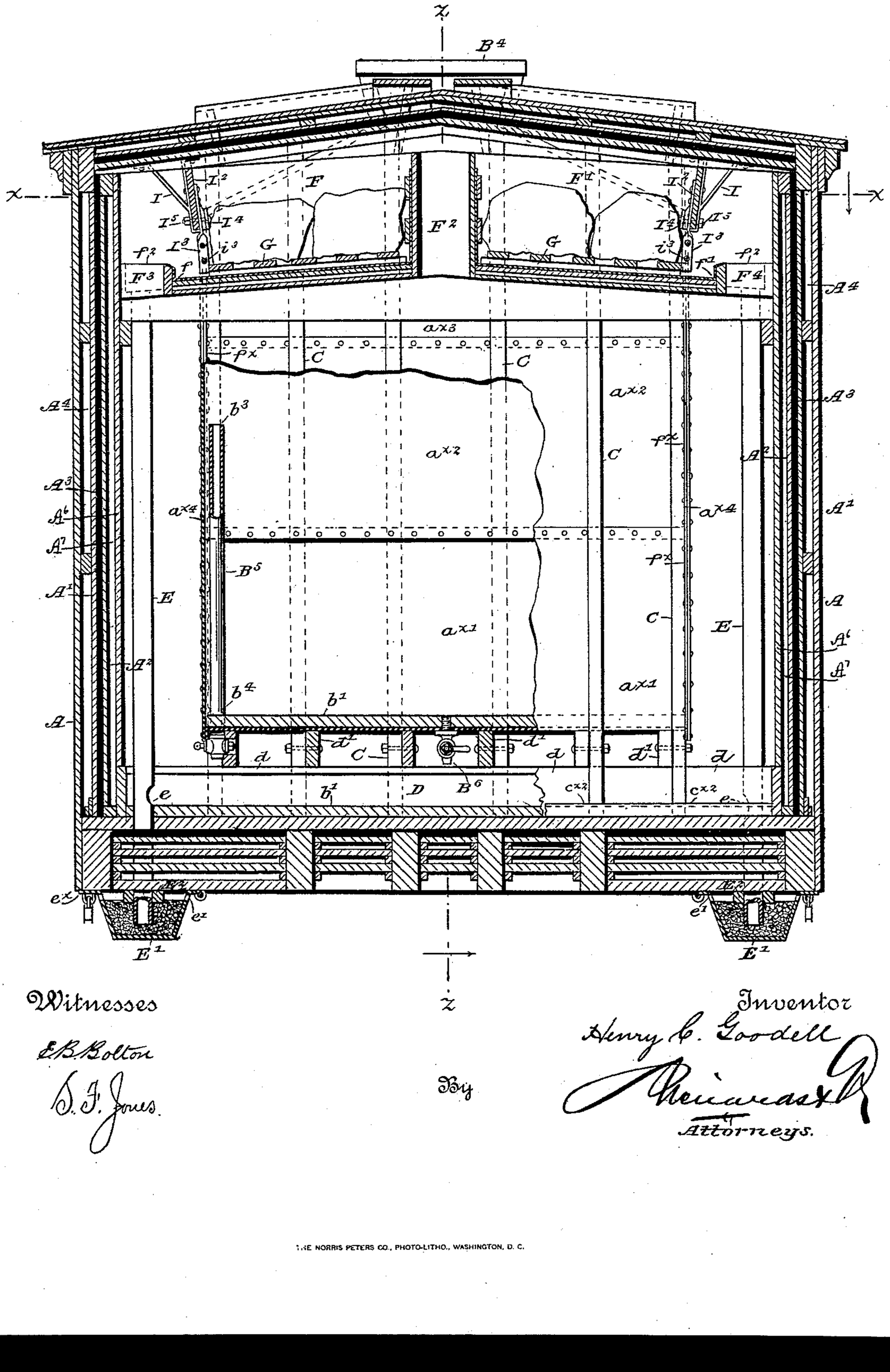
(No Model.) 4 Sheets—Sheet 1.

H. C. GOODELL.

REFRIGERATOR CAR.

No. 496,154. Patented Apr. 25, 1893.

Fig. 1.



Witnesses

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(No Model.) 4 Sheets—Sheet 2.

H. C. GOODELL.

REFRIGERATOR CAR.

