(No Model.) 3 Sheets—Sheet 1.

G. B. ZANTZINGER.

REFRIGERATOR CAR.

No. 538,144. Patented Apr. 23, 1895.

Fig. V.

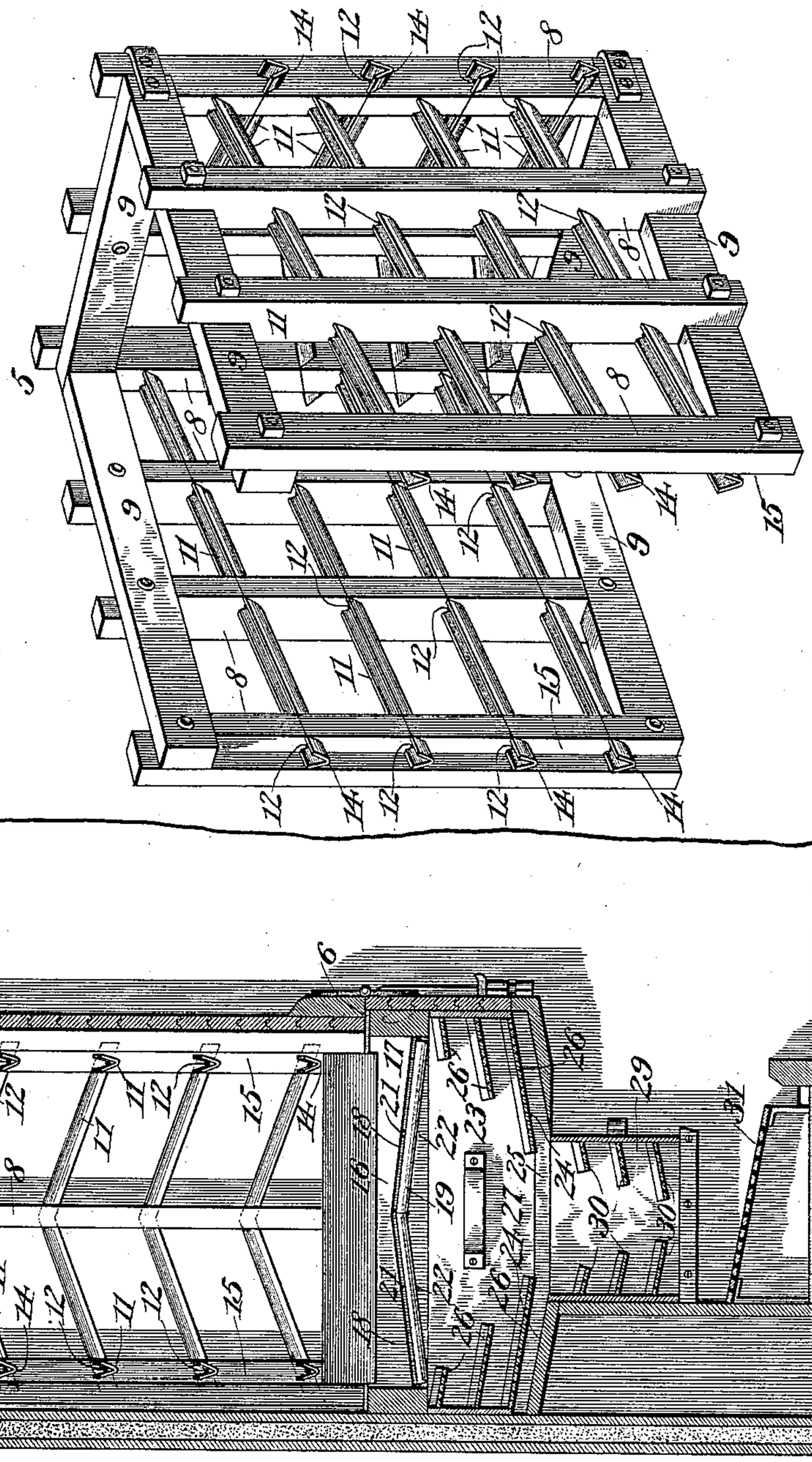

Fig. I.

