waste water from said refrigerant-chamber, of a suitable escape for conducting the waste
15 water from the upper portion of said drip-pan and a chill-pipe for admitting atmospheric air, said chill-pipe having one end extending outside the car or chamber, and having a portion extending along the bottom of said pan
20 below the escape for water and having a portion extended above said pan, whereby the incoming volume of air may be passed through said chill-pipe along and through the lower portion of the drip-pan and into and up
25 through the ice or refrigerant chamber, substantially as described.

2. In a refrigerator car or chamber, the combination, with the chamber for ice or other refrigerant and a drip-pan having a suitable
30 escape-pipe for conducting the water from the upper portion thereof, of a chill-pipe leading into and along the bottom of said drip-pan beneath the escape-pipe for the water and extending through said drip-pan, a suitable ex-
35 haust-pipe communicating with the storage-chamber of the car, and suitable means, such as a fan, for exhausting the air through said pipe, substantially as described.

40 3. In a refrigerator-car, the combination, with a suitable chamber for ice or other refrigerant and a drip-pan for said chamber, of

a chill-pipe connecting the body of the car with the external air, a connection between said chill-pipe and the drip-pan, whereby waste water may be admitted to the chill- 45 pipe, and a stop-cock to prevent the flow of water through said connection, substantially as described.

4. In a refrigerator-car, the combination, with a suitable ice chamber or receptacle and 50 a drip-pan, of a chill-pipe extending within said drip-pan, a connection between said chill-pipe and the drip-pan, whereby waste water may be admitted to the chill-pipe, a stop-cock to prevent the flow of water from the drip- 55 pan into the chill-pipe, and a supplemental discharge-pipe to conduct the waste water from the drip-pan, substantially as described.

5. In a refrigerator car or chamber, the combination, with a suitable chamber for ice 60 or other refrigerant and a drip-pan for said chamber, of a chill-pipe leading to the upper portion of the interior of the car and through the lower portion of the car to the external air and extending through said drip-pan, and 65 a discharge-pipe leading from the upper portion of said drip-pan to conduct the waste water from said pan at a point above the chill-pipe, substantially as described.

6. In a refrigerator car or chamber, the 70 combination, with an exhaust-pipe extending into the body of the car and a suitable fan in gear with the car-axle for exhausting the air from the car, of a vacuum-valve arranged substantially as described to relieve the press- 75 ure upon the inside of the car, substantially as set forth.

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