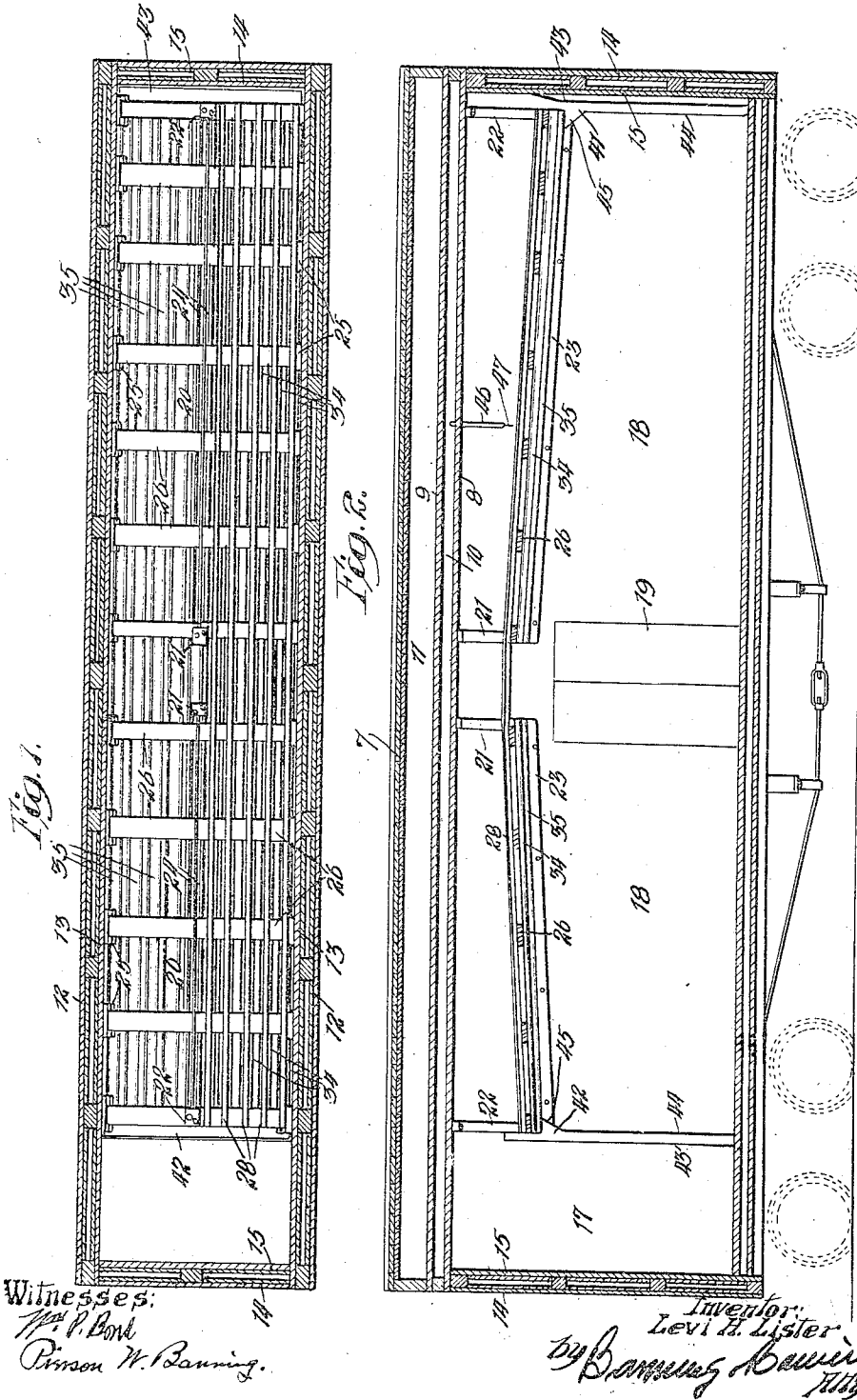


977,412.

Patented Nov. 29, 1910.

2 SHEETS-SHEET 1.



Witnesses:
Mr. P. Bond
Pinson W. Banning.

