

P. C. NISSEN.  
REFRIGERATOR CAR.

Patented June 26, 1883.

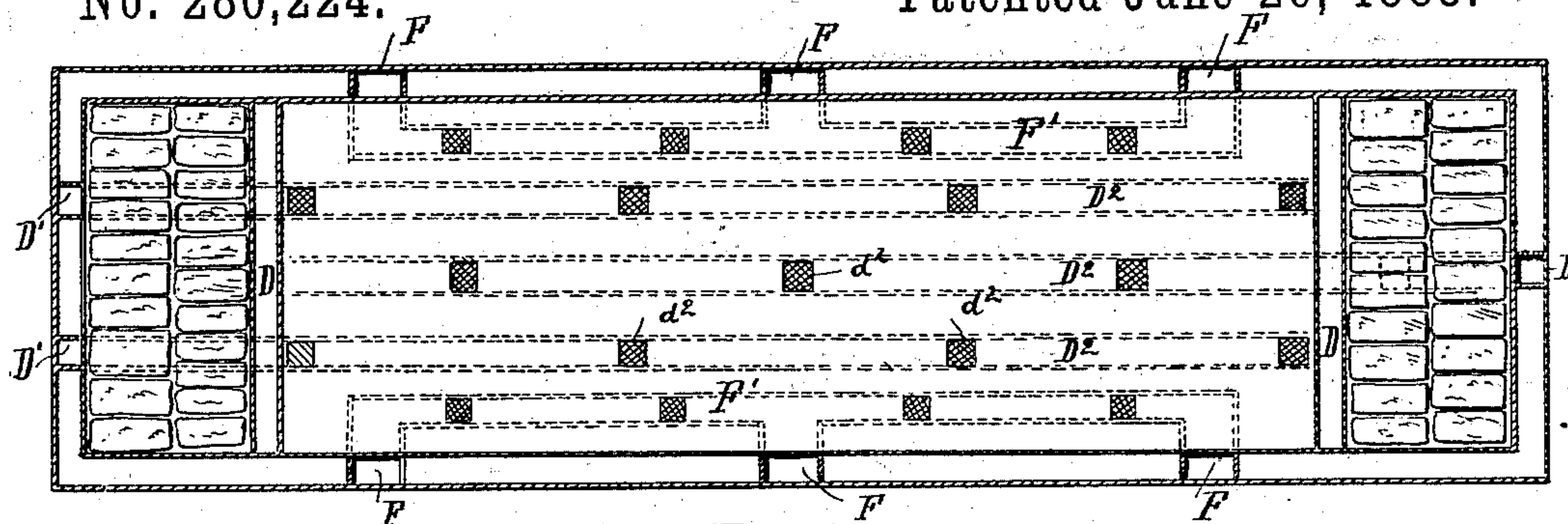
