(No Model.)

2 Sheets—Sheet 1.

W. FLANAGAN.

REFRIGERATOR CAR.

No. 344,039. Patented June 22, 1886.

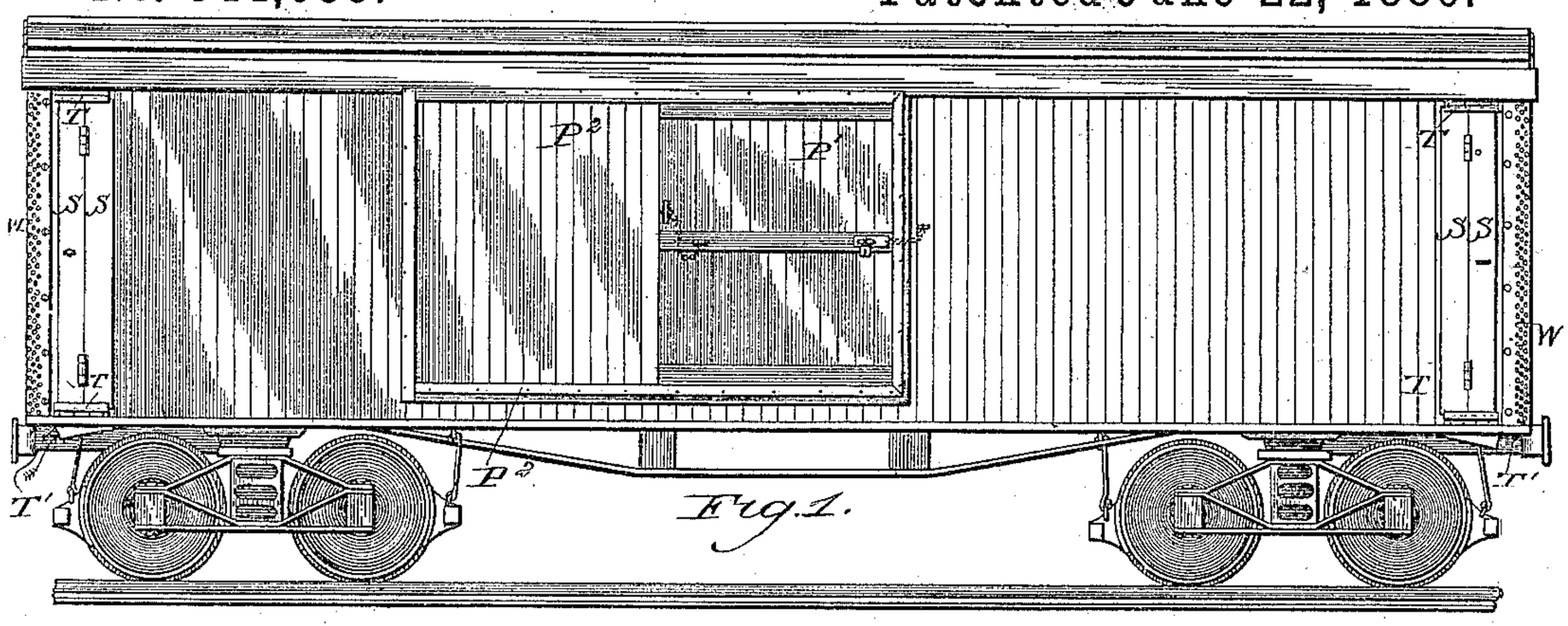

Fig. 1.