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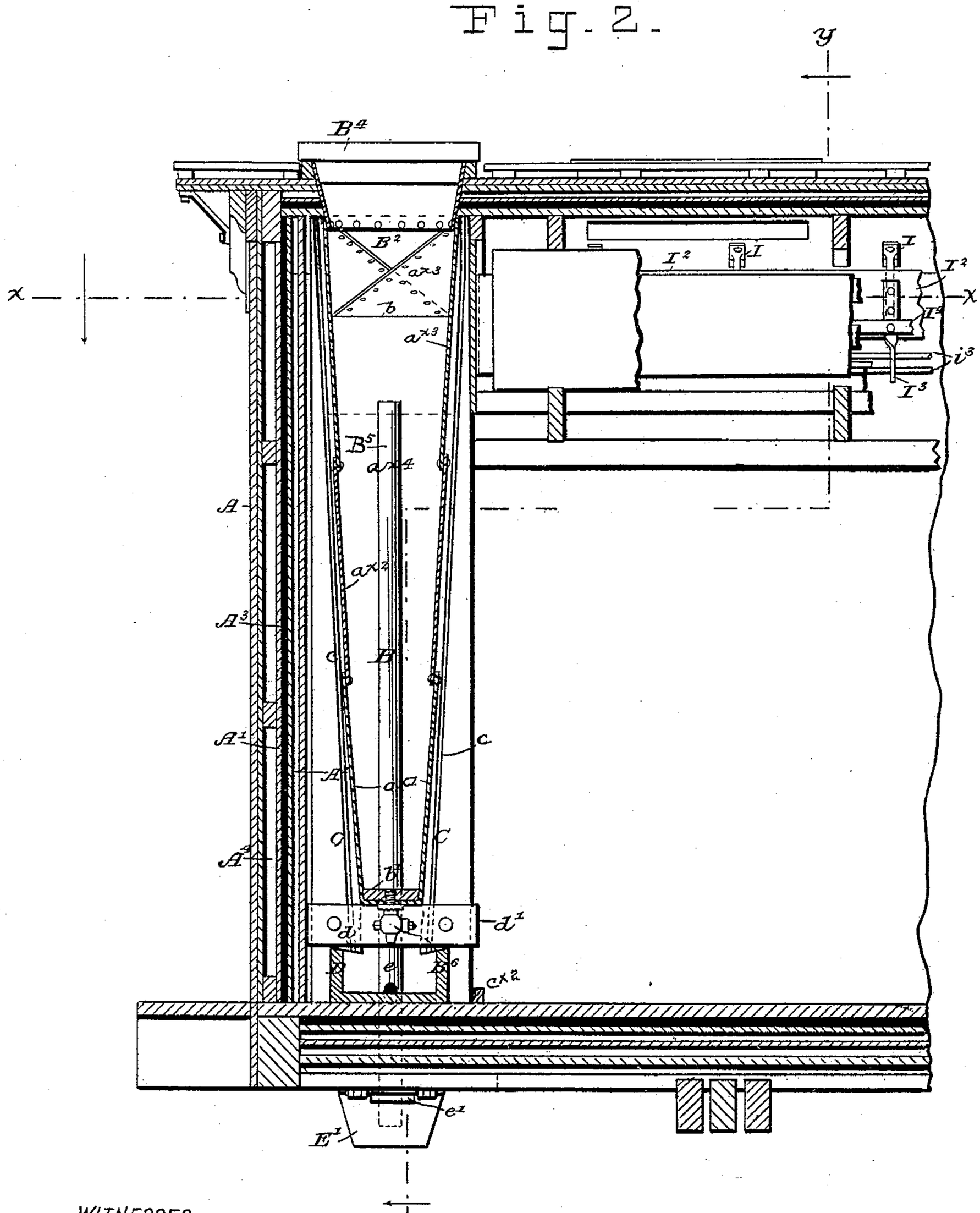
Fig. 2.



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(No Model.)