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(No Model.) 3 Sheets—Sheet 2.

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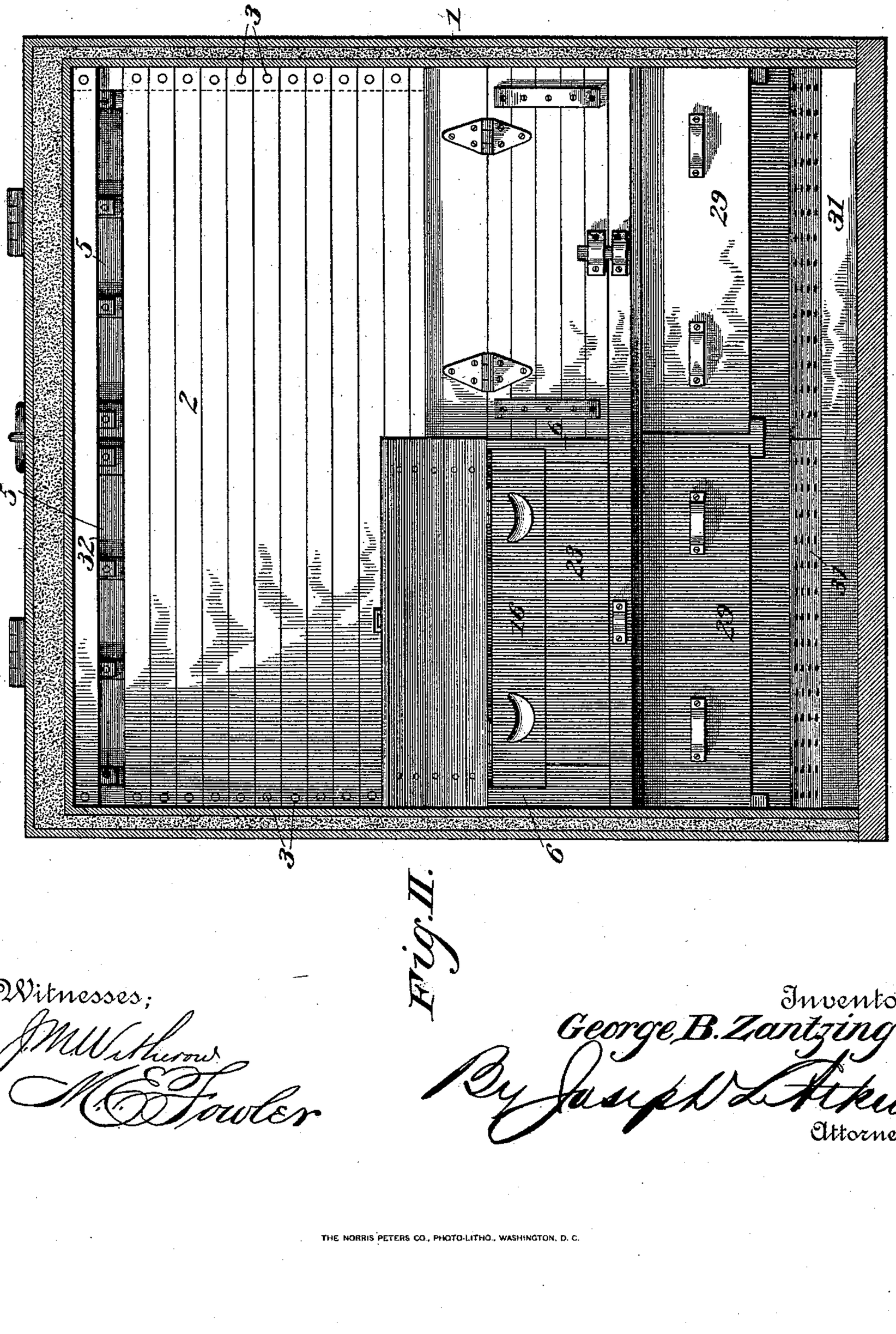

Fig. II.

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(No Model.) 3 Sheets—Sheet 3.

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Fig. III.

