

(No Model.)

E. Z. COLLINGS & C. F. PIKE.

REFRIGERATOR CAR.

No. 285,394.

Patented Sept. 25, 1883.

Fig. 1

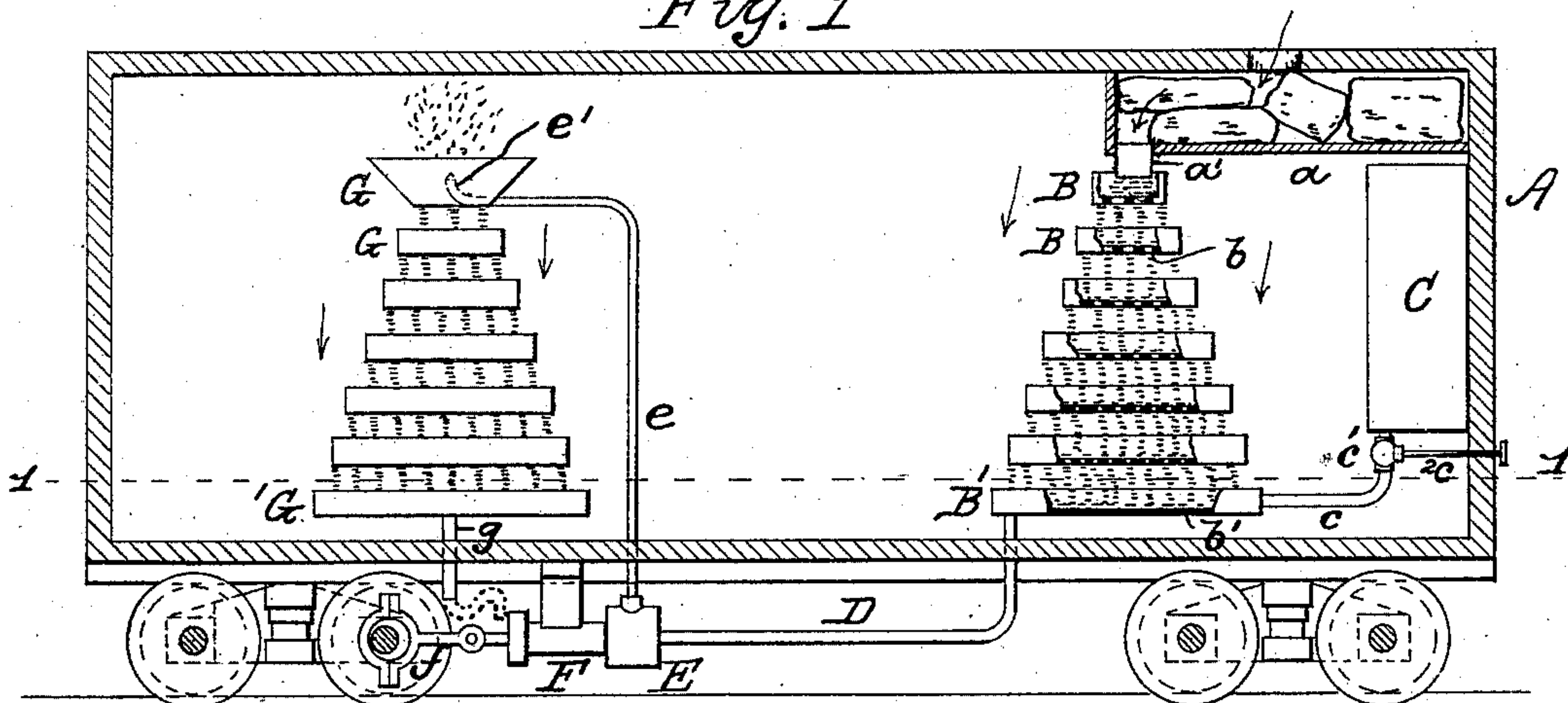


Fig. 2