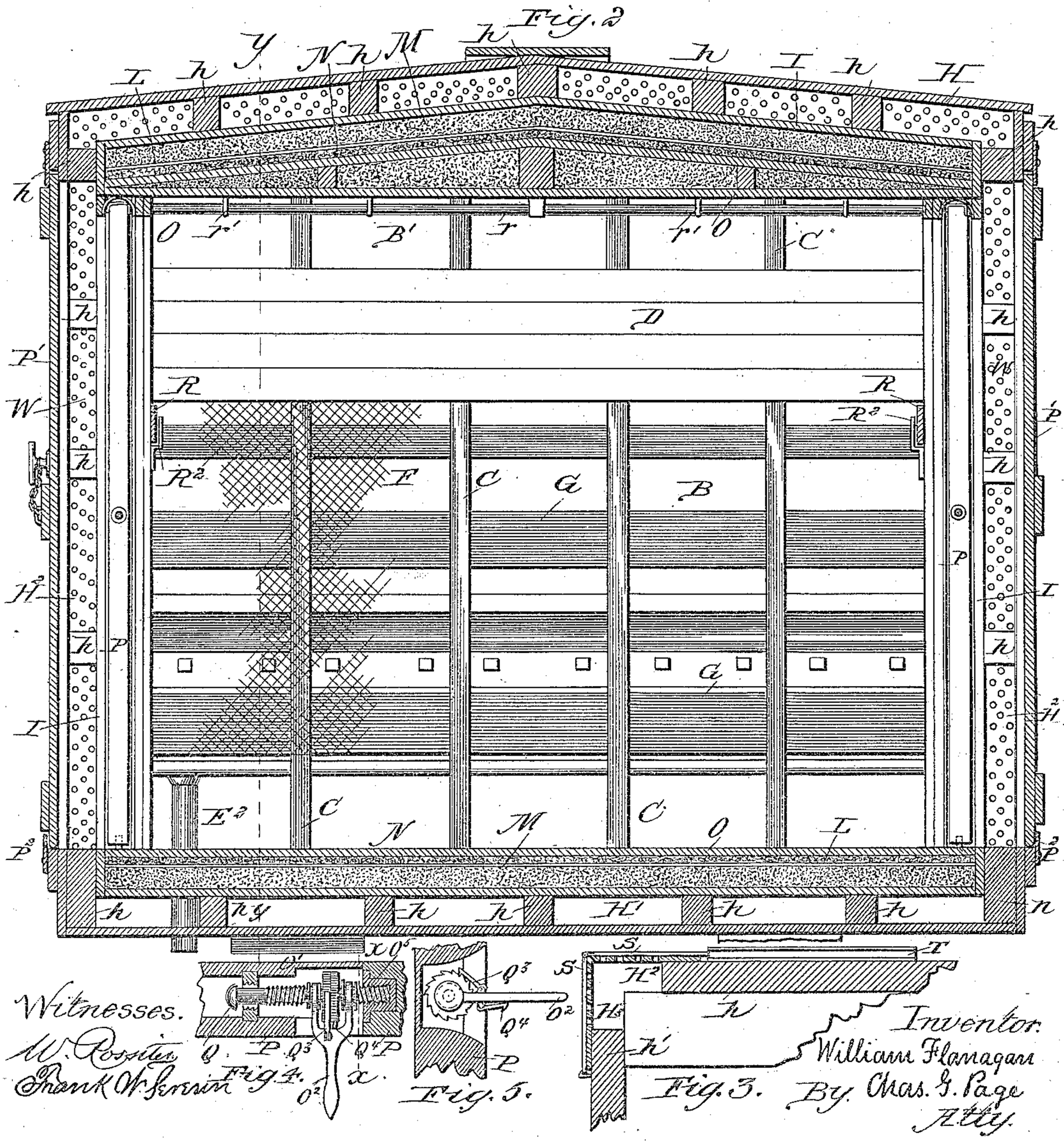

Fig. 2.

Witnesses.
W. Rossiter
Frank W. Serrin

Fig. 4.

Fig. 5.

Fig. 3.