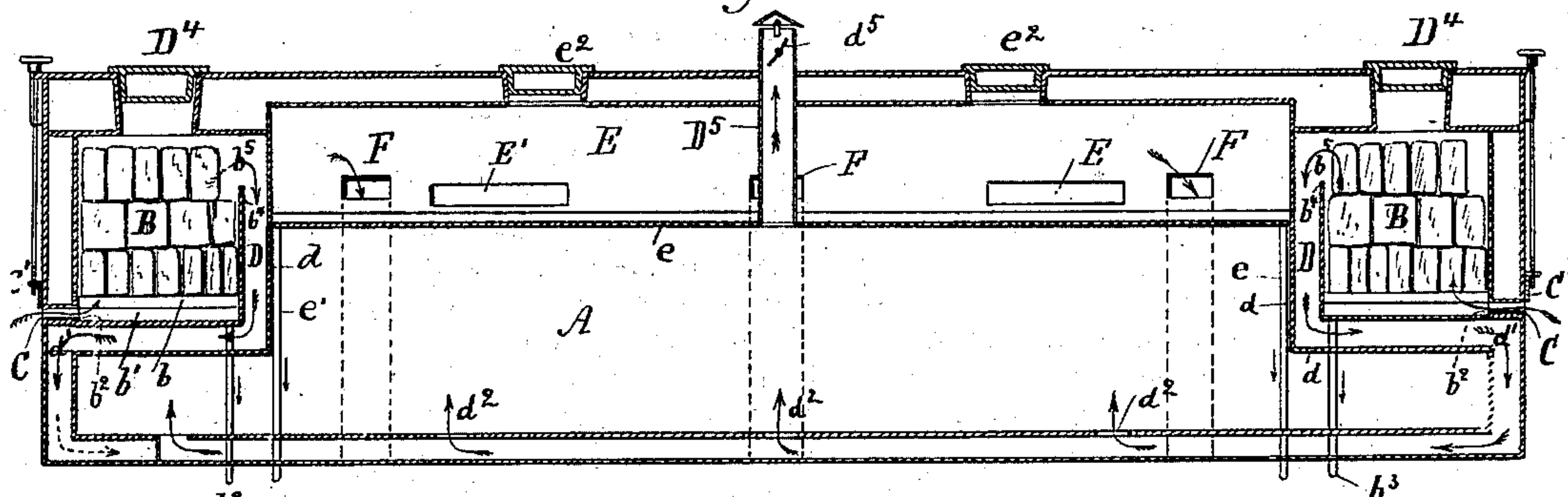
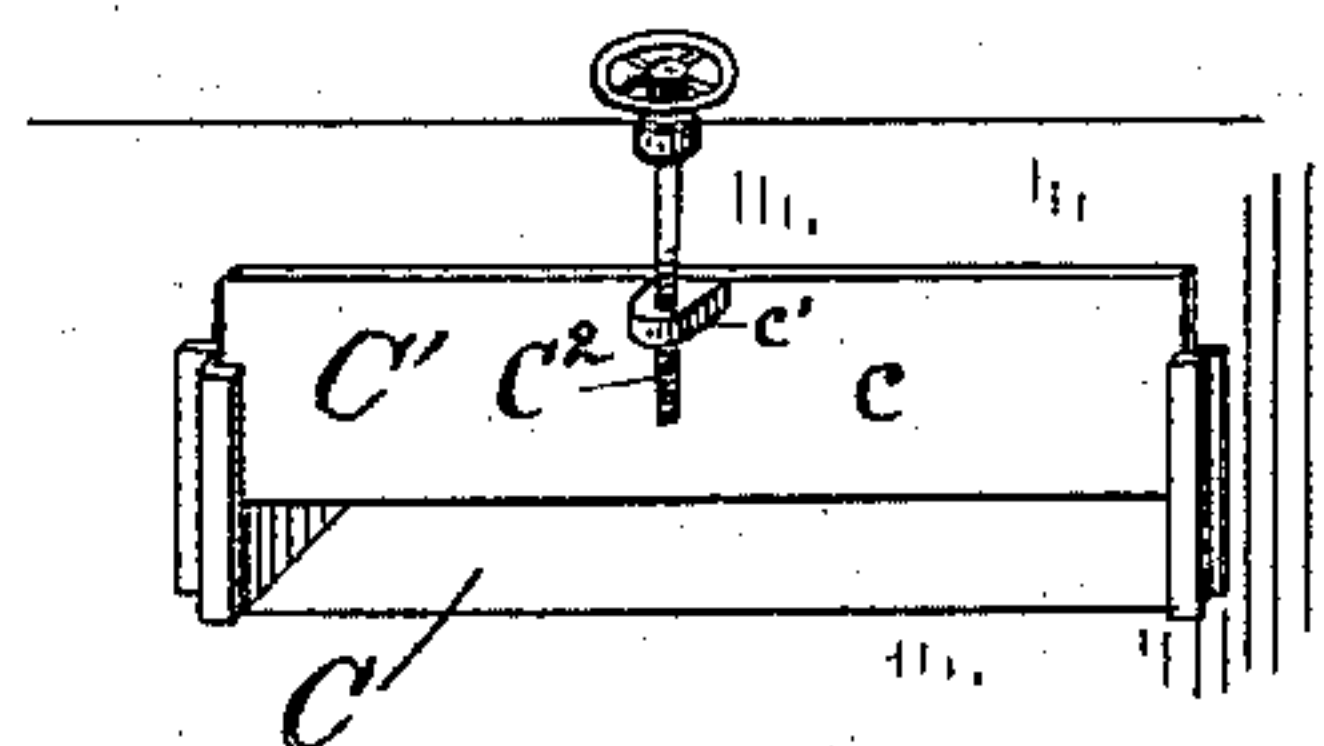