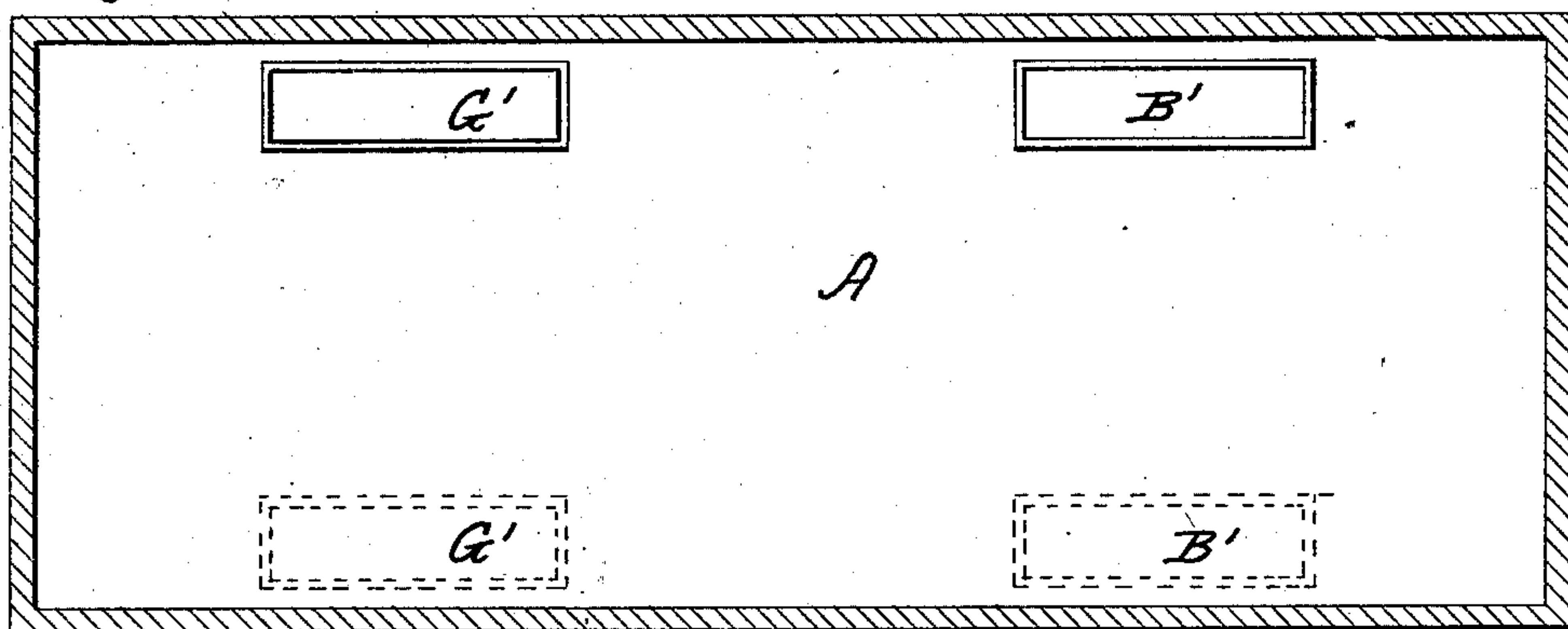


Fig. 3

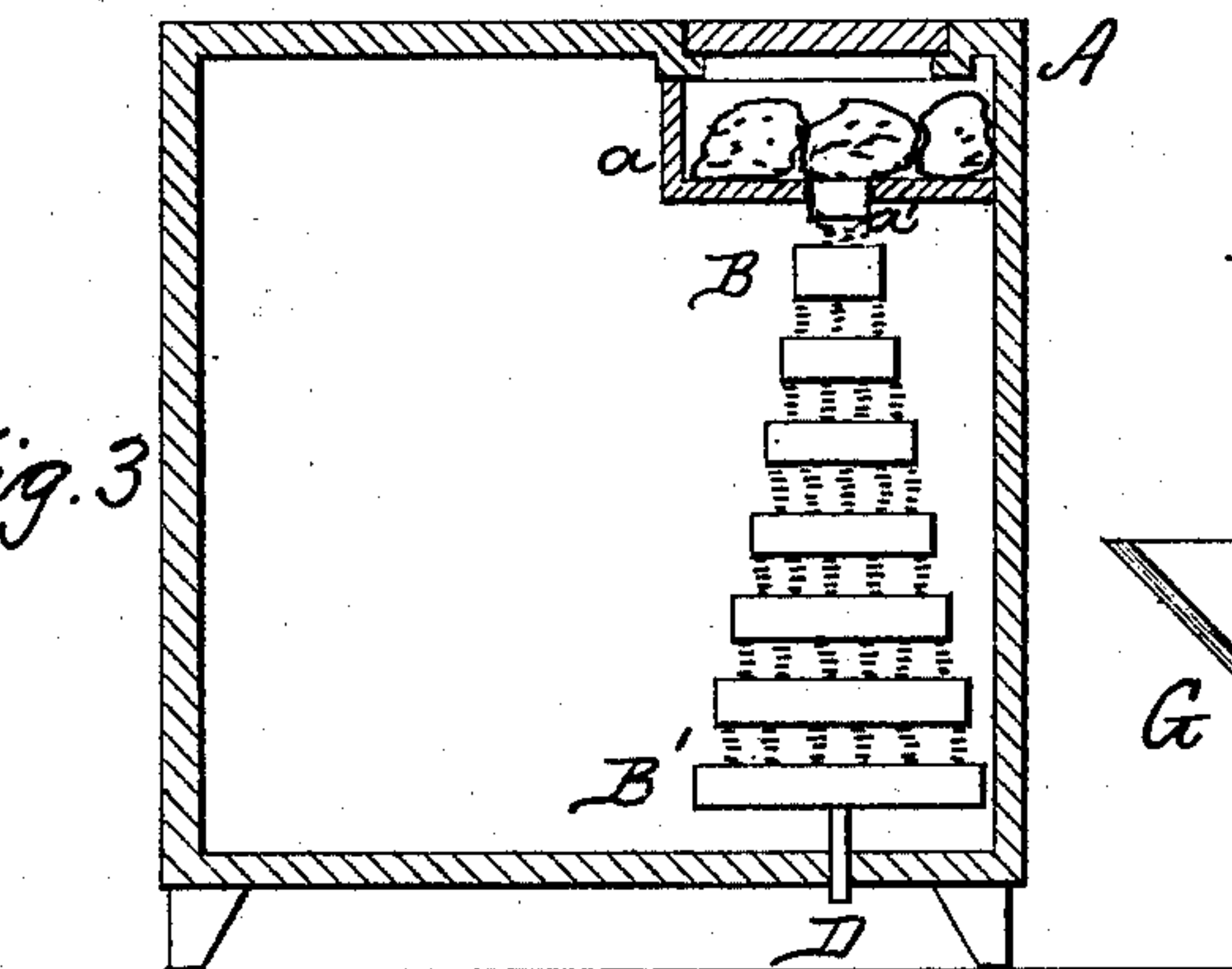


Fig. 5