Inventor.
William Flanagan
By Chas. G. Page
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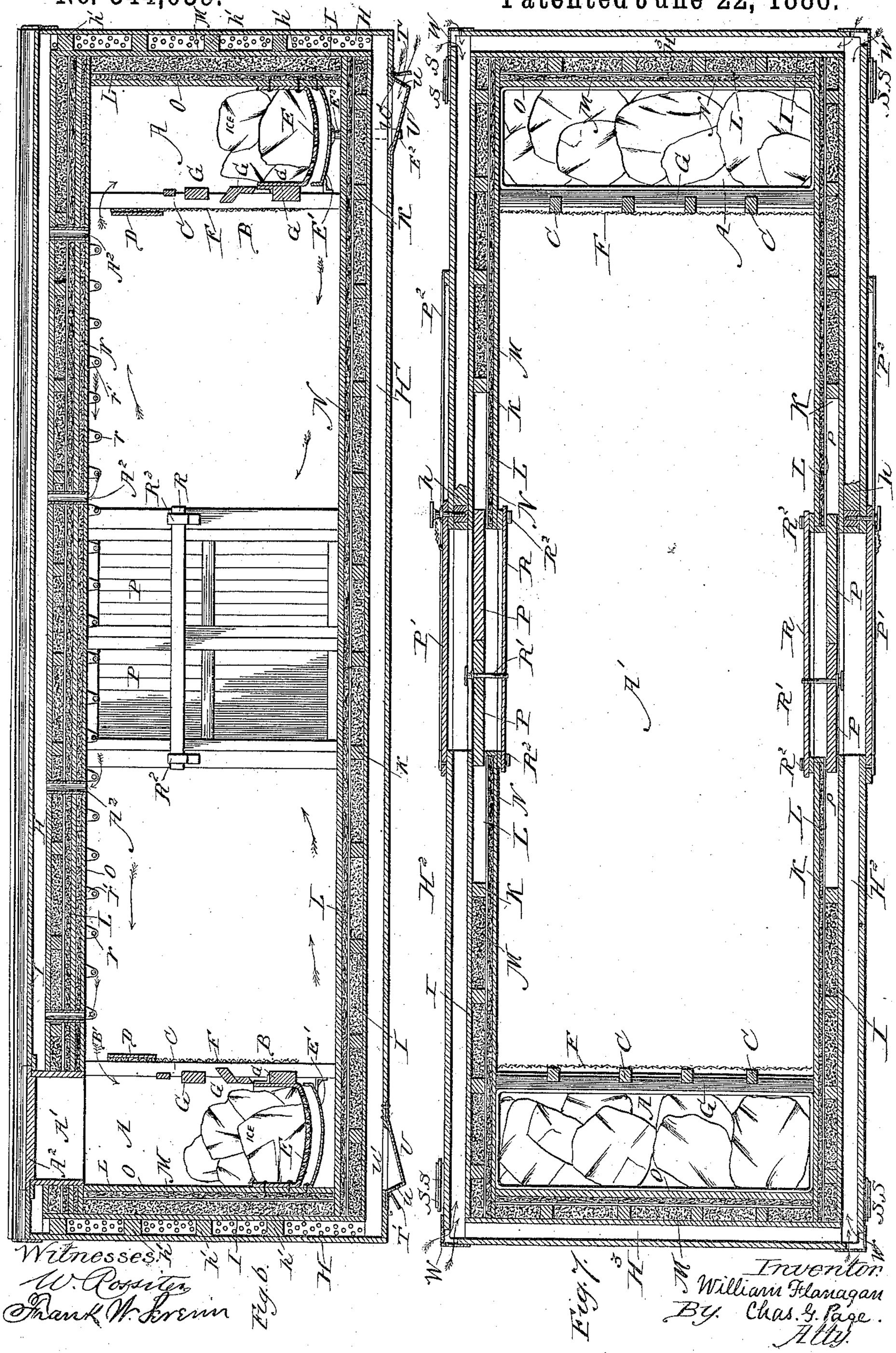

Fig. 6.

Fig. 7.

Witnesses:
W. Rossiter
Frank W. Lerrin

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UNITED STATES PATENT OFFICE.

WILLIAM FLANAGAN, OF CHICAGO, ILLINOIS.

REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 344,039, dated June 22, 1886.

Application filed September 16, 1885. Serial No. 177,234. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FLANAGAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Refrigerator-Cars, of which the following is a specification.

The general object of my invention is to provide an improved construction of refrigerator-car which can be used to advantage either as a summer or winter car for transporting perishable articles, and which, when supplied with ice as a means for reducing the temperature of the car, shall effect the saving of ice and maintain an even temperature throughout the interior of the car.

The special objects are, first, to provide a more convenient arrangement of doors in connection with a lining of some non-conducting substance which surrounds the interior of the car-space; secondly, to provide the ice-box arranged at one end of the car with an improved arrangement of upper and lower air-passages for more effectively inducing the circulation of air between the end and the middle portion of the car-space; thirdly, to provide in connection with air-passages arranged outside of the car-body an improved organization of ventilating-passages which connect with the interior car-space; fourthly, to provide improved means for securing the door of the car; fifthly, to provide said improved detail of construction, all as hereinafter described, and particularly pointed out in the claims.

In the drawings, Figure 1 represents in side elevation a refrigerator-car embodying the principles of my invention. Fig. 2 is a transverse section through the car-body. Fig. 3 is a detail illustrating a horizontal section taken through one of the end corner portions of the car-body, and serving to illustrate one of the jointed side plates in position to close one of the side and one of the end air-passages which are arranged to open at the end corners of the car-body. Fig. 4 is a detail showing a horizontal transverse section through the meeting edge portions of one of the inner sliding double doors, and showing principally in plan a locking device desirably employed to draw and hold the meeting edges of the said sliding double doors together. Fig. 5 is a detail taken through Fig. 4 on the line *x x*, so as to show the double ratchet and pawls and pawl-lever in side elevation. Fig. 6 is a vertical longitudinal section on the line *y y*, Fig. 2. Fig. 7 is a plan section on a horizontal plane through the car-body.