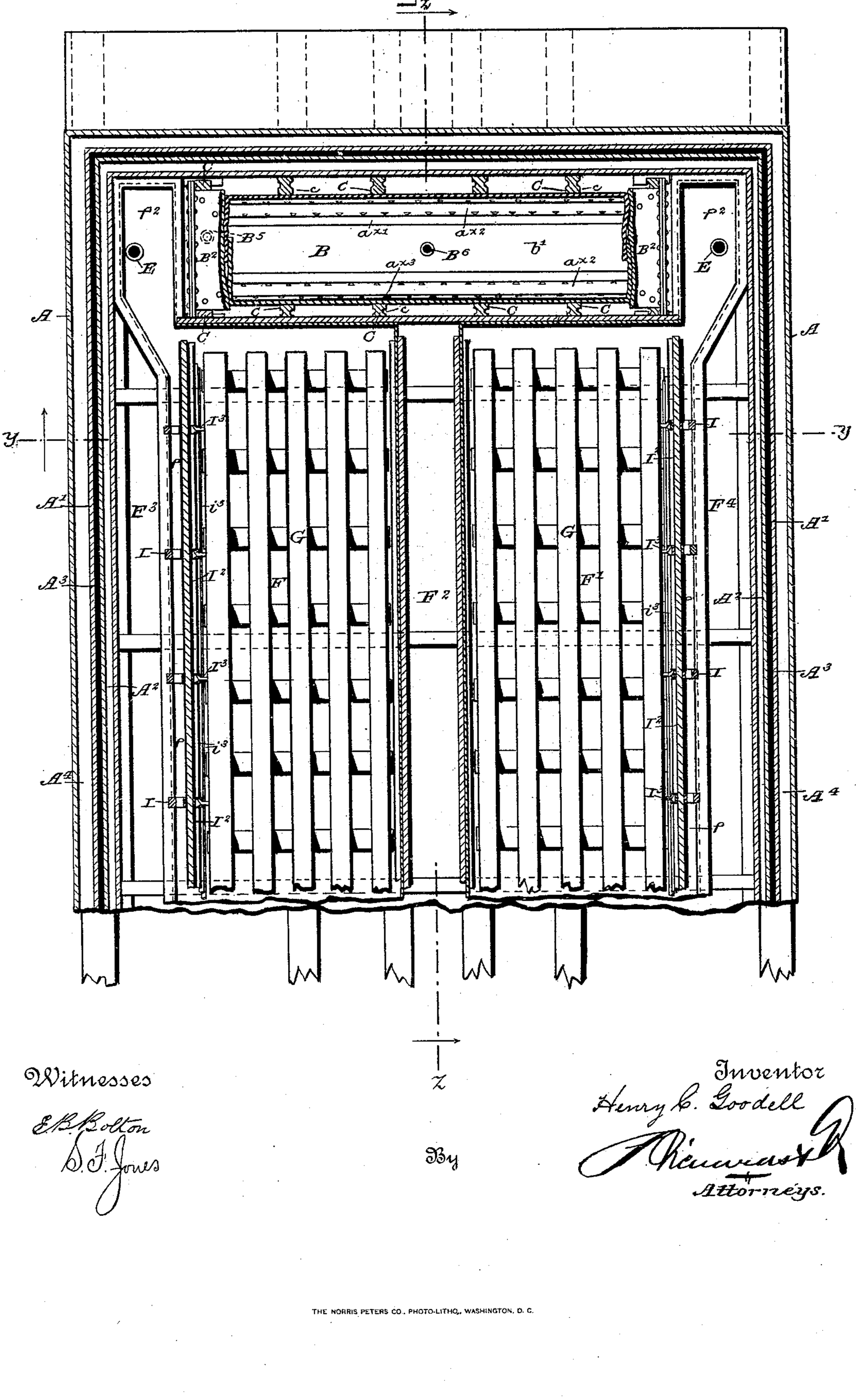
4 Sheets—Sheet 3.

H. C. GOODELL.

REFRIGERATOR CAR.

No. 496,154. Patented Apr. 25, 1893.

Fig. 3.



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(No Model.)

4 Sheets—Sheet 4.

H. C. GOODELL.

REFRIGERATOR CAR.

No. 496,154. Patented Apr. 25, 1893.

Fig. 9.

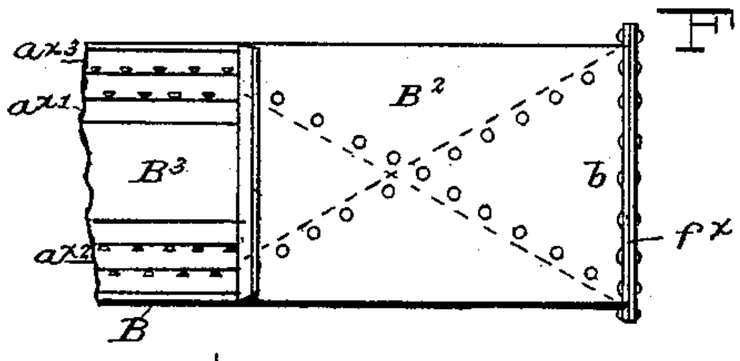


Fig. 4.

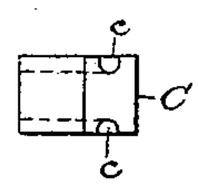


Fig. 7.