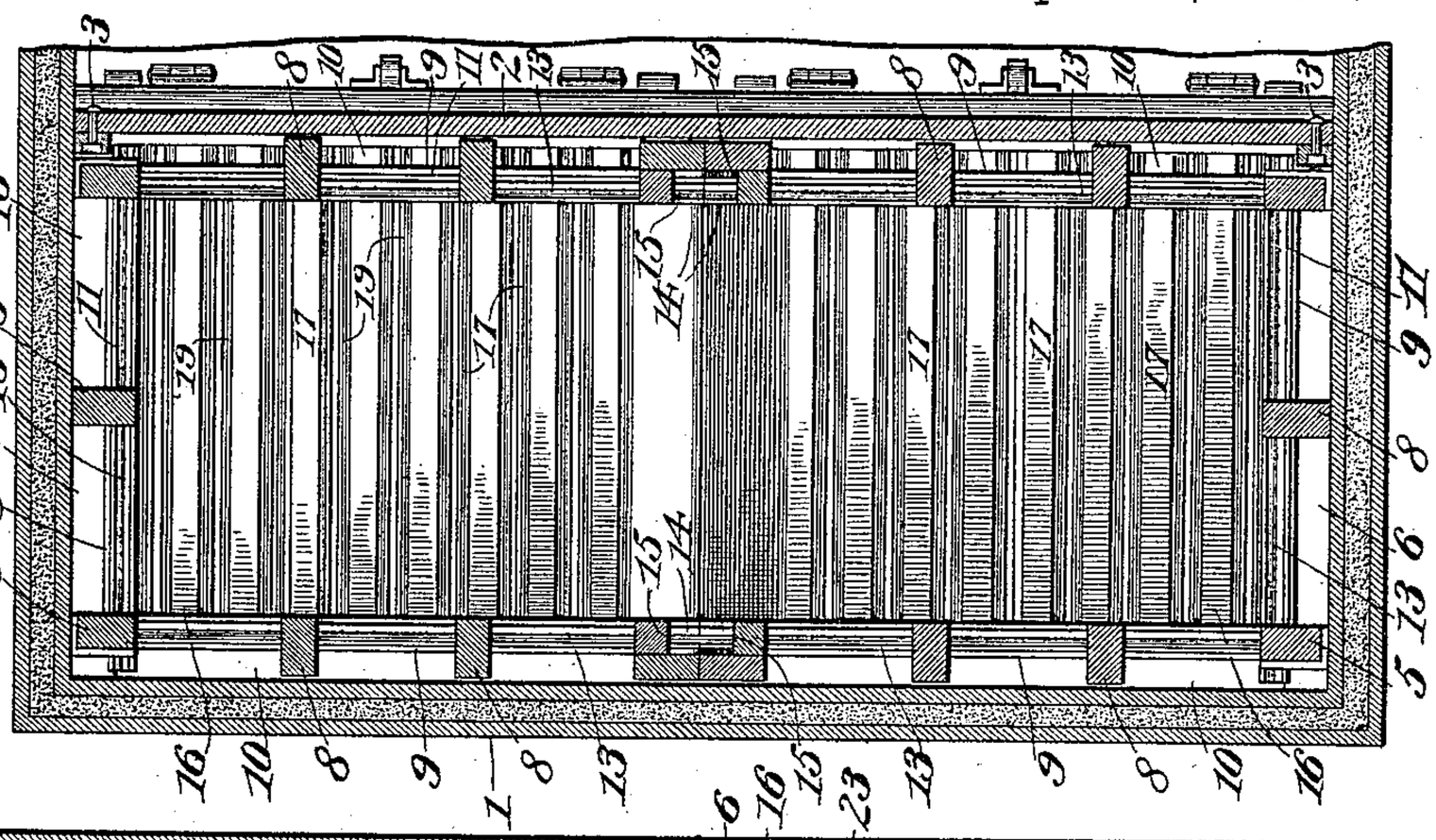