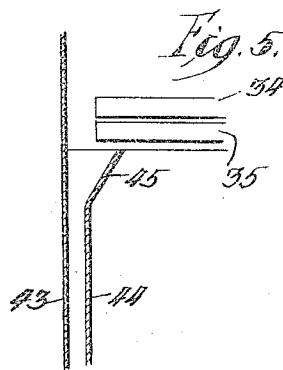
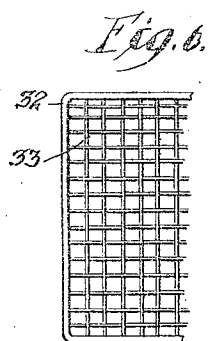
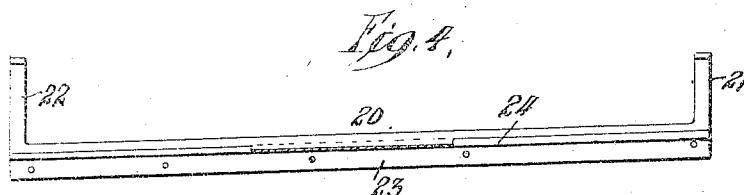
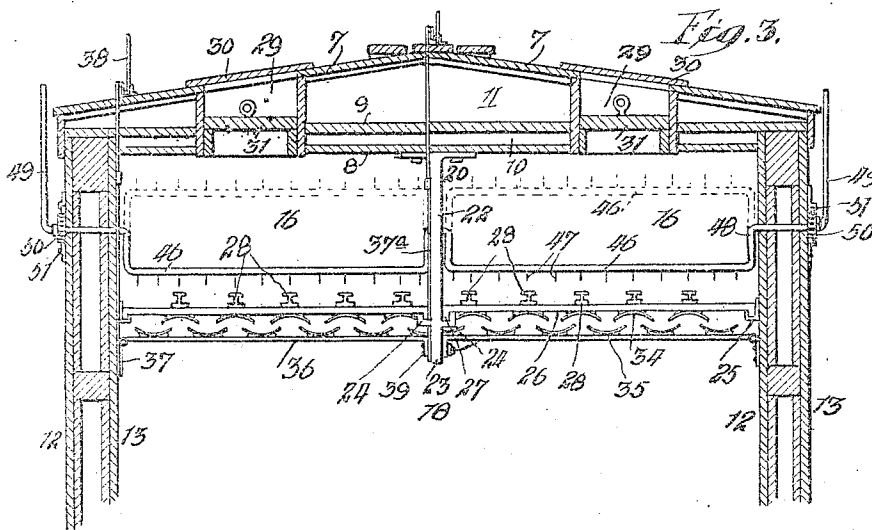
Inventor:
Levi H. Lister
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977,412

L. H. LISTER.
REFRIGERATING CAR.
APPLICATION FILED JUNE 17, 1909.

Patented Nov. 29, 1910.

2 SHEETS-SHEET 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

LEVI H. LISTER, OF BAY ST. LOUIS, MISSISSIPPI, ASSIGNOR OF ONE-HALF TO W. H. BOUSLOG, OF GULFPORT, MISSISSIPPI.

REFRIGERATING-CAR.

977,412.

Specification of Letters Patent.

Patented Nov. 29, 1910.

Application filed June 17, 1909. Serial No. 502,651.

To all whom it may concern:

Be it known that I, LEVI H. LISTER, a citizen of the United States, residing at Bay St. Louis, in the county of Hancock and State of Mississippi, have invented certain new and useful Improvements in Refrigerating-Cars, of which the following is a specification.

The present invention has particular reference to a refrigerating system adapted for the use of cold storage cars, although the system is applicable to cold storage warehouses or other structures adapted for the storage of perishable goods.

In the icing of refrigerator cars, it is the usual practice to store the ice at each end of the car, and thereafter renew the ice from time to time during transit, but this method has been found defective, in that the goods, as, for instance, fruit, stored in the center of the car will frequently spoil, in large measure, by reason of the inequalities in temperature throughout the car, due to the method of storing the ice. Where the ice is stored at the ends of the car, the cold air will be radiated toward the center of the car, not in horizontal lines but in downwardly curving lines, by reason of the natural tendency of the heavier cold air to fall toward the floor of the car, with the result that a V-shaped or wedge-shaped section of fruit or other perishable goods, stored in the center of the car, will be least affected by the cold air, so that the spoiling of the load usually takes place in the center of the car, and particularly near the top. Furthermore, such a method of refrigeration is wasteful of ice, for the reason that it necessitates a lateral radiation, so that the lowermost blocks of ice will radiate for but a very short distance laterally into the interior of the car.

The object of the present invention is to overcome the difficulties above noted, by so arranging the car that the ice will be stored in the top of the car from end to end, and not at the ends of the car, whereby the cold air radiated from the ice will fall directly and evenly onto the load stored beneath the ice.

