

P. H. BATE.
Refrigerator.

No. 240,004.

Patented April 12, 1881.

Fig. 1.

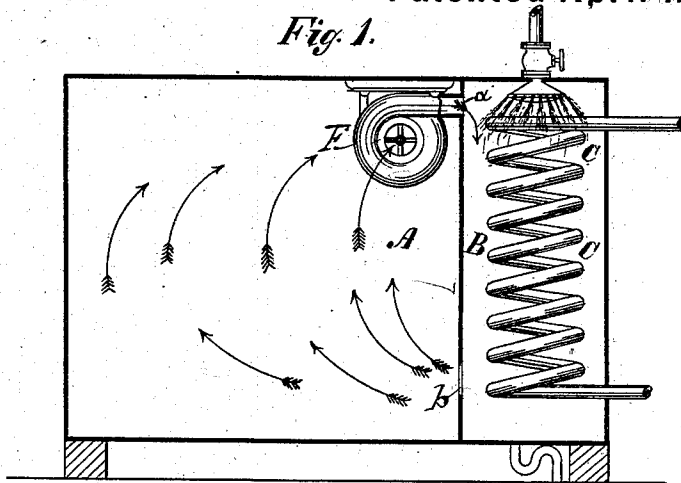


Fig. 2.

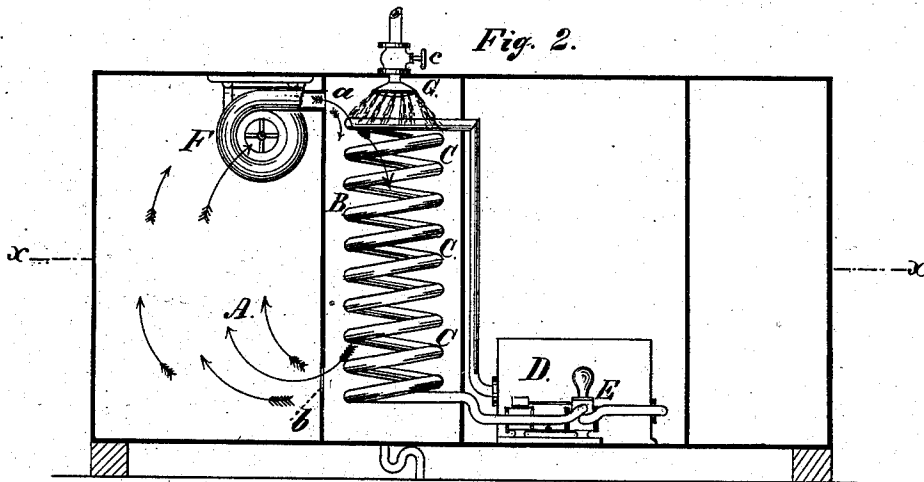
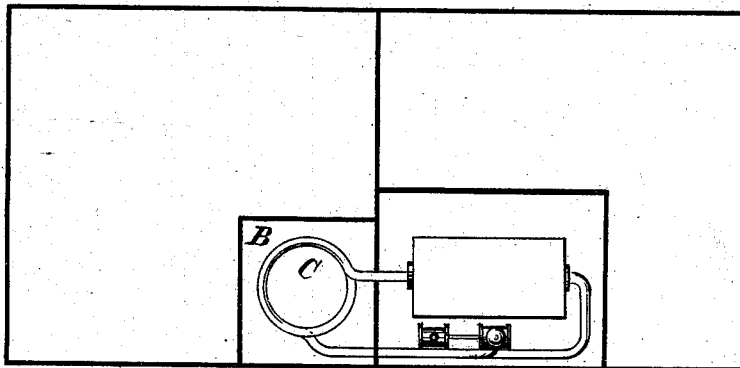


Fig. 3.



Witnesses:

Henry Eichling
Edward Kelly

Inventor:

Paul H. Bate
per James A. Whitney Atty

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Fig. 4.