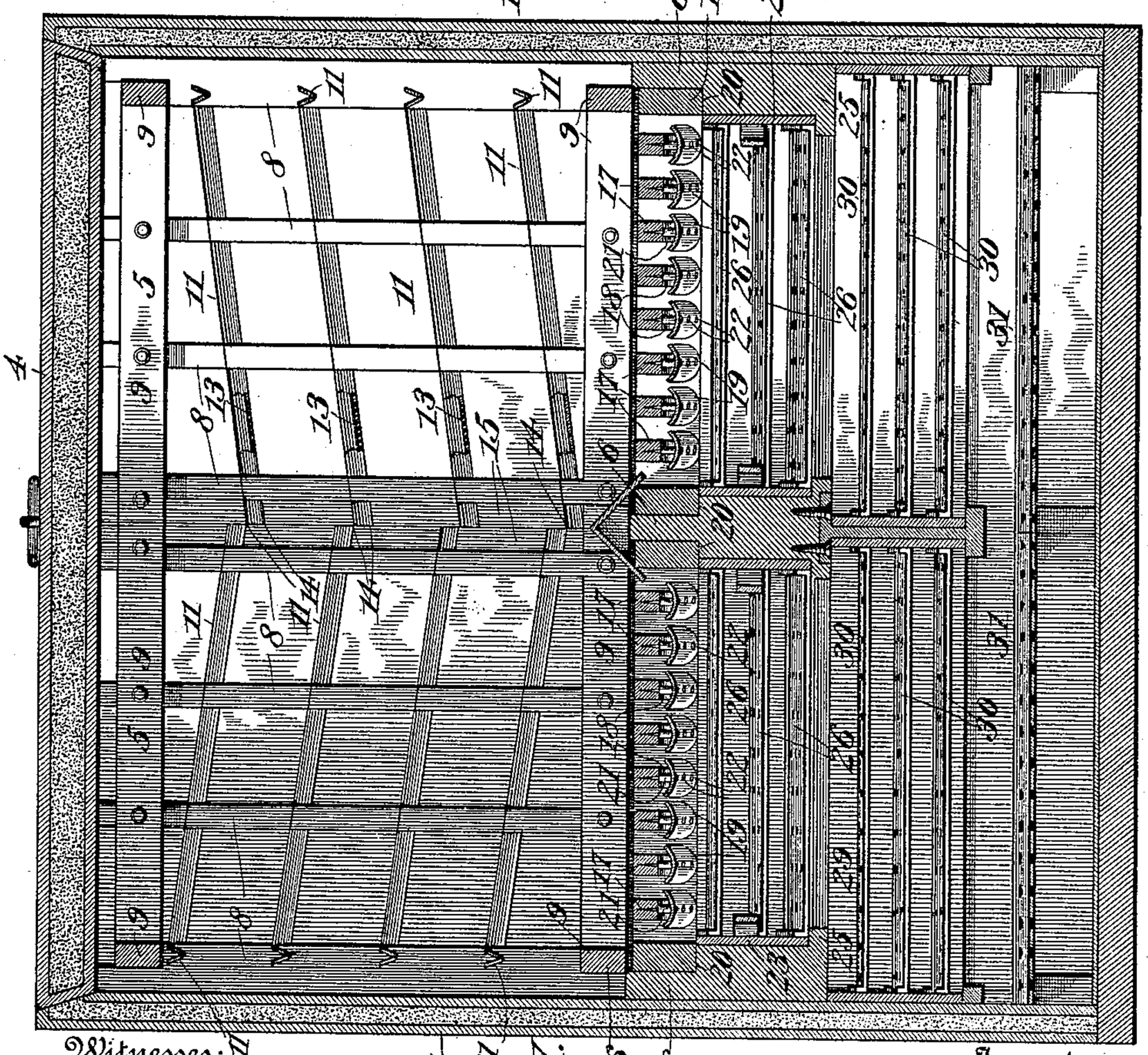