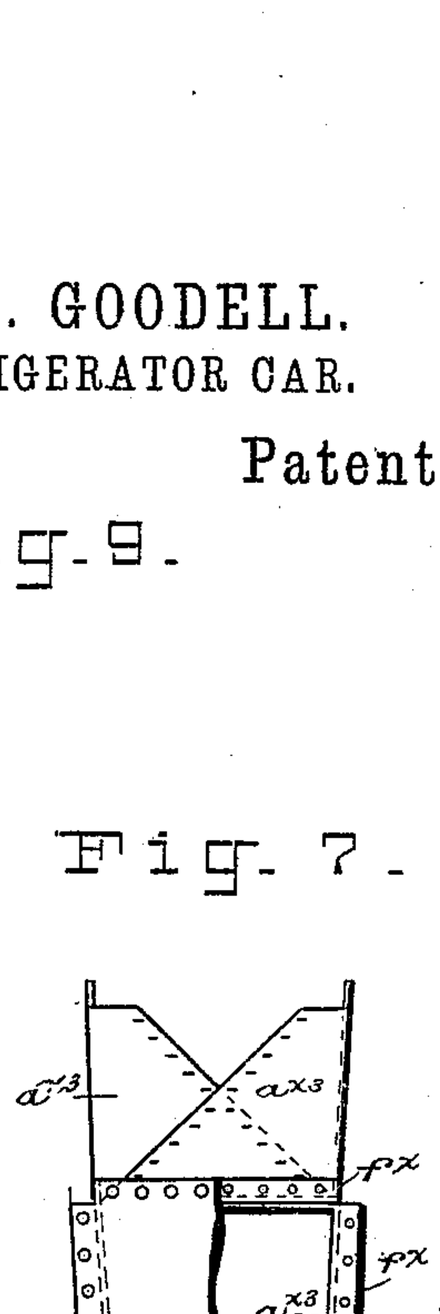


Fig. 8.