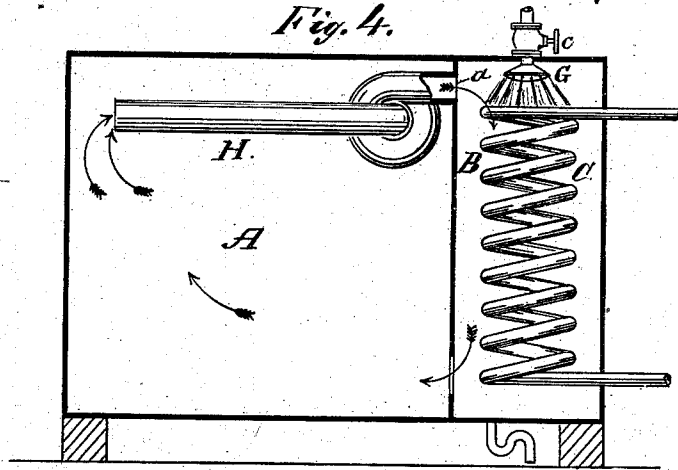
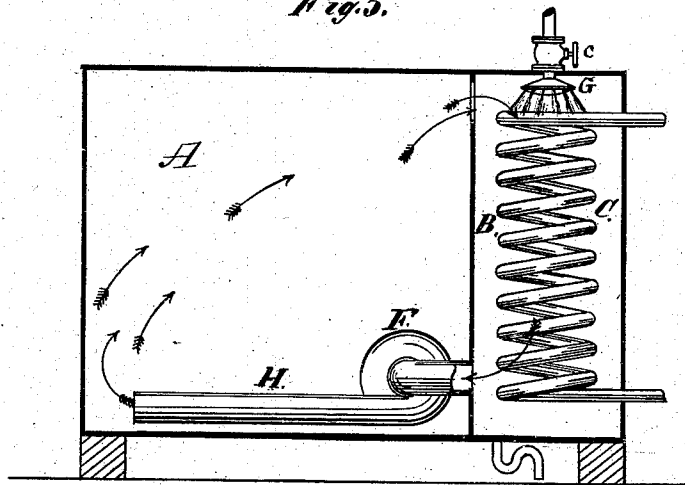


Fig. 5.



Witnesses:

Henry Eichling.
Edward Volley

Inventor:

Paul H. Bate.
per James A. Whitney.
Atty.

UNITED STATES PATENT OFFICE.

PAUL H. BATE, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE BATE REFRIGERATING COMPANY.

REFRIGERATOR.

SPECIFICATION forming part of Letters Patent No. 240,004, dated April 12, 1881.

Application filed December 2, 1876.

To all whom it may concern:

Be it known that I, PAUL H. BATE, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Refrigerators, of which the following is a specification.

This invention relates to that class of refrigerators in which the atmosphere of the refrigerating-chamber is caused to circulate over and in contact with suitable cooling-surfaces—ordinarily blocks of ice.

Many attempts have been made to provide suitable cooling-surfaces by means of the circulation of a fluid refrigerant in pipes; but, on account of the difficulty of regulating and keeping always the refrigerant in such pipes at a uniform and proper degree of temperature, these attempts have been only partially successful. Moreover, it is found that the best effects in the preservation of food in refrigerators are obtained by the circulation of the atmosphere thereof directly in contact with the surface of solid ice. A condensation or frost resembling snow deposited from the atmosphere upon very cold surfaces does not produce the same beneficial result.

This invention consists, first, in a process of preserving food in closed chambers or refrigerators by causing the atmosphere thereof to pass in contact with a film of ice formed upon the chilled metallic surface, whereby the moisture condensed from the air is deposited or absorbed upon the said film in the same manner as it would be if brought in contact with blocks of ice in an ordinary refrigerator, at the same time that all the advantages of the use of a fluid refrigerating medium to chill the pipes are secured.

The invention comprises, also, certain novel combinations of parts adapted for use with a liquid refrigerant, and which are or may be used in carrying into effect the aforesaid process. The apparatus may, however, be employed by bringing the atmosphere of the refrigerating-chamber into direct contact with the metallic surface of the system of pipes located in the chill-box, which forms a part of said apparatus, as hereinafter set forth.

Figures 1 and 2 are vertical longitudinal sections, illustrating the manner in which my

invention can be carried into practice. Fig. 3 is a horizontal sectional view, taken in the line X of Fig. 2. Figs. 4 and 5 represent a modified construction of my said invention, and the feature additional to those represented in Figs. 1, 2, and 3.

A is the refrigerating-chamber, separated by a partition from the chill-box B. In this chill-box B is placed a coil, C, of pipe, or, in lieu of a coil, any other system of pipe which will expose a large metallic surface within the chill-box B. The opposite ends of this coil or system of pipes C are connected with a reservoir, D, filled with salt and ice, the melting of which will provide a greater or less quantity of extremely cold liquid within said reservoir D. A force-pump, E, actuated by any suitable means or power, is arranged in such relation with this reservoir D, and with the pipes C, as to force the cold liquid from the reservoir D continuously through the pipes C, and thence back to said reservoir, this cold liquid consequently keeping the pipes C continually reduced to an extremely low temperature.

F is a fan-blower, operated by any suitable means, and having its outlet communicating with the interior of the chill-box B, as represented at *a*. The chill-box B communicates direct with the chamber A by an opening, *b*. When the fan-blower F is at the top of the refrigerating-chamber A this opening *b* will be at the bottom, and vice versa.

It will be observed that the fan-blower, drawing the air from the refrigerating-chamber A, forces it in at the top of the chill-box B. The air passes through the chill-box, around and over the pipes C, and in contact with a film of solid ice maintained on said coil by suitable means, to be described hereinafter, and being cooled is delivered through the opening *b* back into the lower part of the chamber A, to be returned to the chill-box by means of the fan, and so on, a continuous circulation being produced.