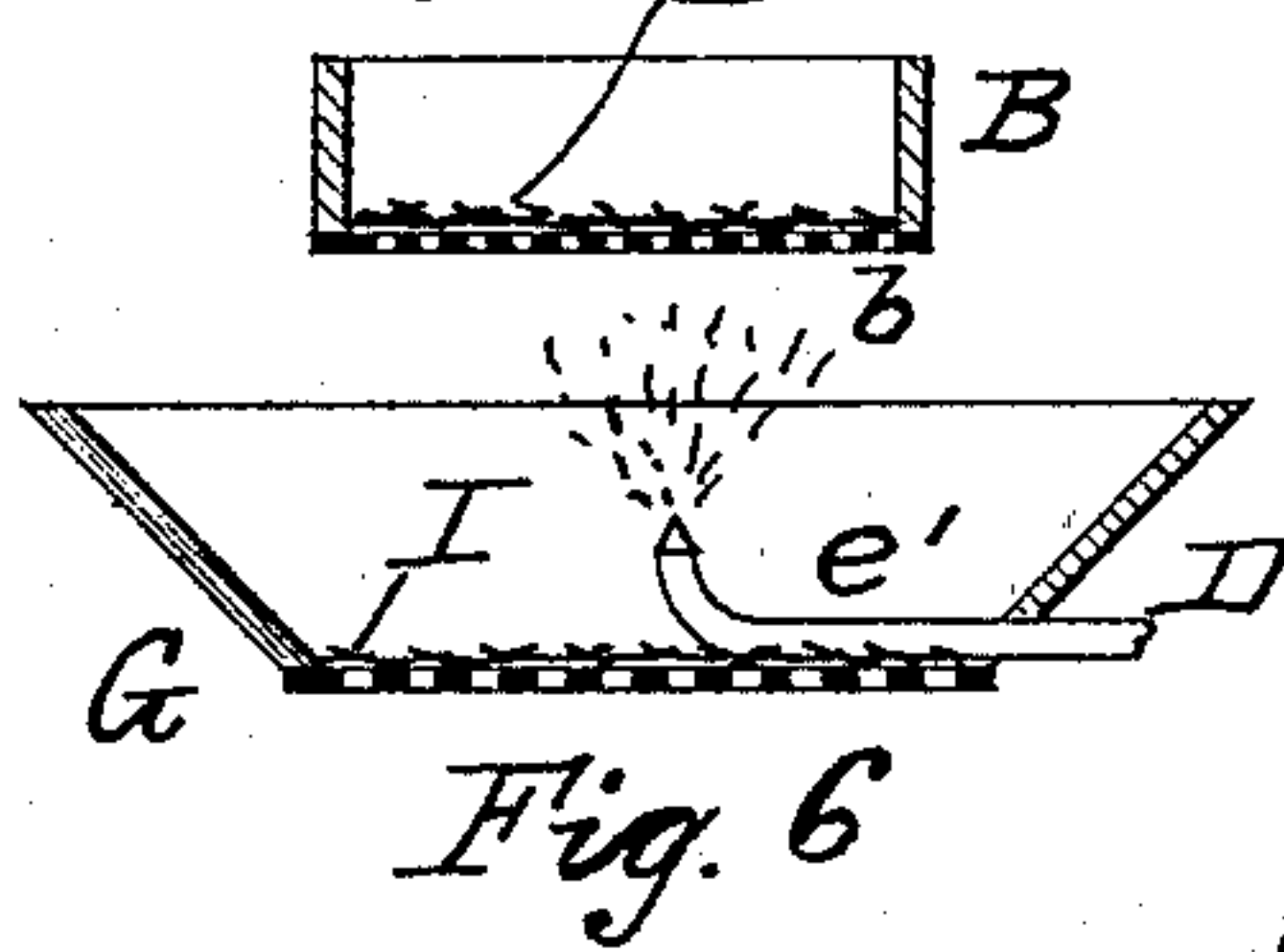
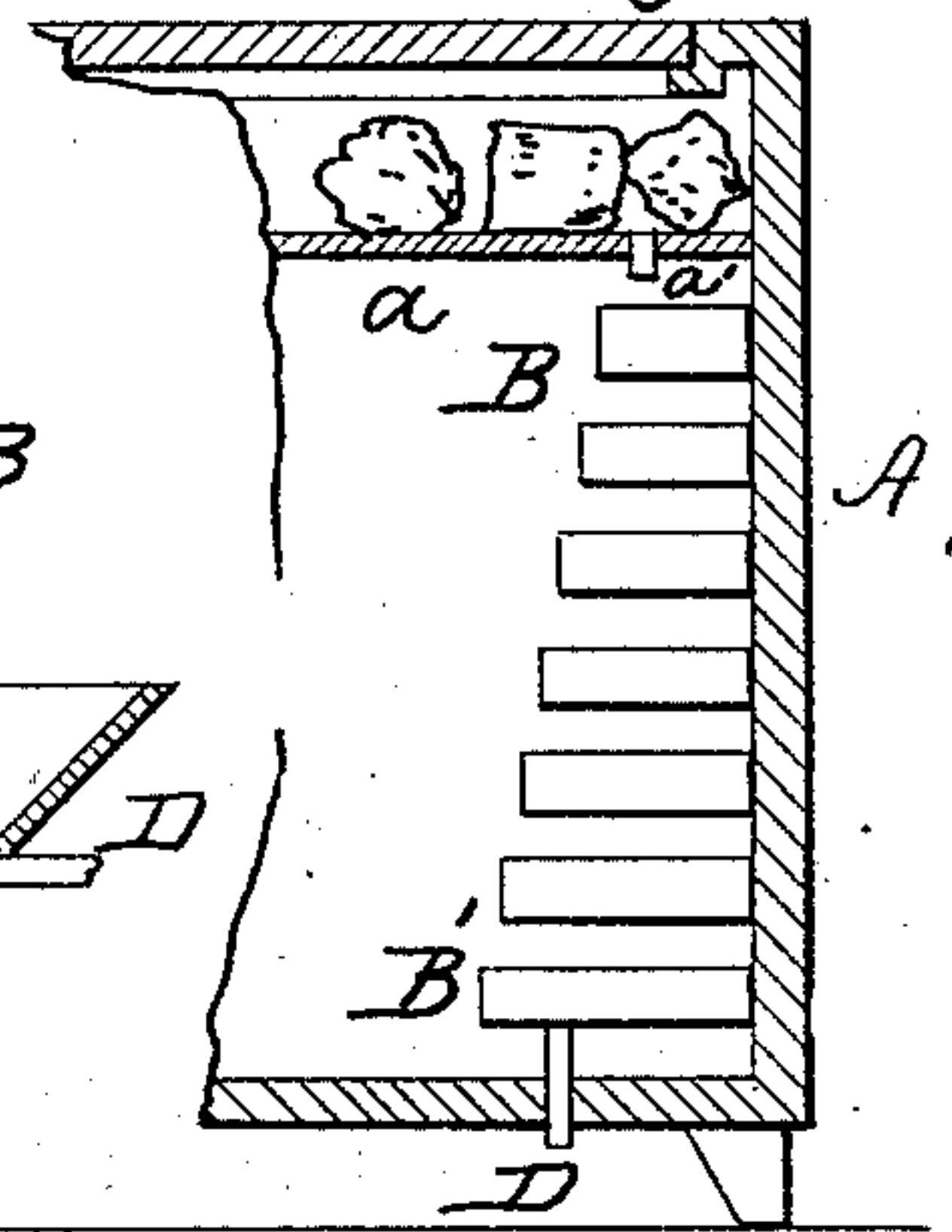