Fig. IV.



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UNITED STATES PATENT OFFICE.

GEORGE B. ZANTZINGER, OF ROCHESTER, NEW YORK.

REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 538,144, dated April 23, 1895.

Application filed June 29, 1894. Serial No. 516,079. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. ZANTZINGER, of Rochester, county of Monroe, State of New York, have invented certain new and useful Improvements in Refrigerators, of which the following is a specification, reference being had to the accompanying drawings.

Generally, the object of my invention is to produce improvements in apparatus for refrigerators in that class in which a constant current of cold, pure air is kept up within a refrigerating or storage compartment.

The special objects of the invention are to insure the purity of the circulating atmosphere, to provide for the greatest efficiency and economy of operation in a refrigerating chamber, and also to provide for the convenient and absolutely perfect cleansing of all the parts that constitute the refrigerating chamber. The first and last named special objects are intimately related to each other, because it is utterly impractical to preserve the purity of the atmosphere within the storage compartment if it is possible for any filth or impure deposit to remain in the refrigerating chamber.

In the accompanying drawings: Figure I is a central vertical longitudinal section of a portion of a storage compartment, as for example a car, with my refrigerating chamber in one end thereof. Fig. II is a front view of the refrigerating chamber. Fig. III is a plan view of the refrigerating chamber. Fig. IV is a longitudinal section of the refrigerating chamber. Fig. V is a perspective view of the removable refrigerator frame or crib.

Referring to the figures on the drawings, 1 indicates the walls of the storage compartment which are made by any suitable and ordinary methods, non-conductive. In one end of the storage compartment, for example, a refrigerating chamber is defined, as by a partition wall 2. This wall may be made, for example, of plowed boards and may be, for example, fixed to the side walls of the storage compartment, as by bolts 3. It may, however, be more permanently fixed to the side walls of the storage compartment, if preferred.

4 indicates a door in the top of the compartment above the refrigerating chamber, designed to permit the introduction of ice into the upper part of the chamber and also the removal of the crib 5, if the partition wall 2 is permanently secured within the compartment. The crib, which is supported upon sills 6 that may be secured to the walls of the compartment, consists of studs or uprights 8 rigidly united together in a frame by cross pieces 9. The purpose of the crib is at least three-fold: It is designed to render that portion of the wall of the refrigerating chamber which comes in direct contact with the ice, removable. It is also designed to afford around the mass of ice which it contains flues 10 for the passage of currents of air in direct contact with the ice. Still another purpose is to provide means of catching the drip from the ice as it melts and causing it to gradually but continuously circulate through the refrigerating chamber toward an exit in the bottom thereof. In that way, the cold water is retarded in its descent and is compelled to give up, practically, its entire cooling properties before it escapes from direct contact with the air that circulates within the compartment.

It should be observed that while it is desirable to retard the escape of the water, it is absolutely essential to the proper operation of the apparatus that the water should never become stagnant, but should be continuously in motion. If the water should stagnate in any part of the refrigerating chamber, it will tend at once to pollute the atmosphere of the compartment. It is with a distinct appreciation of these difficulties to be overcome and with a view to entirely avoid them, that I have adopted the elements that constitute the subject matter of my present invention in its present aspect. In this connection I employ troughs 11 preferably made of metal and supported obliquely in the studs 8. The troughs are preferably V-shaped and communicate through the studs as practically continuous troughs, by means of apertures 12 worked through the studs. Each trough, except the lowest one is provided along its bottom with a series of perforations 13 through which the water that courses in the trough may escape drop by drop. The troughs are arranged in vertical alignment so that the drippings from one trough fall into the next trough below it and so on until the lowest trough is reached, when the water that falls in it is conducted to the end of the trough and liberated from the end

of the ice chamber. Each of the troughs has a discharge outlet 14 for the prevention of stagnation and to provide for the escape of any water which may not be carried off through the perforations in the bottoms of the troughs. By this means a continuous shower of ice cold water is kept up within the flues 10 as long as the apparatus is in operation. The terminal troughs, or the troughs in the end of each crib, preferably discharge toward both sides of the crib, while the lateral troughs, or troughs in the sides of the crib, preferably discharge toward the middle of the refrigerating chamber. It is designed in this connection that both the terminal and lateral troughs shall discharge clear of the frame into the bottom of the refrigerating chamber. For this reason a vertical recess 15 is provided in the stud 8 through which the discharging ends of the lateral troughs project and the corner studs are set at right angles to the adjacent studs on the side so that the discharging ends of the terminal troughs have an unimpeded outlet into the flues 10. An unimpeded discharge for all of the troughs might be secured in many different ways, but the methods proposed by the arrangement of the studs is a simple and convenient one and may be clearly understood by reference to Figs. III and V of the drawings.

