

(No Model.)

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E. T. EARL.
VENTILATOR AND REFRIGERATOR CAR.

No. 583,794.

Patented June 1, 1897.

Fig. 1.

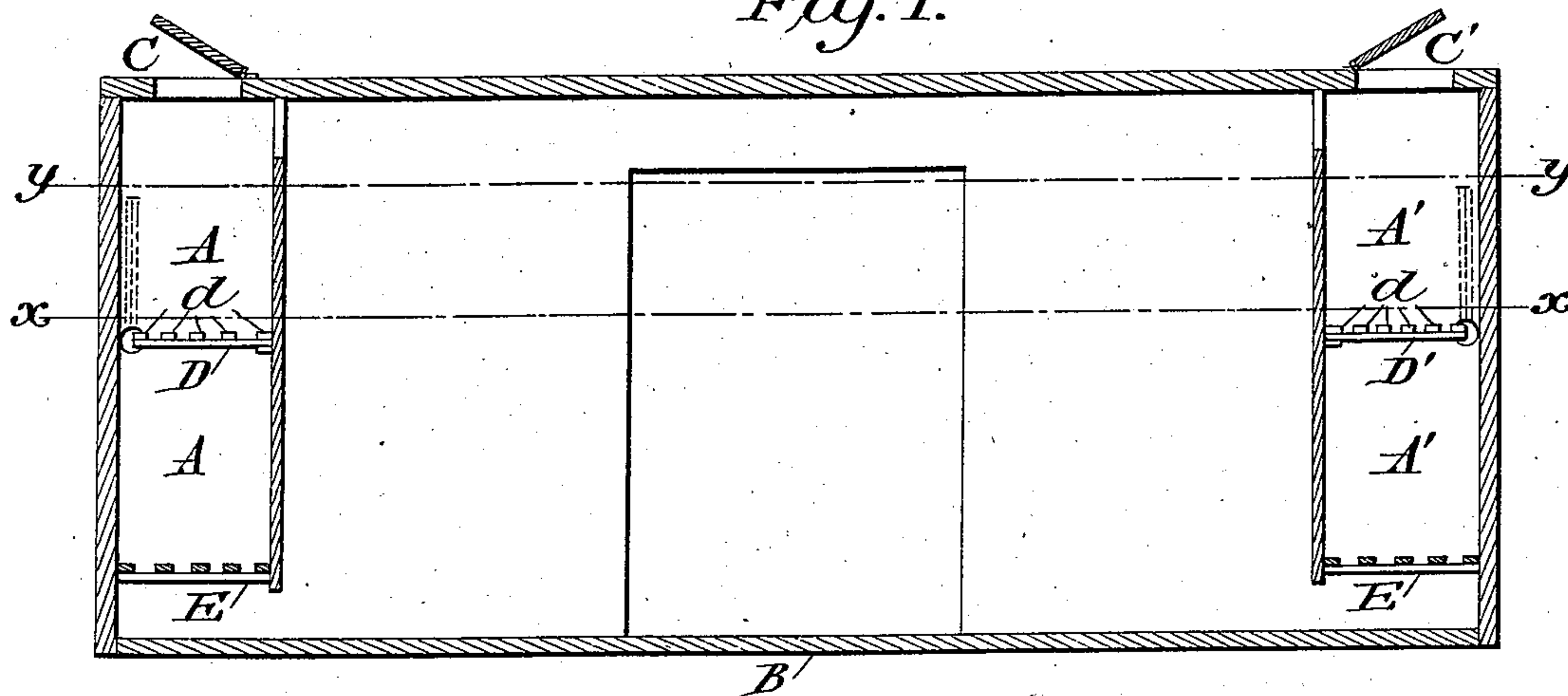


Fig. 3.