Fig. 6

Fig. 4



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UNITED STATES PATENT OFFICE.

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REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 285,394, dated September 25, 1883.

Application filed October 20, 1882. (No model.)

To all whom it may concern:

Be it known that we, EDWARD Z. COLLINGS, of the city and county of Camden, in the State of New Jersey, and CHARLES F. PIKE, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Refrigerator-Cars, of which the following is a specification, reference being had therein to the accompanying drawings, wherein—

Figure 1 is a longitudinal section of a refrigerator-car embodying our improvements. Fig. 2 is a horizontal section on line 1 1, Fig. 1. Figs. 3 and 4 are sectional views of a domestic refrigerator, illustrating our improvements applied thereto; and Figs. 5 and 6 are detail sections.

Our invention has relation to that class of refrigerators wherein the drip-water from the ice is utilized to reduce the temperature of the air in boxes or cars for refrigerating purposes. When the drip-water is collected in or carried through troughs or pans within said fixtures, it in a measure accomplishes the result desired, yet such mode of utilization is open to the objection that the entire volume of the drip-water is not directly utilized to its fullest extent, for it is evident that only the superficial area of the surfaces of the water in the troughs or pans is exposed to the air within the refrigerator. Consequently only the reduced temperature of such surfaces is directly available for the purposes of refrigeration, while that part of the water beneath such surfaces is only indirectly used, and that to but a partial extent, for accomplishing the result desired; hence the greater portion of the drip-water is not directly utilized, its reduced temperature being permitted to waste or spend itself without contributing to effect a refrigeration of the contents within the said fixture.