The interior space of the car-body is partitioned off transversely at each end portion, so as to provide the two ice-receiving chambers A A, into which ice can be filled from an opening through the top of the car. The bulk of the ice within each of these end compartments is exposed to the main interior car-space, A′, but adjacent to the ceiling a passage is provided which is separate and distinct from the space that permits the said exposure of the ice through the partition, whereby in effect each ice-receiving compartment communicates with the main interior of the car through two open passages, the one, B, extending from a point not far above the floor up to a point desirably somewhat higher than the middle of the distance between the floor and the ceiling, the other, B′, extending down a short distance from the ceiling, and both extending the entire width of the interior space from one side wall to the other. The construction of partition for thus permitting each compartment to communicate with the main interior space by upper and lower spaces or passages is desirably the same for each compartment, and may in each instance be formed as follows: Studding C is extended from the floor to the ceiling, and to this is secured a width of horizontally-arranged boarding, D, which is set down sufficiently below the ceiling to provide the upper transversely-arranged narrow passage, B′, and the lower transversely-arranged wide passage or space, B. The horizontally-arranged perforated ice-pan E is supported from and between the studding and the adjacent end wall of the car, and is set over a drip-pan, E′, which latter is also raised somewhat above the floor, so as to expose the cold under sides of the ice and the drip-pans to the air within the car, and also to utilize such refrigeration as may be obtained from the cold water dripping from the ice-pans to the drip-pans. Lattice-work F, preferably of stout wire, is applied against the studding C, and is formed to extend from the

division-strip or boarding D down to the ice-pan, in which way the body of the ice between the strips D and the ice-pans will be well exposed to the main interior car-space, and at the same time the ice prevented from accidentally falling out from its allotted chamber. To further aid in holding the ice within the ice-chamber and to strengthen the structure transversely-arranged strips G can be secured to the studding, the strips and the lattice-work being in such case respectively applied against opposite sides of the same.

By reason of the foregoing construction a circulation of air will be maintained between each end and the middle of the main interior space of the car-body, as indicated by arrows in Fig. 6, it being evident that as the air becomes cooled and condensed within the ice-compartment and along the exposed ice it will descend, thus inducing from the upper portion of the main space currents to supply its place, the refrigerated air in such case passing toward the middle of the car and supplying the place of such air as may by reason of a somewhat higher temperature rise and circulate toward the top passages, B′, of the ice-compartments. An equal temperature will thus be practically maintained throughout the entire portion of the space between the two ice-receiving compartments, and a thermometer will scarcely indicate a perceptible change in any portion of the car.

In Fig. 6 a passage, A′, is shown, formed through the top of the car, whereby ice can be introduced into one of the ice-receptacles, and a door, A^2, is provided for opening and closing the said passage. It is understood, however, that a similar passage and door are provided for each ice-receptacle.

Water is drained from the drip-pans by drip-spouts E^2, arranged to extend down through the bottom of the car, and are conveniently located at one end of each pan, the pans being in practice sufficiently inclined to permit the water to pass to the drip-spouts.

Effective ventilation is attained through the medium of a series of short air-passages, A^2, leading from the upper portion of the main interior space, and desirably formed by means of small tubes arranged to extend vertically through the top of the car-body, their lower ends opening at points along the ceiling and their upper ends opening into an air-passage that is formed along and over the entire top of the car-body.

The entire car is jacketed or inclosed by a casing adapted to provide air-passages, which open at the ends of the car, and between these air-spaces and the inner top, bottom, side, and end walls of the car is provided a packing of some suitable non-conductor of heat, which latter of itself serves as a most important and efficient means for preserving the ice.

The air-passages surrounding the car are in the main similar to those shown in the car of Letters Patent of the United States No. 304,197, assigned in part to myself; but I have found their presence in connection with the packing to materially add to the general efficiency of the structure as a refrigerator-car, and to conduce to beneficial results which it has been found impossible to attain by the car of said patent. The top air-space or air-passage, H, the bottom air space or passage, H′, and the two side air-spaces or air-passages, H^2, all extend the entire length of the car-body and open at the ends thereof, while the two end air-spaces or air-passages, H^3, open at the sides at and along the terminals of the two longitudinal side passages, H^2.