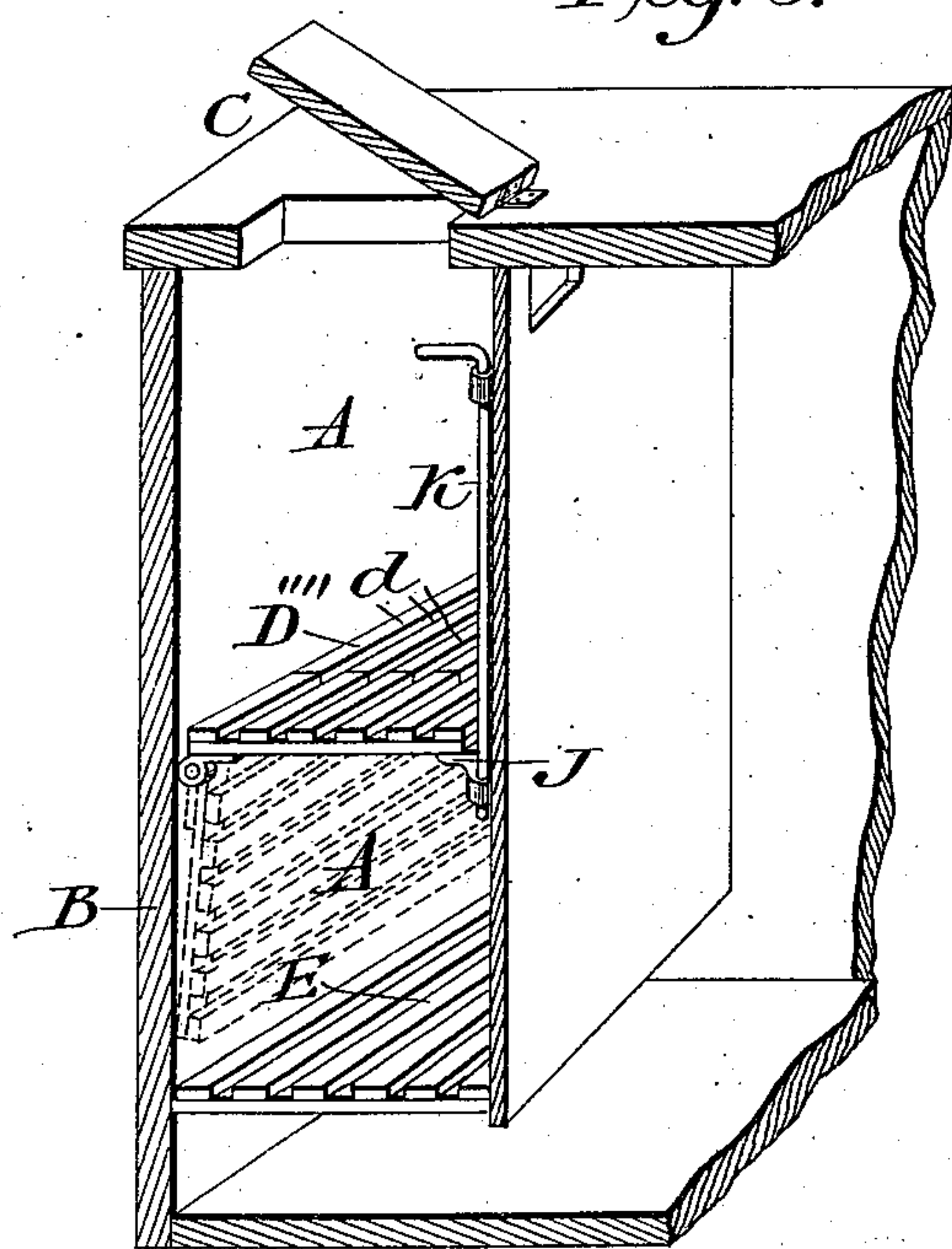
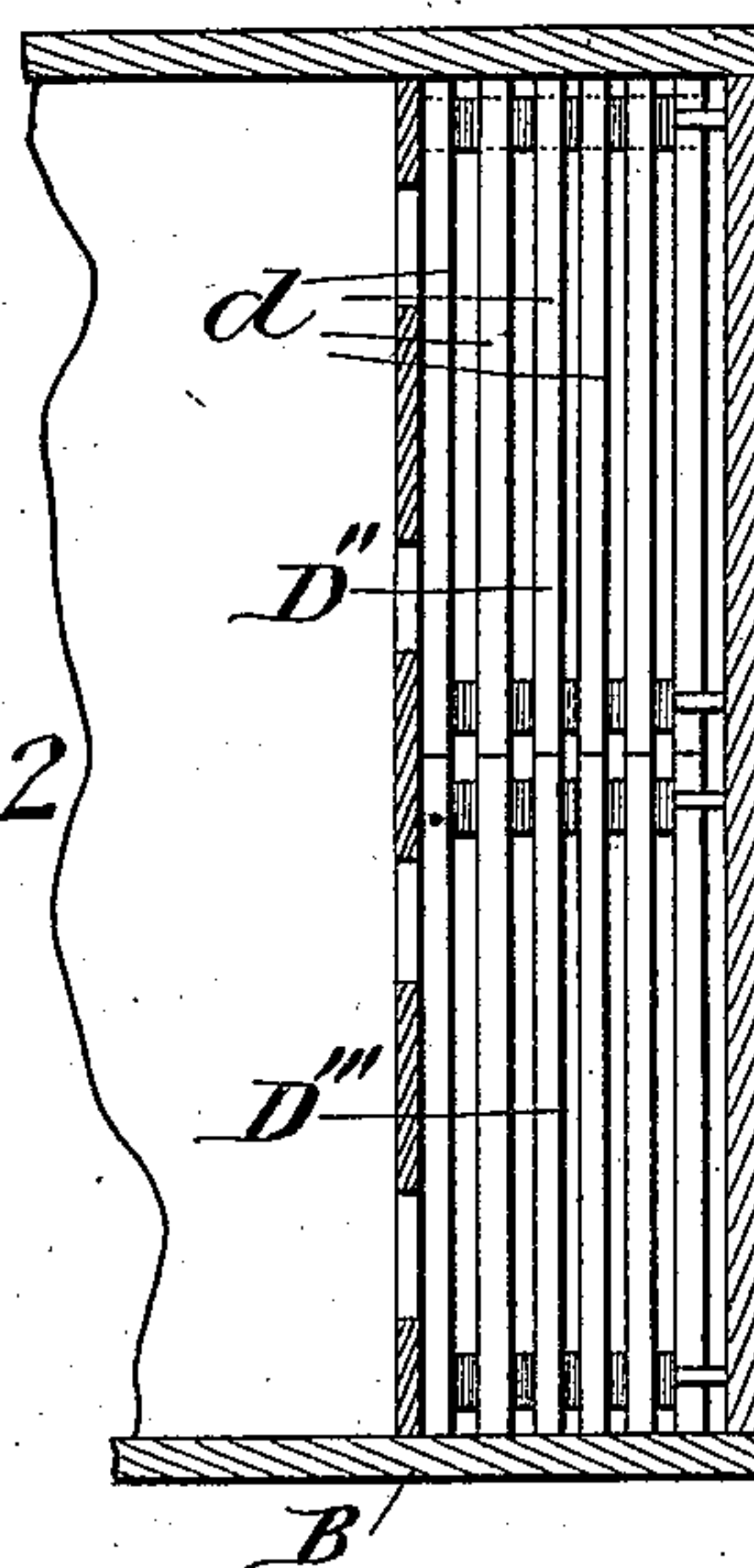