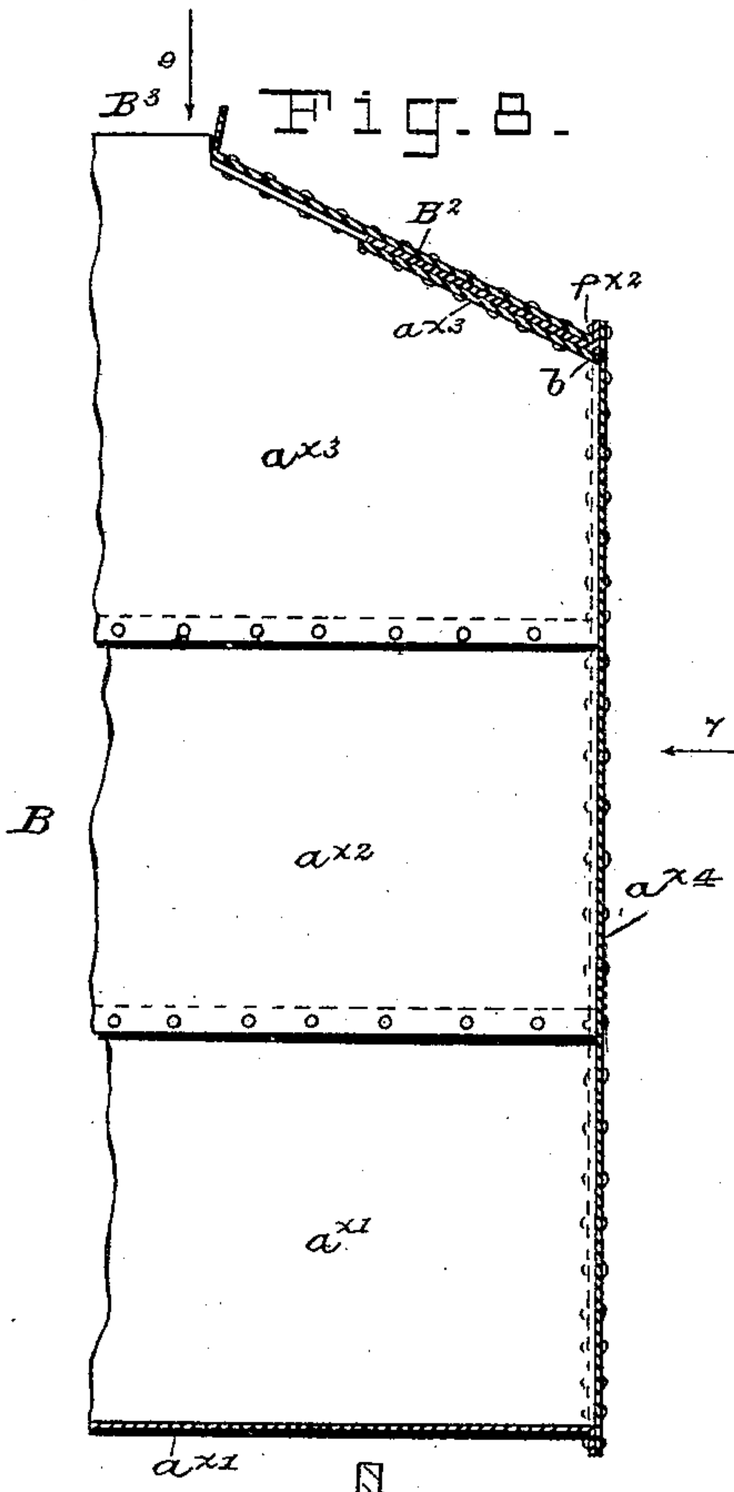


Fig. 5.

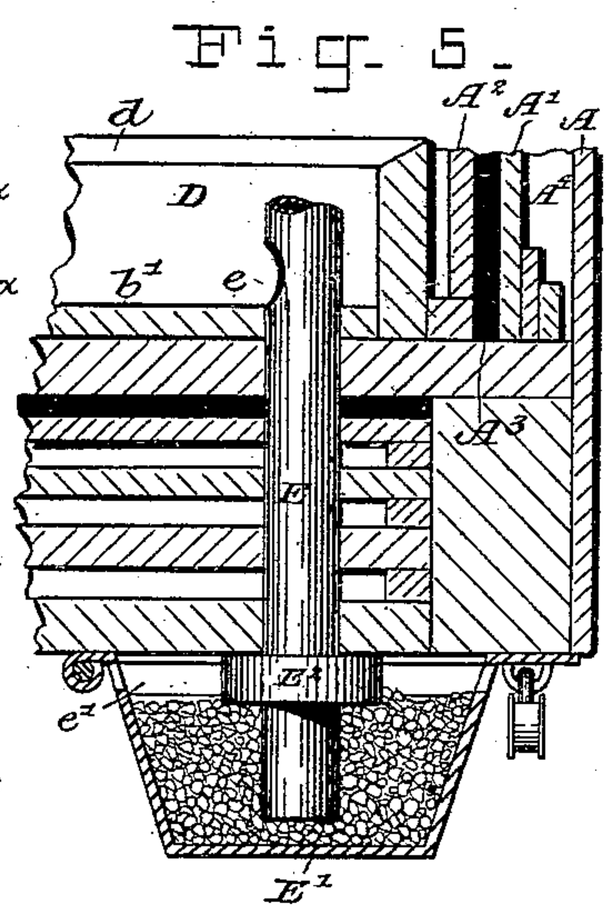
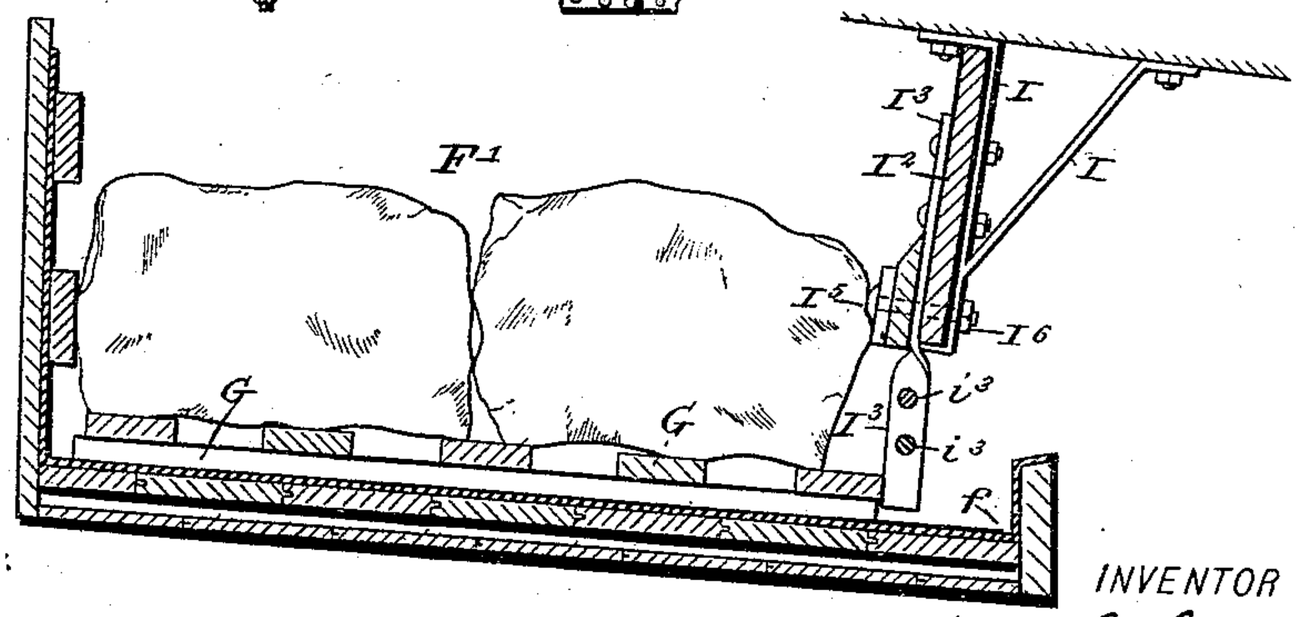


Fig. 6.