Since, in practice, the cribs will be filled with ice, a large part of the water which comes from the melting will percolate through the mass of ice instead of entering the troughs which receive only that portion of the water which melts into them from the sides of the mass of ice. I, therefore, employ as a support for the ice a sliding grid 16 of peculiar construction. It is preferably made of strong, durable wood, as for example, oak, and preferably includes a regular series of cross pieces 17. The peculiarity of the construction of my grid consists in providing oppositely inclined surfaces 18 on their under sides from which are suspended gutters 19 that are parallel with the surfaces 18 and, therefore, drain in opposite directions toward the sides of the grid. It is desirable to form inclined surfaces 18 on the under sides of the cross pieces 17 in order that the proper inclination may be given to the gutters without in any wise interfering with the free sliding movement of the grid upon the branches 20 in the sills 6. The gutters are preferably made of curved sheet metal, and are secured as by stud nails 21 having rivet heads 22, to the bottom of the cross pieces 17. Beneath each of the grids and coextensive therewith is a drip ledge case 23. The case is preferably provided with oblique bearing faces 24 which rest upon longitudinal supports 25. It forms a close joint with the superimposed grid, but when the grid is removed, can be easily lifted from the supports 25. The drip ledge case contains a plurality of inclined, perforated drip ledges 26, each inferior one extending farther toward the center of the case and the last pair defining a throat 27 in the bottom of the case. All of the troughs discharge upon the drip ledges and, while the apparatus is in operation, keep them constantly covered with a film of cold water and produce a constant shower of cold water between the plates and the supporters 25. The throat 27 preferably discharges into a box 29 containing a succession of baffling plates 30 which act, after the manner of the drip ledges, to cool the current of air that passes through it.

31 indicates an inclined deflecting plate secured directly beneath the throat 27 and the baffling plate box 29. To the upper part of the refrigerating chamber an inlet opening 32 permits ingress of the currents of air to be cooled.

In operation, the cribs being filled with ice, the air in the upper part of the compartment entering the refrigerating chamber becomes cooled and passing through the chamber is discharged into the compartment near the flues. The warmer air of the compartment constantly rising toward the top of the compartment, enters the inlet opening 32 and passing through the refrigerating chamber is cooled and discharged into the compartment. The construction of the parts and the arrangements made in that construction for the complete utilization of the refrigerating properties of the ice and water are such that when the apparatus is in operation improved provision is made for effectually drying refrigerating air and discharging the same in a constant and violent draft against the deflecting plate 31 and thence into the compartment. The force of the current tends to a material degree to thoroughly and effectually refrigerate the remotest parts of the compartment.

It may be observed that in addition to the provision for keeping the refrigerating chamber unpolluted in operation, provision is also made for removing every part of the refrigerating chamber so that as often as required each element which enters into its construction may be removed, cleansed and thoroughly dried.

What I claim is—

1. The combination with the side walls of an ice retaining chamber or receptacle, of a system of drainage troughs carried within the circumference of said walls so as to be in contact with the ice within the chamber, and adapted to continuously and unobstructedly promote the discharge of water of liquefaction from the receptacle by receiving it from the sides of the melted ice, instead of permitting it to percolate through the body of the mass of ice, substantially as set forth.

2. The combination with the side walls of an ice retaining chamber or receptacle, of a system of drainage troughs carried within the circumference of said walls so as to come in contact with the sides of the ice within the chamber, and a drainage system in the bottom thereof with which the said troughs communicate, the two being adapted thereby to

discharge all the water of liquefaction at one point, substantially as set forth.

3. The combination with the walls of an ice chamber of a succession of drainage troughs communicating successively from top to bottom and carried within the circumference of the walls of the ice chamber, with their edges arranged to come into contact with the ice contained in the chamber, when the chamber is filled, substantially as set forth.