The boarding forming the exterior of the car-body and providing the outer walls of the several air-passages is secured to appropriately-arranged scantling, of which the pieces *h*, for the top, sides, and bottom, extend longitudinally along the car-body, while the pieces *h′* at the ends extend transversely thereto from side to side of the car. This entire system of scantling is boarded along the inner side to provide the inner walls, I, of the air-passages and to serve, in conjunction with the next inner studding, K, to provide a strong and substantial construction of car-body. The substantial boarding, I, is secured to the outer sides of the studding K at the top, bottom, sides, and end portions of the car-body, whereof the studding is more desirably placed vertically at its side and end portions, and transversely along its top and bottom portions, as herein illustrated.

To the inner side of the entire system of studding K is secured a thin boarding, L, which provides around the entire car at all points between the studding a packing-space to be filled with a packing, M, of some suitable non-conductor of heat, desirably sawdust. The thin boarding L also serves to provide walls at one side of the spaces allotted for the inner doors when the latter are pushed back, as hereinafter described, and in addition to the foregoing it provides a backing for a layer, N, of stout paper or felting, which is practically continuous throughout the several sides of the car-body.

Against the inner side of layer or sheeting of paper or felting is arranged the boarding O, appropriate for the interior walls of the car-body—that is to say, for the floor, the ceiling, and the side and end walls. The main interior space of the car-body, together with the ice-receptacles at the two ends thereof, will be thus inclosed by a composite wall composed of the several strata of boarding and non-conducting packing, to which the required strength and rigidity is given by the studding. The several strata of boarding and packing all extend straight from side to side and end to end of the car-body, and are practically continuous, except at the points of interruption that are necessitated for doorways at the sides, and serve to provide a composite wall having the

minimum of thickness practically attainable in a wall adapted to provide an effective non-conducting car-body.

Each side of the car-body is provided with a doorway and two doors. Of these the double inner doors, P P, when opened, are pushed back into spaces *p*, Fig. 7, reserved between the two strata of boarding I and L, while the outer single doors, P′, when opened, are pushed back along the outer sides of the car-body, said outer doors being arranged to slide in ways formed by strips or cleats P^2, that are secured to the car-body, so as to guide and support the doors. The inner double doors are when closed both drawn tightly together and held by means of a right-and-left screw, Q, which is arranged and operated as follows: The screw is provided with a right-hand thread along one end portion and a left-hand thread along its opposite end portion, and is carried by one of the sliding portions or doors of the inner sliding double doors appropriately recessed to receive and permit a longitudinal as well as a rotary movement on the part of the screws, so that the latter can at one end be extended from the edge of one of the sliding doors to engage in a threaded socket in the edge portion of the opposite sliding door.

A convenient attachment for operating the right-and-left screw consists of a pawl-lever, O^2, carrying two pawls, Q^3 and Q^4, and a double ratchet. The said double ratchet is rigid upon the middle portion of the right-and-left-threaded screw bolt, and the pawl-lever is loosely hung upon the said bolt, for which latter purpose the pawl-lever is forked so as to straddle the double ratchet, and has the ends of its two prongs bent to form loops or eyes, which are fitted to turn upon unthreaded portions of the bolt at points alongside the double pawl. The pawls will be spring-controlled in any suitable way, and arranged so that when one pawl is thrown into engagement with one line of teeth of the double ratchet the other pawl can be thrown out of engagement with the remaining line of ratchet-teeth, and held back against the pawl-levers, as shown in Fig. 5; hence, by employing one or the other of the pawls and vibrating the lever by which they are carried the right-and-left screw-bolt can be turned in the direction desired. Space is formed in the door for the end movement of the double pawl when an end movement is given to the bolt, upon which it is secured, so that the bolt can move longitudinally to an extent sufficient to project one of its ends out from the door in which it is carried, or to retract its said end within the door, as may be required. The inner end threaded portion of the bolt works through stationary nut or bearing O^5, secured in the door; but for a short distance back of the head, on the inner extremity of the bolt, the latter is desirably unthreaded, so that after the bolt has been projected sufficiently to bring its said head up against the fixed nut the bolt can still be turned so as to draw the other door, which is engaged by outer end of the bolt, tightly up against the edge of the door which carries the bolt. The outer doors when closed can be fastened and locked in any desirable way.