The invention, furthermore, relates to the means provided for loading the ice into position within the ice chambers; to the means for draining the ice chambers to prevent leakage into the storage chamber, with-

out impeding the flow of cold air thereto; to the means for holding the ice against displacement, due to the jarring or jerking of the car; and to the invention as a whole and the individual parts thereof.

Further objects will appear from a detailed description of the invention, which consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a sectional plan view of the ice chamber of a refrigerator car; Fig. 2 a sectional elevation of the entire car; Fig. 3 a cross sectional elevation of the same, taken through the center of the car; Fig. 4 a detail of one of the hangers for supporting the floor rails of the ice chamber; Fig. 5 a detail, showing the drainage conduit at one end of the car; and Fig. 6 a detail of the coarse grating adapted to be used as a support for the ice.

The invention, as shown in the present embodiment, is applied to a refrigerator car having a slightly peaked outer roof 7, below which are flat inner and outer ceilings 8 and 9, respectively, leaving inner and outer air chambers 10 and 11, respectively, which are desirable in order to thoroughly insulate the ice to be stored in the upper part of the car. The car is further provided with outer and inner double side walls 12 and 13, respectively, and outer and inner double end walls 14 and 15, respectively.

The general construction of the car, as regards the arrangement of the walls and the lining therefor, follows the standard practice in the construction of refrigerator cars or similar cold storage structures. The ice is stored in the upper part of the car in an overhead ice chamber 16 of full width between the inner side walls. The overhead ice chamber extends at one end up to the end wall of the car, and at the other end terminates short of the end of the car, to provide an end ice chamber 17, although, obviously, the ice chamber may be afforded at the opposite end of the car, or both end ice chambers may be omitted and the overhead ice chamber alone provided. The remaining car space is in the form of a storage chamber 18 having the usual side doors 19. The floor of the overhead ice chamber is supported from the ceilings by means of a pair of hangers 20, in the form shown in Fig. 4, each of which hangers comprises a short center

bracket 21 and a long end bracket 22, and a connecting rail 23 provided, on each side, with a grooved flange 24. The brackets are bolted or otherwise secured to the ceiling of the overhead ice chamber, and the center brackets, being shorter than the end brackets, serve to afford a slight incline in each direction from the center toward the ends of the car.

Each of the grooved flanges 24 coöperates with a flanged bar 25 secured to the adjacent inner side wall of the car and extending parallel with the grooved flange on the hanger; and the flanged hangers and plates, coöperating together, serve to afford a mounting for a plurality of cross bars 26 provided with downturned ends 27, which fit into the grooves. The bars afford a framework upon which is laid a plurality of longitudinally extending rails 28, which have a slope or incline from the center toward the ends of the car, which rails provide an open floor for supporting the cakes of ice, which are loaded into the overhead ice chamber through a pair of chutes 29 located near the center of the car, and closed by means of an outer door 30 and an inner door 31, furnishing a dead air chamber between the doors. The arrangement is one which permits the cakes of ice to be loaded in at the center and to slide by gravity or otherwise toward the ends along the supporting rails. In place of the supporting rails, open frames 32, provided with a heavy mesh 33, may be laid in position to afford an open flooring for the ice chamber, although the rails will ordinarily be found superior, especially in car construction.

The cross bars 26 further furnish a mounting for a plurality of inverted upper troughs 34 which coöperate with a plurality of lower troughs 35 arranged to break joints with the upper troughs, which lower troughs are carried by a plurality of swinging cross bars 36 hinged, at their outer ends, to vertical slide bars 37 adapted to be vertically adjusted by means of a hand lever 38, or other suitable devices, on top of the car, for regulating the distance between the upper and lower troughs, in order to thereby regulate the circulation of cold air through the interstices between the troughs. The inner ends of the bars 36 are supported, on each side of the connecting rails 23, by means of pins 39 which are entered into vertical sliding bars 37 similar to the vertical bars 37. The lower troughs are all adapted to discharge at their ends into header troughs 41 and 42, at the ends of the storage chamber, which header troughs are preferably furnished by providing inner and outer linings 43 and 44, respectively, leaving a discharge space between the two linings.

In order to prevent leakage, the inner lining 44 is provided, at its upper end, with

a transversely extending lip 45 which underlies the ends of the longitudinally extending troughs, as shown in Fig. 2. Obviously, other means might be provided for draining off the drippings carried down through the troughs. In order to hold the cakes of ice against displacement during transit, a plurality of transversely extending spacing frames 46 are provided, each in the form of a rod having thereon a plurality of teeth 47, which rod, at its ends, is offset to afford a crank section 48 terminating in a hand lever 49,—a ratchet wheel 50 and spring dogs 51, or other similar devices, being provided to hold the lever and spacing bracket in adjusted position.