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S. F. Jones.

INVENTOR

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ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY CARR GOODELL, OF ATCHISON, KANSAS.

REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 496,154, dated April 25, 1893.

Application filed September 10, 1892. Serial No. 445,583. (No model.)

To all whom it may concern:

Be it known that I, HENRY CARR GOODELL, a citizen of the United States, and a resident of Atchison, in the county of Atchison and State of Kansas, have invented certain new and useful Improvements in Refrigerating Structures; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to certain improvements in the construction of the refrigerating chambers whereby a low and even temperature of the storage compartment of the structure may be maintained, and to certain details of construction whereby various advantages are obtained, as hereinafter more particularly described.

The invention will be understood on reference to the accompanying drawings, which represent the invention as applied to a railway car, and in which:

Figure 1 is a transverse vertical sectional view of a car, taken on the line *y y* of Figs. 2 and 3 and looking from the center of the car. Fig. 2 is a central longitudinal vertical section, taken on the line *z z* of Figs. 1 and 3. Fig. 3 is a horizontal section, taken on the line *x x* of Figs. 1 and 2. Fig. 4, is a detailed view of the grooved studding post. Fig. 5, is an enlarged detailed view in section of one corner of the car showing the drain pipe in elevation. Fig. 6, is a sectional view of one of the ice racks. Figs. 7, 8, and 9 are detailed views of the ice tank.

When the invention is applied to a railway car, the side and end walls and the top of the car are constructed in a similar manner to that heretofore described and shown in my former patents on improvements relating to the subject of refrigerating structures. They consist, preferably, of an outer boarding, A, with double lining partitions, $A' A^2$, inclosing between them a space A^3, packed with lamp-black or other suitable non-conducting substance, and separated from the outer wall A by an intervening space A^4, equal to the width of the timbering which forms the frame-work of the car. An inner lining or partition A^6, is provided with a space A^7 between it and the partition A^2. At each end of the car or structure constructed in this general manner is placed a refrigerating tank or ice-chamber, B. This tank or chamber extends from the roof of the car nearly down to the floor thereof, and nearly the entire width of the car, as shown in Figs. 1 and 3. The tank or chamber is of tapering or approximate wedge shape, being wider at the top than at the bottom, and is arranged with its widest part at the top of the car or structure; the object of which form and arrangement, is to allow for the upward expansion of the refrigerating mixture of salt and broken ice and the meltings of the ice with which it is filled, which expansion will occur at times when the temperature of the chamber is reduced to or below the freezing point and ice is formed. Without such allowance for expansion the tendency of the expansive force would be to burst the tank and thereby cause a leakage of its contents and a consequent interruption of the refrigerating process.

The tank B is made of sheet metal, and is constructed as shown in Figs. 1, 2, 8 and 9. A section of sheet metal, $a^{\times'}$, is bent on each side of its center, in the direction of its greatest length, in the shape of a trough or gutter, and this forms the bottom and two opposite sides of the tank. Above these two sides are arranged two flat sections or sheets, $a^{\times 2}$, with their lower edges underlapping the upper edges of the trough or gutter sheet on the inner side thereof, as shown more particularly in Figs. 1 and 7. Above these two sections $a^{\times 2}$ are two similar sections or sheets, $a^{\times 3}$, underlapping them as shown. The ends of all these sections have their edges turned outward to form flanges, $f^{\times}$. The bottom and two sides being thus formed, the other two sides, or ends, are formed by tapering sheets or plates, $a^{\times 4}$, which are secured by riveting to the flanges and filling the joints with solder, thus forming a perfectly water-tight joint.