Our invention avoids such disadvantage and objection, and has for its object to utilize the reduced temperature of every atom of the drip-water for the purposes of refrigeration, thereby maintaining a low degree of temperature within the refrigerator by the use of a diminished quantity of ice in comparison with that heretofore employed for effecting like results;

or, if the same amount of ice be used, the refrigeration is maintained for a longer time.

Our invention accordingly consists of a refrigerator having an ice-box or cold-water tank so arranged that the drip-water from the ice or that from the tank will fall upon a succession of perforated pans or plates, whereby such water is maintained in an atomized or finely-divided condition as it passes through the refrigerator; hence each atom of the said water is caused to successively mingle with the air in such fixture to speedily lower its temperature and duly maintain it at the desired degree for refrigerating purposes.

Our invention further consists of means for repeatedly lifting such water from the bottom to the top of the refrigerator as it passes down through the same, in order that it may be sprayed a number of times before it finally passes out of the said fixture.

Our invention still further consists in the novel construction, combination, and arrangement of parts, as hereinafter more specifically described and claimed.

In referring to the accompanying drawings we will first describe the application of our invention to railway-cars, as indicated in Figs. 1 and 2, wherein A represents the car adapted for use as a refrigerator, having an ice-box or cold-water tank, *a*, with outlet-pipe *a'*, below which is arranged a series of pans or vessels, B B'. The pan B' is the last one of such series, and has a solid or unperforated bottom, *b'*. The remaining pans are formed with perforated or wire-gauze bottoms *b*. Said pans may be of any suitable or desired shape, and their number may be increased or diminished, as deemed expedient; but we prefer to construct and arrange them in position so that they will successively increase in size, while the area or extent of the perforations in their bottoms will correspondingly decrease, in order that the drip of each pan will be caught by and not fall outside of the pan below, and to more finely atomize or spray such water as it descends to the lower part of the refrigerator.

G G represent another series of pans, correspondingly formed as already described for pans B B'. The upper pan, G, is provided with a nozzle or atomizer, *e'*, which is secured

to a pipe, *e*, communicating with a reservoir, E, suitably secured in any desired manner to the car. From said reservoir proceeds a pipe, D, to pan B', forming an outlet therefor, to convey the drip-water therein to said reservoir. From pan B' proceeds another pipe, *e*, valved at *c'*, and having an operating-handle, *c''*, therefor. Said pipe *e* connects with a tank, C, designed to contain ice-water, which is to be used as hereinafter more fully explained.

F represents a pump secured to and communicating with reservoir E, and is operated by eccentric or other suitable mechanism, *f*, driven by one of the car-axes.

The operation is as follows: Ice is placed in the box *a*; or, in lieu thereof, cold water may be used. The drip therefrom flows through the pipe *a'* to the pans B B'. As such drip passes through each one of said pans, it is atomized or divided into many small streams, which, commingling with the air of the car, speedily lowers the temperature thereof. Such result is still further hastened by the successive breaking up such atoms or streams into still smaller particles or streams; hence the temperature within the car is soon reduced to the degree suitable for refrigeration, and is so maintained until the supply of ice is exhausted. When the drip from the box *a* arrives at pan B', it is collected therein and flows to reservoir E through outlet-pipe D, from whence it is pumped to pan G through pipe *e* and atomizer *e'*. It descends through the series of pans G G' in a sprayed condition, as above described, until it passes out of the refrigerator through pipe *g*. The latter may, if desired, be provided with a trap, as indicated by dotted lines, Fig. 1, for preventing the ingress of air to said fixture. If desired, instead of permitting such water to so escape, it may be again pumped to other or a duplication of said pans, located upon the opposite side of the car, as indicated by dotted lines, Fig. 2, and thereby repeatedly use such water in a sprayed or atomized condition for effecting the result stated. The reservoir C is provided in order that the cold water therein may, by turning cock *c'*, flow to pan B', and thence through pipe D to reservoir E, from which it is pumped to atomizer *e'*, and sprayed by pans G G' as it descends through the same coincidentally with the fall of the drip-water from box *a* through pans B B' before such drip has reached said pan B' to supply reservoir E. As soon as the drip from the ice-box reaches said pan B' and flows into said reservoir E, the cock *c'* is closed to discontinue the use of the water in tank C.