4. In a refrigerating chamber, the combination with the walls thereof, of a succession of drainage troughs carried within the circumference of said walls and having their edges in contact with the ice contained in the chamber, when filled, each of said troughs communicating with a common drainage system, substantially as set forth.

5. In a refrigerating chamber, the combination with the walls thereof, of a succession of perforated drainage troughs in vertical alignment adapted to come into contact with the ice in the chamber, and to carry off the water of liquefaction therefrom, substantially as set forth.

6. In a refrigerating chamber, the combination with the walls thereof, and flue defining studs, of a drainage trough supported upon the studs within the flues, substantially as set forth.

7. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of a succession of communicating troughs supported by the studs within the flues, substantially as and for the purpose specified.

8. In a refrigerating chamber, the combination with the walls thereof, of flue defining studs and a succession of troughs supported by the studs within the flues, and having perforations in the bottoms thereof, substantially as set forth.

9. In a refrigerating chamber, the combination with the walls thereof, and flue defining studs, of a trough carried in the studs whose inner edges are substantially flush with the inner edges of the studs and are, therefore, adapted to come into contact with the ice contained in the chamber, substantially as set forth.

10. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of a succession of communicating troughs secured, respectively, in the studs, and each having its inner edge flush with the inner edge of the studs which carry it, substantially as set forth.

11. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of a succession of troughs secured, respectively, to the inner edges of the studs and adapted to come into contact with the ice contained in the chamber, said troughs draining from one to the other, substantially as set forth.

12. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of a succession of perforated troughs secured, respectively, to the studs so that their inner edges are substantially flush with the inner edges of the studs in vertical alignment and adapted to come into contact with the ice contained in the chamber, substantially as set forth.

13. In a refrigerating chamber, the combination with a removable crib, of lateral and terminal systems of drainage troughs carried therein so as to come in contact with the sides of a mass of ice contained therein, substantially as set forth.

14. In a refrigerating chamber, the combination with a removable crib, including flue defining studs, of drainage troughs carried on said studs and having their inner edges flush with the inner edges of said studs, substantially as set forth.

15. In a refrigerating chamber, the combination with a removable crib, including flue defining studs, of successively communicating troughs carried in the studs, and means of communication between the troughs through the studs, substantially as set forth.

16. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of successively communicating troughs, and means of communication between the troughs through the studs, substantially as set forth.

17. In a refrigerating chamber, the combination with a removable crib, including flue defining studs, of draining troughs secured to the studs, and discharge outlets, the said troughs adapted to discharge clear of the studs, substantially as set forth.

18. In a refrigerating chamber, the combination with the walls thereof, and drip ledges underneath the chamber, of drainage troughs adapted to drain from the chamber upon the drip ledges, substantially as set forth.

19. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of lateral and terminal drainage systems adapted to establish a constant flow of the water of liquefaction from the chamber, and drip ledges underneath the chamber adapted to receive and discharge all water from the drainage systems, substantially as set forth.

20. In a refrigerating chamber, the combination with the walls thereof and flue defining studs, of lateral and terminal drainage systems adapted to separately discharge portions of the water of liquefaction, and drip ledges underneath the chamber adapted to receive the discharged water of liquefaction, substantially as set forth.

21. In a refrigerating chamber, the combination with the walls thereof and drainage troughs carried therein, of a grid, drain gutters underneath the same, and drip ledges underneath the drainage troughs and the gutters adapted to receive therefrom all the water of liquefaction from the chamber, substantially as set forth.

22. In a refrigerating chamber, the combination with its walls, and drainage troughs carried in the sides thereof so as to come in contact with the sides of a mass of ice contained therein, of a grid and inclined gutters secured thereto, a drip ledge box and drip ledges therein, underneath the drainage troughs and the gutters adapted to receive therefrom all the water of liquefaction from the chamber said box forming a tight joint with the refrigerating chamber, and all combined together to form a closed chamber for the passage of air from top to bottom, substantially as set forth.

In testimony of all which I have hereunto subscribed my name.

GEORGE B. ZANTZINGER.

Witnesses:

P. CAMERON SHUTT,

S. R. LAUSTERER.