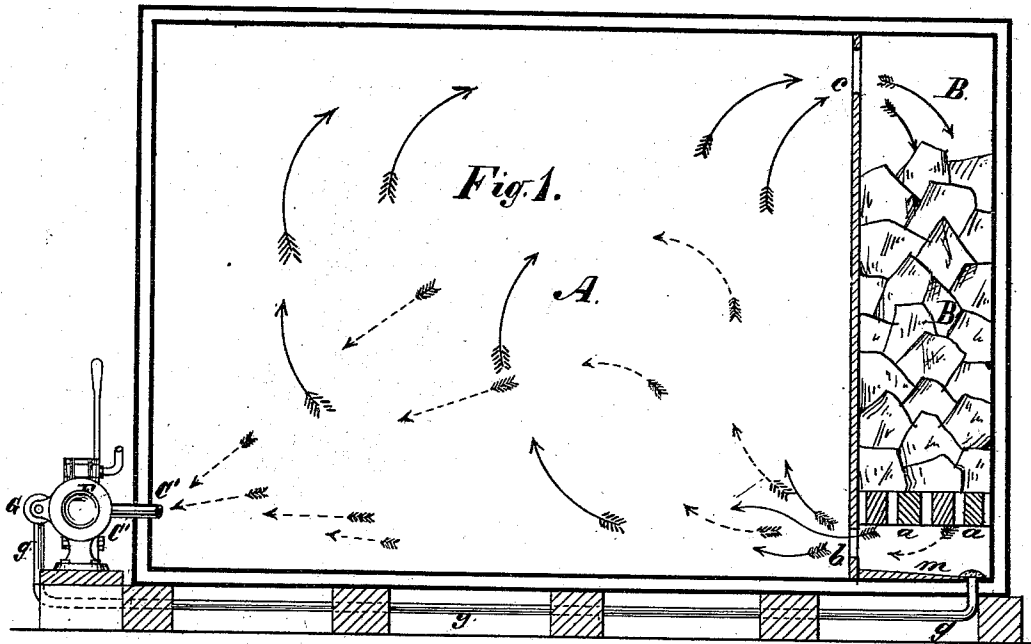
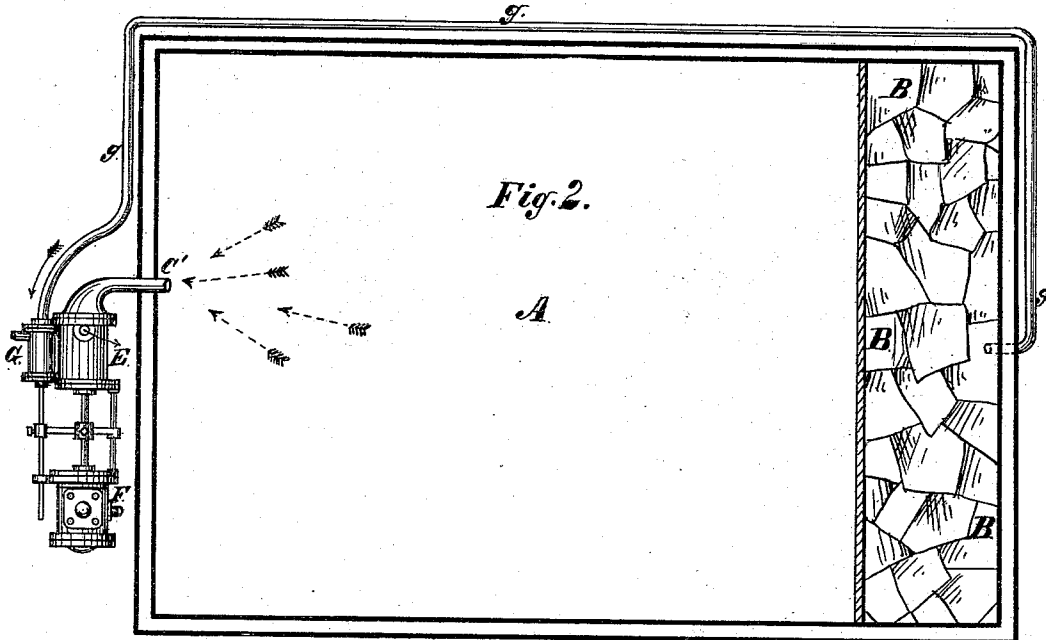


J. J. BATE.
Refrigerator.

No. 222,122.

Patented Dec. 2, 1879.