Fig. 2.



Witnesses.

Alex. Scott
Am. Long.

Inventor.

Edwin T. Earl.

by Spear & Seely
Attorneys

UNITED STATES PATENT OFFICE.

EDWIN T. EARL, OF LOS ANGELES, CALIFORNIA.

VENTILATOR AND REFRIGERATOR CAR

SPECIFICATION forming part of Letters Patent No. 583,794, dated June 1, 1897.

Application filed August 21, 1893. Serial No. 483,668. (No model.)

To all whom it may concern:

Be it known that I, EDWIN T. EARL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Refrigerator-Cars, of which the following is a specification.

This invention relates to improvements in refrigerator-cars, and more particularly to that class of cars wherein ice is carried in suitable tanks or receptacles located at the ends thereof.

Heretofore in handling cars so arranged it has been necessary to fill the ice-tank to its full capacity in order that the refrigeration-line might be raised above the contents of the car when packed. This is rendered needful for the reason that the refrigeration, or cold air, will not extend higher than the top of the ice. This packing of the ice to the full capacity has been objectionable for the reason that the ice is required principally at the warm location where the car is packed or loaded, and at that locality, by reason of the climate, the price of the ice is at the maximum of expense. This objection is particularly pronounced in the transportation of fruit which is raised in the localities of warm climates and there packed for shipment, while a short run from these localities carries the car into cooler climates, where the expense of ice is much reduced. Further, in cold seasons, where there is little added artificial refrigeration needed, it is still necessary to pack the ice-tanks to the full capacity in order to raise the ice and refrigeration line above the contents of the car.