If desired, the pans or trays may be provided with a layer of fibrous or textile material, as shown at I, Figs. 5 and 6, so that the water falling onto such material will spread itself over the entire area thereof before it passes through the perforated or wire-gauze bottoms, thereby providing for the spraying of the drip-water throughout the extent of the

bottoms of the pans, and not at any one part thereof, as it might otherwise do if such textile or fibrous material be not employed.

When a tank of ice or cold water is substituted for the ice-box *a*, a valved pipe should be provided therefor to regulate the volume of the flow through the spraying-pans.

In Figs. 3 and 4 we have shown our improvements applied to domestic refrigerators wherein said pans are constructed and arranged as above described for pans B B', the pumping devices being dispensed with, if desired. Where the latter are employed, they may be manually operated; or power of any suitable kind may be employed.

We have shown the pump on the refrigerator-car as being operated by one of the car-axes; but we do not confine ourselves thereto, as it may be manipulated by the vibratory movement of the car, or by steam-pressure from the locomotive, or by any other suitable or desired means.

It is apparent that we utilize the low temperature of every atom of the drip-water for refrigerating purposes; and none of it is wasted or allowed to uselessly spend itself. Consequently in refrigerators with our improvements applied thereto a decreased quantity of ice is required to maintain the refrigeration than has heretofore been the case; or if the same quantity be employed such result is kept up for a longer time. Another advantage resulting from the use of the spray is that all odors from the meat or other contents of the refrigerator are absorbed by the atoms of water forming such spray, and are carried off or out of the said fixture when such water finds its egress therefrom, so that the air therein is maintained in a state of great purity and at a low degree of temperature.

What we claim as our invention is—

1. The method herein described for effecting refrigeration, which consists in successively spraying or atomizing ice-water, and then dividing such atoms into still finer atoms or sprays, substantially as set forth.

2. In a refrigerator, the combination of a water-tank or ice-box and a series of pans having perforated bottoms, substantially as shown and described.

3. The combination of an ice or water tank, a series of pans with perforated bottoms, and an outlet-pipe for said pans, substantially as shown and described.

4. The combination of ice or water box *a*, and a series of pans of gradually increased size and having perforated bottoms, substantially as shown and described.

5. The combination, with an ice or water tank, of a series of pans or trays which gradually increase in size from the top to bottom of the series, each pan having a bottom of finer perforations than the preceding pan, substantially as shown and described.

6. The combination, with tank *a*, of a series of pans or trays with perforated bottoms, which

are successively formed with smaller or finer perforations, substantially as shown and described.

5 7. In a refrigerator, the combination of an ice-box, and a series of pans or troughs which successively increase in size, and the bottoms of which have perforations which successively decrease in extent, substantially as shown and described.

10 8. In a refrigerator, the combination of an ice or water box, a series of perforated trays or pans, and a layer of fibrous or textile absorbent material therefor, substantially as shown and described.

15 9. The combination of box *a*, series of pans B and B', the former having perforated bottoms and the latter a solid bottom, the pipe D, reservoir E, pump F, operating mechanism therefor, pipe *e*, and a second series of pans,
20 G G', substantially as shown and described.

10. The combination of box *a*, pans B B', pipe D, pump F, operating mechanism therefor, and pans G G', substantially as shown and described.

11. The combination of tank C, pans B B', 25 pipe *c*, valved at *c'*, pipe D, pump F, operating mechanism therefor, pipe *e*, and pans G G', substantially as shown and described.

12. The combination of tank C, pump F, and communicating pipes between said parts, the 30 pipe *e*, pans G G', and operating mechanism for said pump, as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD Z. COLLINGS.
CHAS. F. PIKE.

Witnesses:

S. J. VAN STAVOREN,
CHAS. F. VAN HORN.