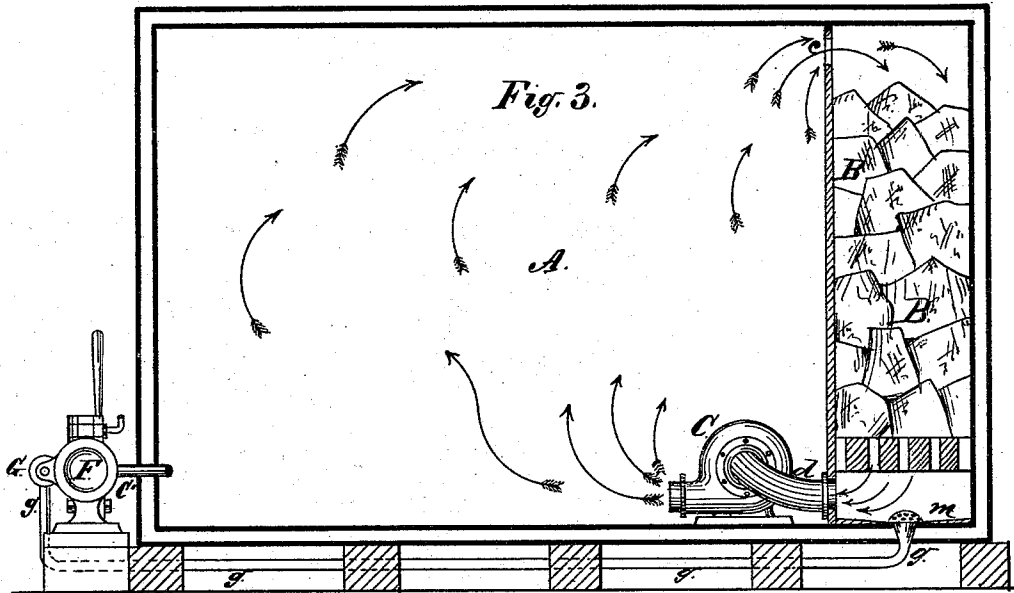
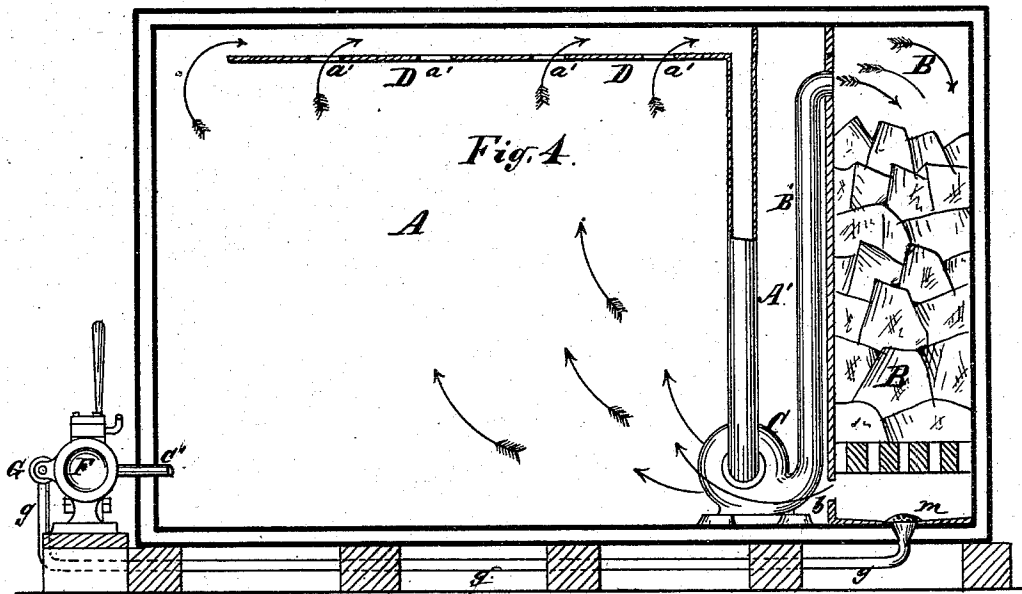
Witnesses:
Henry Eichling
W. Wells Jr.

Inventor:
John J. Bate
per James A. Whitney
Atty

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UNITED STATES PATENT OFFICE.

JOHN J. BATE, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN REFRIGERATORS.

Specification forming part of Letters Patent No. 222,122, dated December 2, 1879; application filed August 16, 1878.

To all whom it may concern:

Be it known that I, JOHN J. BATE, of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Means for Preserving Meats and other Perishable Articles of Food, of which the following is a specification.

This invention consists in the novel process of preserving meats, vegetables, fruits, &c., by subjecting them to the action of an attenuated atmosphere cooled by circulation in contact with ice or equivalent cooling-surfaces; also, in certain novel combinations of parts, whereby the aforesaid process may be effectually carried into practice.

My said invention enables meat and other perishable articles of food to be preserved with a much less waste of ice than is the case with the methods of refrigeration by the use of ice hitherto known.

Figure 1 is a vertical sectional view, representing an apparatus embracing certain mechanical features embraced in my said invention, and Fig. 2 is a horizontal sectional view thereof. Fig. 3 is a vertical sectional view of said apparatus provided with certain accessories, that may be used in connection therewith when desired, and Fig. 4 is a like view of the same fitted with further accessories, which may also on occasion be employed.

A is the refrigerating-chamber, in which are placed the articles to be preserved. When in use this chamber is closed, and its inner walls should be made air-tight, either by means of a sheet-metal lining soldered at the joints or by other suitable means, and of such strength and construction as to bear a pressure in an inward direction of from seven or eight to ten pounds to the square inch, more or less. B is an ice-box, which receives the ice used to insure the requisite degree of refrigeration.