To further tighten up the inner double doors and prevent them from rattling during travel means are provided whereby they can be drawn and held against the boarding L, simple devices for such purposes being provided by bars R, which can be supported against the inner sides of the car-body, and screw-bolts R′, which, when the inner doors are closed, can be inserted through the same and screwed into the bars so as to draw the bars and doors toward each other. The bars can be held in any desired form of supports, R^2, secured to the inner sides of the car-body, and can be removed bodily therefrom when an entrance to the car is desired; or, if preferred, each bar could be secured at one end by a set-screw and at the other held in one of the said supports. A circulation of air is permitted and induced through the surrounding air-passages at all times when the passages are open, and in addition to such function the outer walls of the air-passages serve to protect the inner packed portion from the heat of the sun as well as from rain. Means are, however, provided for closing these air-passages in winter so as to surround the car in extreme cold weather with a dead-air space, which will effectively prevent perishable articles within the car from freezing.

As a simple construction of devices for closing said air-passages, I have provided for each corner portion of the car a pair of sliding plates, S S, hinged together and arranged to slide in guideways formed by cleats T, Fig. 1, secured along the upper and lower portions of the sides of the car-body, in which way the plates can be drawn back and away from the ends of the air-passages, so as to lie against the sides of the car-body, as illustrated in Figs. 1 and 7, or, when desired, they can be moved toward the ends of the car so as to bring their hinges coincident with the corners of the body, and thus permit one of each pair of plates to be swung round against an end of the car-body, while the remaining plate is left against the side thereof, as herein shown in the sectional detail, Fig. 3, in which one of these jointed sliding plates is illustrated in position to close one of the side and end air-passages. The bottom air-passage can be closed by hinged plates T′, Fig. 6, arranged to open or close the perforated end portions *u* of deflectors U, which are attached to the under side of the car-body and arranged to provide appropriate mouths for catching the air and directing the same through openings *u′* into the bottom passage, H′. Any means suitable will also be provided for opening or closing the top air-passage—for example, plates V can be hinged to the ends of the car in position to be swung up to close the passage at its ends. All of

these closing-plates will have means appropriate for securing them in either an open or a closed position—for example, the double plates at the sides of the car-body can be provided with set-screws or catches, and the other plates can be provided with suitable fastening media.

Perforated plates W are desirably arranged at the ends of the top, the side, and the end air-passages, to serve as strainers and otherwise guard the passages, and while wire-netting would subserve the same purpose perforated plates are preferably employed.

As a means for conveniently hanging up meats within the car, rods *r* are arranged transversely across the interior space of the car-body and secured at their ends in the sides thereof. The rods are arranged horizontally in position near the ceiling, from which latter they can be further supported by straps, staples, or hangers *r'*, attached to the ceiling. The height at which these rods are placed above the floor affords an extent of space suitable for hanging up any of the articles which it is desirable to carry within a refrigerator-car.

At the top portion of the car-body space is usually left between the horizontal boarding that forms the ceiling and the boarding that is next to the felt, and which forms a double inclined slope downwardly from the middle to the sides in conformity with the usual double slope of the roof, and, if preferred, this space can be packed with sawdust or other suitable material, as in Fig. 2.

What I claim as my invention is—

1. In a refrigerator-car, the double-wall car-body jacketed to provide surrounding air-passages, and provided with a non-conducting material which fills the spaces between its double walls, except at points adjacent to the side doorway of the car, thereby providing at said points spaces *p*, in combination with an outer door for closing the doorway-space through the jacket, and the inner doors, P, arranged to slide back into said spaces *p*, where they are pushed apart for the purpose of opening the doorway, substantially as described.

2. The refrigerator-car having its body lined with a non-conducting material and inclosed by a jacket which provides air-passages, substantially as described, combined with the ice-chambers A, located at opposite ends of the car, and each constructed with a lower air-passage, B, and upper air-passage, B', and a partition, D, intermediate of said passages and between the middle and top portion of the car-space A', substantially as set forth.

3. The refrigerator-car body lined with a suitable non-conducting material and jacketed to provide surrounding air-passages opening at the ends of the car into the external atmosphere, combined with the ice-chamber A, located at the ends of the car and constructed with the upper and lower air-passages, substantially as set forth, and a series of tubes, A, located at intervals through the top of the car from one ice-chamber to the other, and providing ventilating-passages which lead from the interior car-space to the longitudinal air-passage that extends over the roof, substantially as described.

4. The double-wall refrigerator-car body provided adjacent to its side doorway with spaces *p*, combined with the inner sliding doors, P, arranged to slide back into said spaces, the right-and-left screw Q, for drawing the opposing edges of said doors tightly together, and means, substantially as set forth, for operating the said right-and-left screw.

In witness whereof I hereto sign my name in the presence of two subscribing witnesses.

WILLIAM FLANAGAN.

Witnesses:
CHAS. G. PAGE,
FRANK W. SEVERIN.