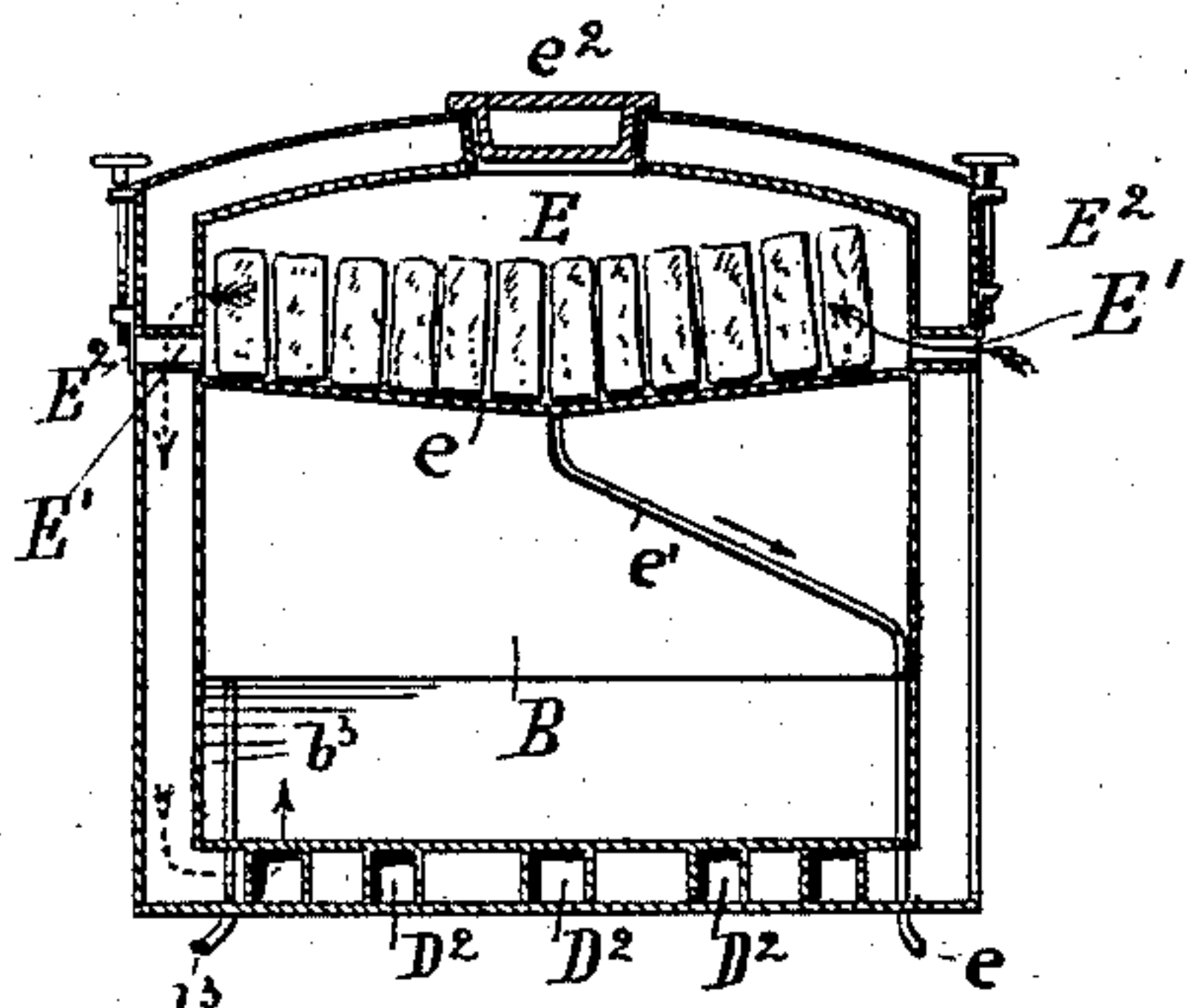
Fig. 1



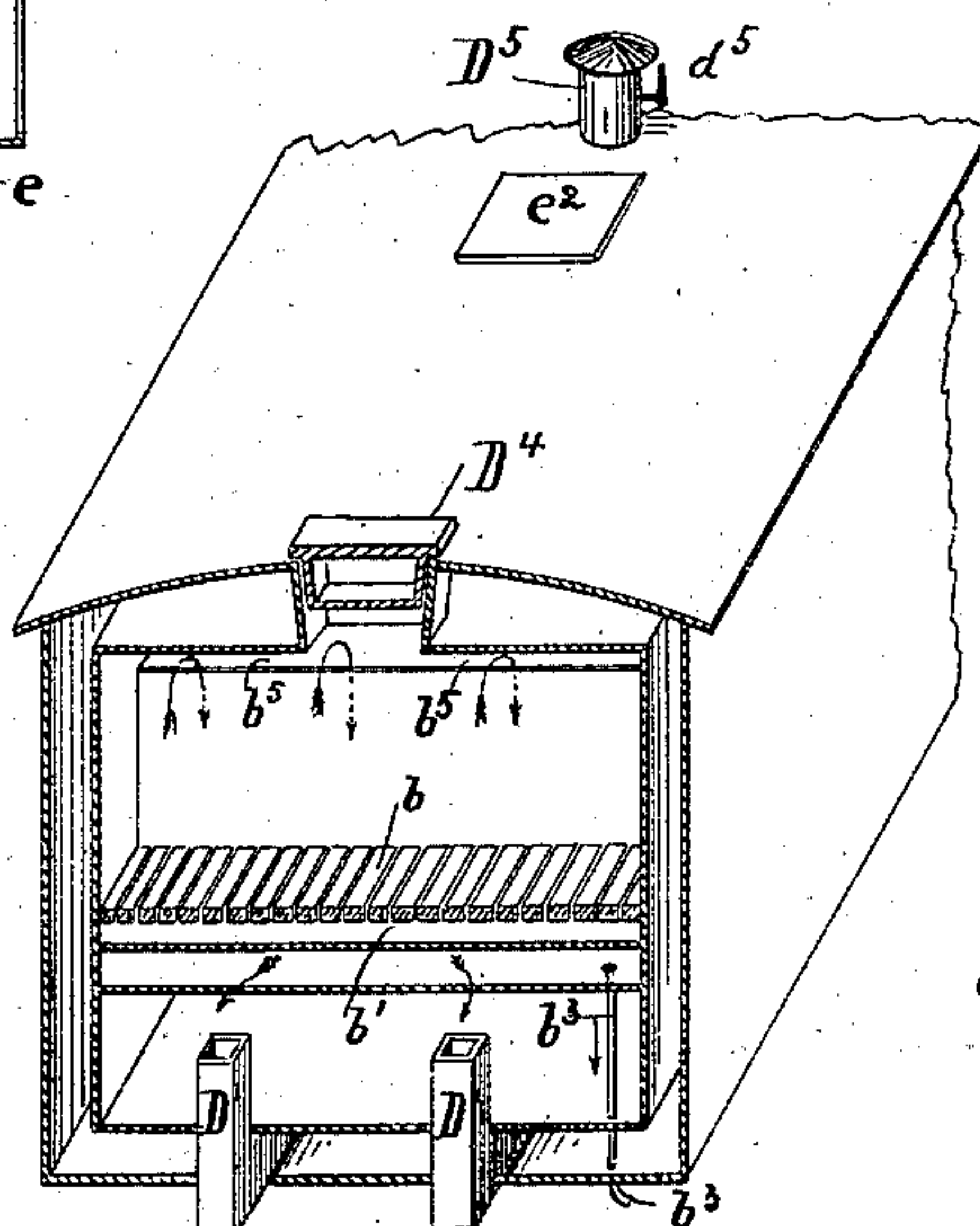
*Fig. 2*



*Fig. 5*



*Fig. 3*



*Fig. 4*

Witnesses:

*I. Lorum.*

J. Oliver Morris

*Inventor:*

Peter C. Nissen

By Pierce T. Fisher

Attorneys.