The ice-box may be arranged as represented in Fig. 1, the ice resting upon a grate or system of slats, *a*, at a suitable distance from the floor, and with an opening, *b*, at the bottom, and another, *c*, at the top, so that the air contained within the chamber A, entering the ice-box at the top through the opening *c*, and being cooled by contact with the ice, will descend through the ice-box and out through the opening *b* back to the chamber A, a constant circulation of

air through the chamber A being by this means obtained. This is the simpler form of chamber and ice-box.

When desired, a fan-blower, C, connected with the ice-box by a pipe, *d*, substantially as shown in Fig. 3, may be used to give greater force and determinate direction to the circulation of the air within the chamber A. When said chamber is large or of irregular form, so that it is desirable to cause the air to pass more directly to different parts of said chamber, one or more distributing-conduits, D, may be connected by pipes A' B' with the fan-blower and with the ice-box, as represented in Fig. 4. This conduit or conduits D may be perforated at intervals, as shown at *a'*.

So far as concerns the structure and relative arrangements just hereinbefore set forth of the chamber A, the fan-blower, and the air-distributing conduit or conduits, the same are not novel, and, apart from their combination with other elements, as hereinafter stated, are not here claimed.

E is an air-pump, which may be operated from a steam-engine, either direct-acting, as shown by the location of the steam-cylinder F and its adjuncts in Fig. 3, or by a steam-engine or other suitable motor arranged in any other appropriate manner. The air-pump E may be of any suitable construction, and is so connected with the chamber A, as shown at C'—as, for example, by a suitable pipe, as represented—that by its operation it draws air from the interior of the chamber A, thus creating a partial vacuum therein.

I am aware that the preservation of perishable articles of food by placing them in a vacuum more or less approaching a perfect vacuum has been many times proposed; but such is wholly different from my method, herein-after set forth, and said hitherto-known method therefore I do not claim.

G is a small pump for removing from the apparatus the water resulting from the melting of the ice in the ice-box. It may be operated from the motor which drives the air-pump, or by any other suitable means. Its inlet-pipe *g* extends to the trough *m* underneath the ice-box.

In the working of the invention the air-pump is put in operation to exhaust from the

chamber A a portion of the air contained therein, as indicated by the dotted arrows in Fig. 1. This is continued until the atmosphere within said chamber has its density reduced or attenuated, say, one-half, more or less, when the operation of the air-pump is caused to cease for the time being. The attenuated, or, so to speak, rarefied, atmosphere remaining within the chamber, circulates through the ice-box, and thence back to the chamber, as hereinbefore stated, and as shown by the solid arrows in Figs. 1, 3, and 4, being, of course, cooled thereby, and in its cooled condition coming in contact with the meat, vegetables, or fruit, whatever they may be, suitably placed in the chamber. Inasmuch as the attenuated atmosphere within the chamber includes only one-half (more or less) the actual quantity of air that the chamber would contain of the ordinary unattenuated atmosphere, it follows that a proportionately smaller quantity of ice is sufficient to reduce the temperature to any given degree, the economy of ice being in proportion to the attenuation of the atmosphere within the chamber A, so long as this attenuation is not carried to such an extent as to practically prevent the due and proper circulation of the said attenuated atmosphere. In general, moreover, the greater the attenuation of said atmosphere the greater the desirability, or, in extreme cases, the necessity, of the fan-blower to urge or assist the circulation.

The attenuation of the atmosphere within the chamber causes the disengagement of vapors, gases, &c., from the meat or other articles placed in the chamber for preservation. When this has occurred to any sensible degree the air-pump may be again set in motion to again attenuate the contained atmosphere to the same diminished density as before.

The water resulting from the melting of the ice in the ice-box is collected in the trough

below, and at intervals is drawn off by the pump G.

What I claim as my invention is—

1. The herein-described process of preserving meats, vegetables, fruits, &c., by subjecting the same to the action of an attenuated atmosphere cooled by repeated contact with ice, substantially as herein set forth.

2. A preserving apparatus comprising, in combination, the following elements, viz: a closed chamber for containing the articles to be preserved, an air-pump for attenuating the atmosphere within said chamber, and an ice-box for cooling the attenuated air, with or without a fan-blower for circulating said attenuated air, the ice-box and refrigerating-chamber being both contained in an air-tight covering or structure, and the air in the refrigerating-chamber being cooled by repeated contacts with the ice, substantially as herein set forth.

3. The combination of the pump for withdrawing the water resulting from the melting of the ice with the chamber, the air-pump, and the ice-box, substantially as and for the purpose set forth.

4. A refrigerator or apparatus for preservation of food, composed of the following elements: first, a closed chamber; second, an ice-box in communication with said chamber; third, an air-pump in communication with the refrigerating-chamber through its inlet-valve; fourth, a pump for removing the drip; and, fifth, a fan-blower communicating with said refrigerating-chamber and with the ice-box, and arranged to cause a circulation again and again of the atmosphere of the aforesaid refrigerating-chamber through the ice-box, substantially as described.

JOHN J. BATE.

Witnesses:

A. R. PAGE,
H. WELLS, Jr.