In some cases—as, for example, when it is desired that the cool or refrigerated air shall be conducted directly to or directly withdrawn from the remoter parts of the refrigerating-chamber A—the conduit is attached either to the inlet through which the air passes to the

chill-box B, as represented in Fig. 4, or to the outlet through which the air passes from said chill-box; this conduit, in the one case, serving to conduct the air from the remoter parts of the refrigerating-chamber A to the chill-box, and in the other serving to conduct the air direct from the chill-box to the remoter parts of the chamber A, a more efficient cooling or refrigerating of such remoter portions of the refrigerating-chamber A being by this means provided for.

In cooling the air by passing the same through the chill-box, it is brought, not into direct contact with the metal surface of the pipes C, but into contact with a film of solid ice maintained thereon as before stated. I therefore provide, in suitable relation with the metallic pipes C in the chill-box B, a rose-head, G, or other suitable means of spraying or distributing water upon the surfaces of the pipes C, this rose-head being provided, of course, with a suitable stop-cock, *e*, by which the water may be turned on or off, as occasion requires. The pipes C being reduced in temperature, as hereinbefore explained, the spraying of water upon their external surfaces insures the freezing of the water upon said surfaces, and consequently presents to the contact of the air a sheet, so to speak, of solid ice, so that the air impinging upon said sheet deposits its moisture by condensation, and being simultaneously cooled, passes to and through the refrigerating-chamber, as hereinbefore explained, and by its combined dryness and low temperature exerts the most beneficial effect upon the meat, vegetables, or the like placed for preservation in the refrigerating-chamber A. The degree to which the temperature of the pipes C will be reduced depends upon the character of the liquid caused to flow through the same, said liquid being either that resulting from the admixture of snow and salt, or by a commingling of suitable chemicals. It will, of course, be understood that to freeze the water sprinkled upon the pipes in the chill-box, the cooling-liquid must be maintained at a temperature less than 32° Fahrenheit. In some cases, where only a very moderate reduction of temperature is necessary, the water immediately resulting from the melting of ice will be found sufficient.

It should be observed that in some cases, especially where the liquid used is that resulting from the melting of ice and snow, said liquid may become too cold for the purposes required. In this case it may be drawn off and a fresh supply of the liquid forced through the pipes C. What I claim as my invention is—

1. The method of preserving food in closed chambers or refrigerators, the same consisting in forming and maintaining a film or body of ice, in contradistinction to mere frost resembling snow, upon a coil of pipe, by the circulation of a suitable refrigerant therein, and in creating a constant circulation of the atmos-

phere of the refrigerating-chamber over and in contact with the film of ice on said coil, substantially as described.

2. The combination, with a closed refrigerating-chamber, a chill-box, and a coil or system of pipes located within said chill-box and connected with a source of supply of a suitable refrigerating agent, of a fan-blower communicating with the interior both of said chill-box and of the refrigerating-chamber, and arranged to cause a circulation of the atmosphere from the upper part of said refrigerating-chamber downward over said coil or system of pipes, and to deliver the cooled air at the lower part of said chamber, substantially as described.

3. The combination, with a closed refrigerating-chamber, a chill-box, separated from said chamber by a partition, with apertures at opposite sides or ends, a coil or system of pipes in said chill-box, and a pump for circulating a refrigerating medium in said coil or system of pipes, of a fan-blower communicating with the interior of the chill-box through the aperture in one side or end of the separating-partition, and also with the interior of the refrigerator, the said parts being relatively arranged and operating substantially as described, whereby the atmosphere of said refrigerating-chamber is drawn from one side of said chamber, passed through said coil or system of pipes, and delivered into said refrigerating-chamber at the opposite side.

4. A refrigerator or apparatus for preserving articles for food or other purpose, the same composed of the following elements: first, a refrigerating or provision chamber; second, a chill-box, separated therefrom by, third, a partition with apertures therein, as shown; fourth, a coil or system of pipes in said chill-box; fifth, a pump for circulating a refrigerating medium in said coil or system of pipes; sixth, a fan-blower arranged substantially as set forth; seventh, a rose or sprinkler at the upper part of the chill-box; and, eighth, a siphon-trap at the lower part of said chill-box, substantially as described.

5. The combination, in a refrigerator, of the following elements: first, a refrigerating-chamber; second, a chill-box, separated from said refrigerating-chamber by, third, a partition with apertures, as shown; fourth, a coil or system of pipes located in the chill-box; fifth, a reservoir for a liquid refrigerant; sixth, a pump, the said coil of pipes and pump being in direct communication with said reservoir and with each other; and, seventh, a fan-blower, arranged substantially as set forth, for causing a circulation of the atmosphere of said refrigerating-chamber into and through said chill-box, substantially as described.

PAUL H. BATE.

Witnesses:

EDWARD HOLLEY,
H. WELLS, Jr.