# UNITED STATES PATENT OFFICE.

PETER C. NISSEN, OF CHICAGO, ILLINOIS.

## REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 280,224, dated June 26, 1883.

Application filed April 9, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, PETER C. NISSEN, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Refrigerator-Cars, of which I declare the following to be a full, clear, and exact description.

My present invention has relation to the improvement of cars which are provided with one or more ice-chambers and with one or more storage-chambers, wherein a low temperature is constantly maintained, and which are thereby especially adapted to the preservation and transportation of meats, fish, fruits, and other perishable articles of food.

The object of this invention is to provide an improved construction and arrangement of ice-chambers and cold-air-delivery flues or conduits, whereby a very low temperature may be more effectually maintained in the storage-chamber; and this object I have accomplished by the improvements hereinafter described, illustrated in the accompanying drawings, and particularly defined in the claims at the end of this specification.

Figure 1 is a horizontal section cutting through the lower portion of the end ice-boxes. Fig. 2 is a vertical longitudinal section through the center of the car. Fig. 3 is a vertical transverse section. Fig. 4 is a sectional view in perspective, taken through one of the end ice-chambers, the cold-air-delivery conduits being shown in projection. Fig. 5 is a detail view of one of the valves for the air-induction ports.

The walls of the car-body are preferably double, and may be left hollow, or, if desired, may be lined or packed in any approved manner with non-conducting material, such as felt, sawdust, and the like.

The main portion of the car consists of the storage-chamber A, in which the meats or other provisions are kept. In the ends of the car, and in substantially the positions shown, are placed the ice-chambers B, which are preferably sheet-metal tanks having perforated or open-work bottoms  $b$ , beneath which are the conduits  $b'$ , which communicate with the air-induction conduits C, that extend through the ends of the car, and are there furnished with the register-valves  $C'$ . These valves  $C'$  con-

sist each of a plate,  $c$ , having thereon a threaded sleeve,  $c'$ , through which passes the threaded end of the valve-rod  $C^2$ , that extends to the top of the car, and is there provided with a suitable hand-wheel for operating the valve. By means of these valves and their rods is controlled the amount of air delivered to the ice-chambers B. The bottom of each conduit  $b'$  is furnished with the lip or rib  $b^2$ , thus forming beneath each ice-chamber a drip-pan, from which the water is led away by the drip-pipe  $b^3$ . The top of the inner wall,  $b^4$ , of each of the ice-chambers B is cut away, as shown at  $b^5$ , to allow the air, after passing up through the ice, to enter the broad air-delivery conduit D, the outer wall of which is formed by the bent metal plate  $d$ , that extends to the roof of the car, and the inner wall of which is formed by the side  $b^4$  of the ice-chamber B and the bottom of the conduit  $b'$ . To the end  $d'$  of each of the conduits D is connected a series of bent extensions or delivery-conduits,  $D'$ , which pass between the end walls of the car and terminate in the extensions  $D^2$ , located in the floor of the bottom. The extensions  $D^2$  of the conduits leading from each of the ice-chambers B extend to a point near the opposite end of the car, and these extensions are preferably arranged alternately in the bottom, as shown, and are provided with discharge-openings  $d^2$ , lying beneath corresponding openings in the car-floor, that are covered by suitable gratings. Above the ice-chambers B are the doors  $D^4$ , for the delivery of ice to the chambers. In the roof of the car, and leading from the storage-chamber, is placed the ventilator  $D^5$ , having a suitable valve,  $d^5$ , through which the air escapes from the storage-chamber as it becomes heated.

From the construction of parts as thus far defined, it will be seen that the air, entering through the induction-conduit in regulated quantity, passes upward through the spaces between the ice, and thence down the delivery-conduit D and through its extensions  $D^2$ , and is discharged through the openings in the floor of the storage-chamber. By its passage beneath, through, and around the ice-chambers, the temperature of the incoming air is greatly reduced, and as the air in the upper part of the conduits D is of a greater specific gravity than that in the storage-chamber, as it de-



scends through the conduits, it forces the cold air to rise in such chamber. The air thus rising contacts with the meats or other provisions and becomes heated thereby, and gradually escapes through the ventilator in the roof of the car.