My invention is designed to overcome these difficulties and disadvantages, and is to be distinguished from the car in which the bottom of the ice-box is made to slide vertically for adjustment to any point, and which has special and obvious disadvantages.

My invention consists of a hinged supplemental or intermediate floor, whereby the upper part alone of the box may be used to contain the ice, or the whole may be so used, and the adjustment or conversion of the box may be readily effected en route and without interference with the contents of the car, either by raising the hinged intermediate floor or by lowering the same; but I prefer

the construction shown for raising the said hinged floor, since I have found it more convenient in practice, for the reason that it avoids movable supports under the intermediate floor, which supports are necessarily and with difficulty operated from above.

My invention further consists in forming the said intermediate hinged floor in two independent parts or sections, whereby the ice remaining on the intermediate floor may be disposed of when for full refrigeration the whole box is to be filled by pushing the remaining ice to one section, moving the freed section, and then pushing the ice from the remaining section and letting it fall to the bottom of the box. If the floor be made in one part, the floor is difficult to move—in fact, cannot be raised—and if made to drop the catches are hard to work. Further, if the floor is dropped, the body of ice hinders it from being raised again until substantially all of the ice has been removed.

In the drawings, Figure 1 is a longitudinal vertical section of a refrigeration-car provided with my invention. Fig. 2 is a plan view in cross-section, showing the auxiliary shelf or bottom. Fig. 3 is a perspective view in detail, showing the auxiliary shelf or bottom in position and means for mounting it in the ice-tank.

For convenience of description with reference to the drawings I will let the letters A A' designate the ice-tanks at the ends of the car B. These tanks ordinarily are provided with the slatted bottoms E to allow the cold air to sink through the ice and pass out into the body of the car and into the contents or load. In ordinary operation this cold air distributes itself across the bottom of the car among the contents, from which it gradually extracts warmth and is raised by other colder air coming from the ice-tanks. As the air rises it continues to abstract heat from the contents of the car until it reaches the top, where it passes through suitable openings in the ice-tank to be again cooled by contact with the ice to repeat the operation above described. It will be observed that in this operation the heat in the contents is abstracted with a rapidity proportionate to the quantity of ice consumed, or, in other words, the units of heat taken from the load are pro-

portionate to the units of cold taken from the ice-tank; also, while the operation of the ice-tank, as above described, is slow the air is held in contact with the ice for a great length of time, in which it is rendered extremely cold, so that when it is expelled into the body of the car it abstracts so much more heat from the load as to produce rapid refrigeration.

To avoid the necessity of loading the ice-tanks to their full capacity at the disadvantages above mentioned, I provide the tanks with auxiliary bottoms D D', of a perforated or slatted construction, as designated by *d* in drawings, to permit the air to pass through them, as in the permanent bottoms E. These auxiliary bottoms may be secured in the tanks in any suitable manner, but that preferred by me is shown in the drawings, in which the shelves or bottoms D'' and D''' are separate sections extending half across the tank and are hinged to the side thereof. They are supported in a horizontal position by either ordinary stops, as shown in Fig. 1 of drawings, or by pivotal stops J, as shown in Fig. 3. In the former construction the auxiliary bottoms are raised against the side of the tank when not in use, as shown in dotted lines Fig. 1, while in the latter construction the bottoms are dropped against the side below the hinged connection, as shown in Fig. 3. Both constructions have in view the same object, which is the transferring the ice from the auxiliary bottom D D' to the bottom E should any remain after the run in which the diminished quantity of ice is used.