The top of the tank is inclined downward from a central aperture B^3 to the line *b b*, Fig. 1, corresponding with the top edges of the end pieces or sheets $a^{\times 4}$, and is formed as follows: The upper edges of the upper sections or sheets $a^{\times 3}$ are lapped one over the other, as shown in Fig. 7, and their edges formed with the flanges $f^{\times}$ as above described. Over these lapped portions are laid two plates, B^2, the

lower edges of which are formed into flanges $f^{\times 2}$ and riveted to the plate $a^{\times 4}$, and the upper edges of which are turned upward and form two sides of the central aperture B^3, the other two sides of which are formed by extensions of the upper edges of the two upper sections $a^{\times 3}$. The joints are made tight by means of solder as above described. This construction of the tank secures a free circulation of air over the top of the tank and down the back and underneath the tank into the cold storage compartment.

The central aperture B^3 provides for supplying ice to the tank B. It fits in a corresponding opening in the top of the car or structure, and is provided with a tightly-fitting cover B^4. The refrigerating tank or ice chamber thus constructed rests above a trough or gutter, D, hereinafter more particularly described, and is supported in a frame-work formed of upright studding pieces, C, on the exterior of its two opposite widest sides. These studding pieces C are tapered longitudinally, and have their widest ends at the bottom and their narrowest ends at the top, as shown in Fig. 2. By this construction and arrangement a partition is produced which is of uniform or nearly uniform strength as compared with the pressure acting against it, and so produces the maximum strength required, with a minimum of material and consequent minimum loading of the car with dead weight. The studding pieces exteud down to the floor of the structure, outside of the gutter D, and are there secured by a foot piece $c^{\times 2}$ placed in front of them and nailed to the floor. By this construction, the tanks B are guarded by the studding pieces C on one side from contact with the contents of the storage compartment, and on the other side they are kept from contact with the end of the car or structure; so that a free circulation of air is secured around all sides of the tank, which thus presents a great amount of refrigerating surface.

In the inner edges of the studding pieces C are vertical grooves *c*, such as are shown in some of my former patents, for intercepting the condensation of moisture on the sides of the tank and conducting the same to the trough floor at the bottom of the structure and below the tank.

The bottom or floor of the tank B has a cushion formed of wooden pieces, *b'*, which protect the bottom of the tank from injury when lumps of ice are thrown into it from the aperture B^3.

A stand-pipe, B^5, is placed in the tank B, as shown in Figs. 1 and 2, to carry off any superabundance of water that may accumulate in the tank by the meltage of the ice therein. As it is not desirable to keep the tank absolutely free from water at all times, the upper end b^3 of this pipe extends about half the height of the tank and its lower end b^4 extends below the bottom of the tank and terminates just above the floor or bottom of the gutter D. By means of this pipe B^5, the water formed in the tank B, by meltage or condensation above the upper end b^3 of the pipe, is carried off through said pipe; and the water and broken ice, mixed with salt, which is in the lower part of said tank below the top b^3 of the pipe, forms a powerful refrigerating mixture, which may sometimes be sufficiently reduced in temperature to congeal the mixture.

The bottom of the tank is provided with an outlet cock B^6, by means of which all the accumulated water in the tank may be withdrawn when desired.

The gutter, D, (see Figs. 1 and 2,) is arranged under the tank, and rests on the floor of the car. On the side walls *d* of the trough are placed transverse strips *d'*, on which the tank B rests. The top edges of the walls *d* are chamfered or beveled inwardly and downwardly. This gutter collects and carries off the drainage from the pipe B^5, together with the drippings from condensation on the sides of the tank and in the vertical grooves *c*, of the studding pieces C, and discharges the same through an aperture *e* in a vertical drain pipe E. The drain pipes E are located at or near the corners of the structure, and carry off the meltage of the ice from the overhead ice boxes F F' provided with the drainage gutters *f f'*, with which the upper ends of the pipes communicate. The lower ends of the drain pipes E discharge into traps which allow the escape of water therefrom while at the same time preventing the access of air through them into the said pipes and thence into the refrigerating compartments. These traps consist of basins E', attached to the bottom of the structure so as to allow the lower ends of the drain pipes to extend down into them and terminate near their bottoms. The upper edges of the basins are flanged at $e^{\times}$ and provided with overflow apertures *e'* through which the water from the drain pipes E can escape. One edge or flange of the basin is hinged to the bottom of the structure, and the opposite edge or flange is provided with a slot for engagement with a staple and a padlock or fastening bolt or key; by which means provision is made for holding the basin in place when in use and for lowering it in order to discharge the entire contents. When in use, the basin or trap may be filled with salt or other suitable substance, through which the water may easily escape without permitting air to enter, and also preventing the formation of ice in winter.

In order to more fully guard against the admission of air, or to prevent it from impinging against the sides of the pipe E, a collar or shield, E^2, is placed around the exterior of said pipe on a line with the escape duct *e'*, thereby shielding the said pipe from any incoming current of air and preventing the formation of ice on the said pipe.