Beneath the roof of the car, and extending between the ice-chambers B, or, if desired, from end to end of the car, is formed the top ice-chamber, E, the bottom *e* of which is preferably double-inclined and of sheet metal, and is provided centrally at its end with a suitable drip-pipe, *e'*. On each side of this ice-chamber are the air-induction ports *E'*, provided with suitable valves, *E''*, to control the supply of air, and from each side also extend the cold-air-delivery conduits *F*, that pass down the side of the car and terminate in extensions *F'*, having discharge-openings similar to those in the extensions *D''* in the bottom of the storage-chamber. In the roof of the car, above the ice-chamber E, are formed the doors *e''*, for delivery of ice thereto. The operation of this part of my invention is as follows: The ventilators upon one side of the car are closed, and air admitted in regulated quantity through those of the opposite side passes over and through the ice, descends through the conduits *F*, and is discharged through the openings in the extensions *F'*.

By placing the ice-chambers in the elevated positions shown a higher column of cold air is secured in each of the delivery-conduits, and consequently a better circulation in the storage-chamber is obtained than would be possible were the ice-chambers upon a lower level. Moreover, by the arrangement of induction-pipes shown, a supply of fresh air purified by passage up through the ice is secured. The delivery of the cold air to the bottom of the storage-chamber and its upward circulation will be found of especial advantage in the preservation of quarters of beef suspended from the top, as the coldest air is thus first delivered to the part of the meat most liable to spoil.

It will be understood, of course, that some of the features of this invention can be used independently of the others, or in connection with refrigerator-cars of other construction, and that the details of construction may be varied without departing from the scope of the improvements. Thus, for example, the ice-chambers at the ends of the car may be used in some cases without that in the top, or vice versa, and the precise number and arrangement of the conduits that deliver the air to the bottom of the storage-chamber may also be varied. I have therefore defined in the following claims what I regard as the scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a refrigerator-car, the combination, with an elevated ice-chamber, of a cold-air-delivery conduit or conduits leading from the ice-chamber to the bottom of the storage-chamber, and there provided with extensions having openings for the discharge of cold air up through the floor of the storage-chamber, substantially as described.

2. A refrigerator-car having a storage-chamber provided with a ventilator for discharge of air, an elevated ice-chamber with fresh-air-induction ports, and air-delivery conduits *F*, extending from said ice-chamber to the floor of the car, said conduits being arranged substantially as set forth, whereby a supply of fresh cold air is maintained in the storage-chamber, substantially as described.

3. A refrigerator-car having a storage-chamber, an elevated ice-chamber with perforated or open-work bottom, an air-induction conduit below said ice-chamber, communicating with the outer air, and an air-delivery conduit or conduits leading from the top of said ice-chamber to the bottom of the storage-chamber and discharging therein, substantially as described.

4. A refrigerator-car having a storage-chamber, an elevated ice-chamber at each end of the car, provided with a perforated or open-work bottom, an air-induction conduit below the bottom, communicating with the outer air, and air-delivery conduits extending down the sides and beneath said ice-chambers and along the bottom of the storage-chamber, and there provided with discharge-openings, substantially as described.

5. In a refrigerator-car, the combination, with the storage-chamber having a ventilator, of an ice-chamber having a perforated or open-work bottom, an air-conduit below said bottom, communicating with the outer air and provided with a valve, and an air-delivery conduit extending from the top of the ice-chamber down its sides and beneath the air-induction conduit, and terminating in perforated sections located in the bottom of the storage-chamber, substantially as described.

6. A refrigerator-car having a storage-chamber, above which is an ice-chamber with cold-air-discharge conduits *F*, and at the ends of which are ice-chambers with cold-air-discharge conduits *D* and *D''*, leading therefrom along the bottom of the storage-chamber, and adapted to discharge cold fresh air into said chamber, substantially as described.

PETER CHR. NISSEN.

Witnesses:

GEORGE P. FISHER, Jr.,  
JOSEPH O. MORRIS.