In use, the inner and outer icing doors will be opened, and the cakes of ice deposited through the roof in the center of the car. It will be noticed that the rails are substantially flat for a short distance in the center, so that the cakes of ice, when first deposited, will remain stationary until directed in either direction toward the ends of the icing chamber. As soon as a cake of ice is moved from the center position, it will slide down toward the end of the ice chamber under the spacing frames, which, during the loading operation, will be swung to the position shown in dotted lines in Fig. 3, which allows the cakes of ice to pass under the frames. As the ends of the ice chamber are filled, the spacing frames can be successively lowered, so that the cakes of ice will be held in substantially the positions in which they are initially deposited, and this is important in order to prevent the cakes of ice, after they have partially melted, from packing solely in the ends of the ice chamber and leaving the center of the chamber empty. Furthermore, the spacing frames are important in preventing undue movement of the ice cakes when subjected to the jarring and jerking of the train, which might result in damage if such movements were unimpeded.

In the shipping of perishable produce, such as berries, it is desirable that the car should be cooled rapidly and maintained at this temperature throughout transit. In order to initially cool the car, the lower series of troughs may be lowered by movements of the levers 38, which lowering will enlarge the openings between the upper and lower series of troughs and afford little or no impediment to the descent of the cold air from the overhead ice chamber. At the same time the arrangement of troughs is one which prevents drippings from the ice from coming in contact with the cargo. After the car has been initially cooled, the lower series of troughs can be elevated to bring them into close proximity to or into actual contact with the inverted upper series of troughs, so that the flow of air

from the overhead ice chamber will be decreased, thereby maintaining a low temperature without unduly melting and wasting the ice.

5 When it is desired to clean the troughs, this can be readily accomplished by swinging down the lower series on their hinges into parallelism with the sides of the car, which affords easy access to both the upper
10 and lower series of troughs.

The invention is one which serves to equalize the temperature throughout the car, and at the same time secure a maximum cooling action from the ice, by depositing
15 the ice overhead and in position to permit the cold air to pass directly downward to the storage chamber. Furthermore, the arrangement is one which simplifies and expedites the icing operation, which is very
20 important, especially on long journeys where it is necessary to re-ice one or more times before the completion of the trip.

Although the invention is intended primarily for application to refrigerator cars,
25 it will be understood that it is not limited to such application, and that in the claims, where the term "car" is employed, it is the intention, unless otherwise restricted, to cover a car or any other cold storage structure.
30

What I regard as new and desire to secure by Letters Patent is:

1. In a refrigerator car, an ice supporting floor located near the top of the car so as
35 to form an overhead ice chamber, said floor sloping downwardly from the center toward the end of the car and supported by a plurality of transversely extending bars suitably secured to the car body, a door opening
40 into the ice chamber above and in substantial alinement with the most elevated portion of the sloping floor, a series of inverted upper troughs below the ice chamber, and a series of independent lower troughs
45 below the upper troughs and breaking joints, substantially as described.

2. A refrigerating car, an ice-supporting floor located near the top of the car so as to
50 form an overhead ice chamber, said floor sloping downwardly from the center toward the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a door
55 opening into the ice chamber above and in substantial alinement with the most elevated portion of the sloping floor, a series of inverted upper troughs below the ice chambers, and a series of independent lower
60 troughs below the upper troughs and breaking joints therewith, the lower series of troughs being vertically adjustable toward
30 and from the series of upper troughs, substantially as described.

3. A refrigerating car, an ice-supporting
65 floor located near the top of the car so as to

form an overhead ice chamber, said floor sloping downwardly from the center toward the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a door
70 opening into the ice chamber above and in substantial alinement with the most elevated portion of the sloping floor, a series of inverted upper troughs below the ice chamber, a series of independent lower troughs
75 below the upper troughs and breaking joints therewith, and a transversely extending header trough into which the lower troughs discharge, substantially as described.

4. A refrigerating car, an ice-supporting
80 floor located near the top of the car so as to form an overhead ice chamber, said floor sloping downwardly from the center toward the ends of the car and supported by a
85 plurality of transversely extending bars secured to the side walls of the car body, a door opening into the ice chamber above and in substantial alinement with the most elevated portion of the sloping floor, a series
90 of inverted upper troughs below the ice chambers, a series of independent lower troughs below the upper troughs and breaking joints therewith, the lower series of
95 troughs being vertically adjustable toward and from the series of upper troughs, and a transversely extending header trough into which the lower troughs discharge, substantially as described.