The main ice-boxes, F F', are arranged at the top of the structure, as in my former pat-

ents, and they are separated by a central air passage, F^2, and have outer air passages, F^3 F^4, between their outer sides and the sides of the structure. This arrangement secures a free circulation of the warmer air of the refrigerating structure up through the central passage F^2, and thence through the ice-boxes F F′, and from thence the cold air descends into the refrigerating structure through the side openings F^3 F^4. The tanks B are placed one at each end of the structure, and the main ice-boxes F F′ extend the entire length of the structure between said tanks. This makes the formation of the gutters *f f′* continuous from one end of the structure to the other. These gutters lead into basins f^2, formed in each of the corners of the structure, as shown in Figs. 1 and 3, and the drain pipes E carry off the meltage from the ice in the boxes F F′.

The ice-boxes F F′ are provided with removable wooden racks, G, which hold the ice from contact with the floor or bottom of said boxes, thereby allowing the air to circulate around and under the ice so as to secure the greatest possible refrigerating surface and consequent cooling of the air thereby. These racks when in place rest on the bottoms of the ice-boxes, and their outer-edges bear against the edges of straps or bars I^3 hereinafter described.

Attached to the roof or ceiling of the car or structure, near the ends and at certain intermediate points, on two opposite sides, are iron braces or brackets I, (see Fig. 6) of V shape in their cross section, the two branches of which are turned or flanged outward and secured by bolts to the roof or ceiling. Against the inner sides of these braces rests a board or strip I^2, extending longitudinally of the car, resting on the offset at the bottom of the bracket and fitting snugly the roof of the car. Next to this board I^2, opposite each brace I, rests the upper portion of an iron strap or hanger bar I^3, the lower portion of which is turned or twisted at a right angle with the upper portion. Against the upper portions of these bars or straps rests a wooden strip or bar, I^4, which is secured in place by bolts I^5 passing through the braces I, board I^2, strap I^3, and strip or bar I^4, and secured by nuts I^6. In the lower portions of the straps or bars I^3, which are at right angles to the upper portions, are holes, through which pass iron rods, of three-eighths gas pipe i^3. These rods are about two inches apart, and the upper one is about two inches from the lower edge of the strip or bar I^4. The outer edge of the rack G, bears against the inner edges of the lower portion of the strap or hanger bar I^3, and is thus prevented from slipping outwardly down the inclined surface of the ice-box; while the lumps of ice resting on the rack in the ice-box are arrested by the strips or bars I^4 and the rods i^3, so that ample space is left between the ice and the side of the structure for the free circulation of air, and no piece of ice of larger dimensions than the spaces between the rods i^3 can pass between them.

It is obvious that the improvements which are herein shown as applied to a railway car are equally applicable to any form of refrigerator, whether stationary or built on a car or vessel.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination, with the ice boxes F, F′, gutters formed along one edge of the ice box and basins f^2 at the end of the car forming an extension of the gutters, and drain pipes leading from said basins, substantially as described.

2. In combination, with the ice boxes F, F′ extending the length of the car, gutters *f, f′* for draining the same, a drain pipe E, a trough D, an end tank draining into the same and an outlet from said trough through pipe E, substantially as described.

3. In combination, with the ice boxes F, F′, the gutters, the end tank B, the trough D, below the same and the pipes E, having trapped ends, said pipes passing from the ice boxes through the trough D, with openings in the pipes E, in line with the bottom of the trough to drain the same, substantially as described.

4. In combination with the drain pipe E, a trap having a filling covering the end of the pipe and a collar encircling the pipe above the filling, substantially as described.

5. A tapering or wedge-shaped ice-tank provided with a surrounding frame-work of studding pieces made tapering and arranged with their wider and stronger ends at the bottom of the structure, so as to give said structure the maximum of strength with the minimum of material, substantially as shown and described.

6. In combination with a refrigerating tank, a drip gutter D, beneath the same having upright side walls supporting cross pieces upon which said tank rests, the upper edges of said side walls being beveled or inclined inwardly, and studding pieces grooved in their sides the grooves emptying into the trough, substantially as and for the purpose set forth.

7. In combination with the ice-chambers F F′ and the ice racks G carried thereby, the bracket I and the hanger bar I^3, depending into line with the ice rack and holding it in place, substantially as and for the purpose shown and described.

8. The combination with the tank B and the trough D, of the stand pipe B^5 extending a distance within the tank the outlet cock B^6 and an outlet from the trough, substantially as shown and described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY CARR GOODELL.

Witnesses:
J. E. CHRISTIE,
M. L. ROWAY.