By the construction shown at Fig. 1 the unloading is accomplished by clearing one of the sections D'' D''' by transferring the ice on the other, then raising the cleared section and sliding the ice from the remaining section through the hole thus formed to the floor below and raising the remaining section so the whole tank may be loaded. By the construction shown at Fig. 3 this operation may be accomplished, it being only necessary to turn the stops J from under the auxiliary bottoms D''', when the whole load is dropped by the bottoms falling to the position shown in dotted lines. To turn the stops J, they are provided with the rod K, mounted in suitable bearings on the side of the tank and terminating in a handle at the top of the ice-tank. Neither of these constructions, however, are essential to my invention, as any auxiliary bottom or shelf to subdivide the chest to carry a diminished quantity of ice at or above the packing-line for the contents of the car, however secured in the chest, will, in conjunction with the other elements of this invention, come within the scope thereof.

To produce the required refrigeration at the beginning of the trip, when the diminished tank is employed, I use means for producing a forced draft through the ice to cause a more rapid consumption of the ice, the refrigerant effect of which is to reduce the temperature of the contents of the car in proportionate

rapidity. In this way with a small quantity of ice I produce as quick a refrigerant effect as though employing a tank loaded to full capacity without forced draft. It will be observed that without the forced draft or accelerated ventilation the circulation of air described in the first part of the specification would be as slow as in a full tank with only one-half or less refrigeration effect, passing over one-half the quantity of ice. This would not be sufficient to prevent the starting of decay while on the run, where the need for saving in cost of ice is required.

The means employed by me to produce the forced draft is to place on the top of the car over the ice-tanks scoop-shaped extensions opened in opposite directions lengthwise of the car. These extensions cooperate, the one to catch and force the air into the car through the ice-tank at one end, while the other causes a vacuum which draws the air out of the car at the other end. The effect of this cooperation is to produce a strong forced draft through the ice and car. In forming these extensions I may employ the doors to the ice-tanks used for loading the ice. By hinging the doors so they open in opposite directions I form of them deflectors, the forward one of which forces the air down into the car through the ice, while the other forms the partial vacuum above described. These doors may be maintained in an open position by any suitable means, such as hooks, which will maintain the doors securely in position. Another and preferred device to hold the doors open is to fit wedge-shaped pieces of wood or sheet-iron on the sides of the door to rest on the roof and hold firmly the door.

Where this invention is used, the forward ice-tank only need be supplied with ice, and this only partly filled, as described, for the draft is taken in at the forward end over the ice and carried through the load of the car until discharged through the opening provided at the rear. Greater proportion of consumption in the smaller quantity of ice takes place by reason of the larger quantity of air handled, but the effect is the same as that which would be produced by the use of a large quantity of ice and slow circulation of air.

When a car provided with the invention arrives at the station where ice is cheap and where it is desired to pack the entire tank for the long run, this may be readily accomplished as above described by lowering what ice remains in the upper section into the lower section and filling ice in on top until the whole tank is loaded. The doors C C' are then closed and the car ready for the run. The invention, however, has made a considerable saving by causing the small quantity of ice, at an extremely high price, to fully refrigerate the car to a location where the price of the ice is cheap.

Having thus described this invention, what I claim is—

1. In a refrigerator-car, an ice-tank having openings at top and bottom, and a floor, and

provided with an intermediate or supplemental floor loosely supported within the tank, and adapted to be turned against the wall of the tank, or to lie as a floor across the said tank, substantially as described.

2. In a refrigerator-car, an ice chest or box having openings at the top and bottom communicating with the upper and lower part of the car, and having also a floor at the bottom, and provided with an intermediate or supplemental floor, hinged and movable to lie across the ice-box as a floor or against the wall, and means for supporting said floor in position across the said ice-box, the parts being constructed and combined, substantially as described.

3. In a refrigerator-car, an ice chest or box having openings at the top and bottom, and having also a floor at the bottom, and provided with an intermediate or supplemental

floor formed in two parts independently hinged and movable to lie across the ice-box as a floor or against the wall, and means for supporting said floor in position across the said ice-box, the parts being constructed and combined, substantially as described.

4. In a refrigerator-car, an ice-tank having openings at top and bottom, and having a floor at the bottom, and provided also with an intermediate or supplemental floor formed in two parts separately supported, whereby one of such parts can be moved independently of the other so as to provide an opening for discharging ice from both of said parts into the bottom of the tank, substantially as described.

EDWIN T. EARL.

Witnesses:

JAMES R. TOWNSEND,
E. A. CURTIS.