5. In a refrigerator car, an ice supporting floor located near the top of the car so as to
100 form an overhead ice chamber, said floor sloping downwardly from the center toward the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a
105 center icing door in the roof of the ice chamber above the most elevated portion of the floor, and means located above the ice supporting floor for preventing movement of the ice along said ice supporting floor, sub-
110 stantially as described.

6. In a refrigerator car, an ice supporting floor located near the top of the car so as to
form an overhead ice chamber, said floor sloping downwardly from the center toward
115 the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a center icing door in the roof of the ice chamber above the most elevated portion of the floor,
120 a series of inverted troughs below the ice chamber, a series of independent lower troughs below the upper troughs, and breaking joints therewith, and means located
125 above the ice supporting floor for preventing movement of the ice along said ice supporting floor, substantially as described.

7. In a refrigerator car, an ice supporting floor located near the top of the car so as to
form an overhead ice chamber, said floor
130

sloping downwardly from the center toward the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a center icing door in the roof of the ice chamber above the most elevated portion of the floor, a series of inverted troughs below the ice chamber, a series of independent lower troughs below the upper troughs, and breaking joints therewith, the lower series of troughs being vertically adjustable toward and from the upper series of troughs, and means located above the ice supporting floor for preventing movement of the ice along said ice supporting floor, substantially as described.

8. In a refrigerator car, an ice supporting floor located near the top of the car so as to form an overhead ice chamber, said floor sloping downwardly from the center toward the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a center icing door in the roof of the ice chamber above the most elevated portion of the floor, a series of inverted upper troughs below the ice chamber, a series of independent lower troughs below the upper troughs, and breaking joints therewith, a transversely extending inner trough into which the lower troughs discharge, and means located above the ice supporting floor for preventing movement of the ice along said ice supporting floor, substantially as described.

9. In a refrigerator car, an ice supporting floor located near the top of the car so as to form an overhead ice chamber, said floor sloping downwardly from the center toward the ends of the car and supported by a plurality of transversely extending bars secured to the side walls of the car body, a center icing door in the roof of the ice chamber above the most elevated portion of the floor, a series of inverted upper troughs below the ice chamber, a series of independent lower troughs below the upper troughs, and breaking joints therewith, the lower series of troughs being vertically adjustable toward and from the upper series of troughs, a transversely extending head or trough into which the lower troughs discharge, and means located above the ice supporting floor for preventing movement of the ice along said ice supporting floor, substantially as described.

10. In a refrigerating car, a pair of center hangers extending longitudinally of the car and suspended from the roof thereof, a plurality of cross bars having their inner ends supported by the hangers and their outer ends supported from the side walls of the car, a plurality of longitudinally extending

rails laid upon the bars and sloping downwardly from the center toward the ends of the car, and an icing door in the car near the most elevated portion of the rails, substantially as described.

11. In a refrigerating car, a pair of center hangers extending longitudinally of the car and suspended from the roof thereof, a plurality of cross bars having their inner ends supported by the hangers and their outer ends supported from the side walls of the car, a plurality of longitudinally extending rails laid upon the bars and sloping downwardly from the center toward the ends of the car, an icing door in the car near the most elevated portion of the rails, a series of inverted upper troughs supported below the cross bars, and a series of lower troughs located below and breaking joints with the upper troughs, substantially as described.

12. In a refrigerating car, a pair of center hangers extending longitudinally of the car and suspended from the roof thereof, a plurality of cross bars having their inner ends supported by the hangers and their outer ends supported from the side walls of the car, a plurality of longitudinally extending rails laid upon the bars and sloping downwardly from the center toward the ends of the car, an icing door in the car near the most elevated portion of the rails, a series of inverted upper troughs supported below the cross bars, and a series of lower troughs located below and breaking joints with the upper troughs, the lower series of troughs being vertically adjustable toward and from the series of upper troughs, substantially as described.

13. In a refrigerating car, a pair of center hangers extending longitudinally of the car and suspended from the roof thereof, a plurality of cross bars having their inner ends supported by the hangers and their outer ends supported from the side walls of the car, a plurality of longitudinally extending rails laid upon the bars and sloping downwardly from the center toward the ends of the car, an icing door in the car near the most elevated portions of the rails, a series of inverted upper troughs supported below the cross bars, a series of lower troughs located below and breaking joints with the upper troughs, the lower series of troughs being vertically adjustable toward and from the series of upper troughs, and transversely extending header troughs at each end of the car into which the lower troughs discharge, substantially as described.

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Witnesses:

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