(No Model.)

A. J. CHASE.

REFRIGERATOR.

No. 303,805. Patented Aug. 19, 1884.

Fig. 1.

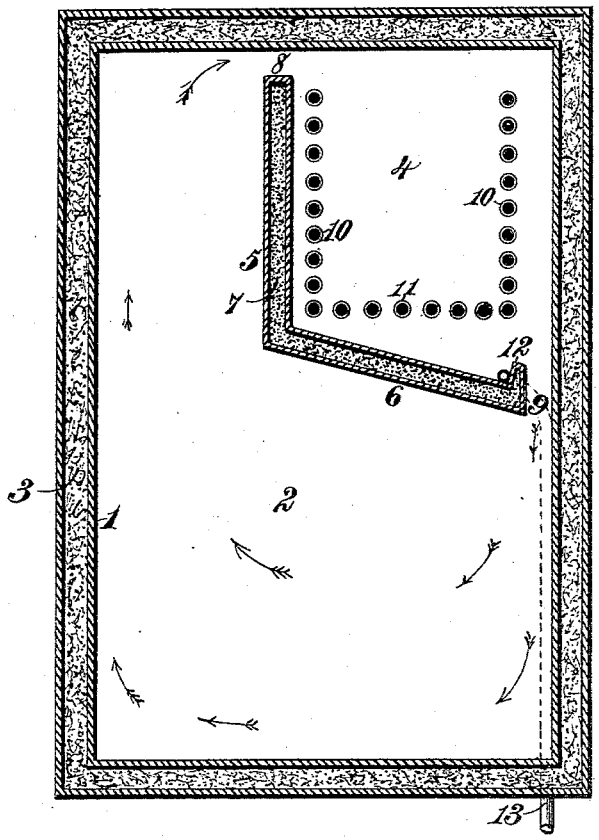
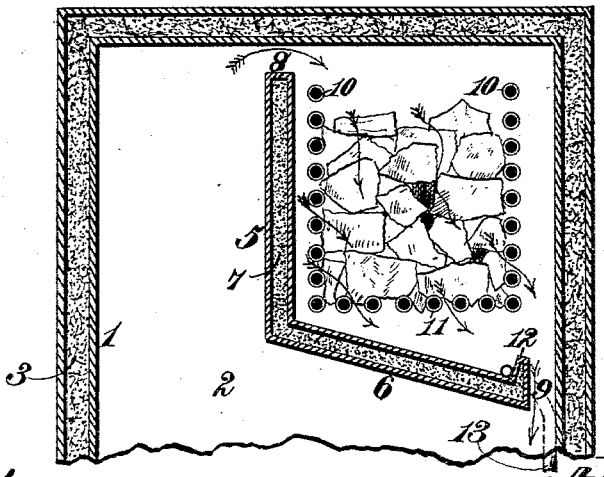


Fig. 2.



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UNITED STATES PATENT OFFICE.

ANDREW J. CHASE, OF BOSTON, MASSACHUSETTS.

REFRIGERATOR.

SPECIFICATION forming part of Letters Patent No. 303,805, dated August 19, 1884.

Application filed May 19, 1884. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. CHASE, a citizen of the United States, residing at Boston, Massachusetts, have invented new and useful Improvements in Refrigerators, of which the following is a specification.

This invention relates to improvements in that method of refrigeration wherein the heat is absorbed by a cooling agent—such as gas or common air—when passed through vacuum pipes or cylinders, to absorb heat in proportion to the extent of rarefaction or expansion of the controlled gas or air.

The objects of my invention are to avoid the use of a blower to obtain a circulation of air through the preserving-chamber and over the vacuum pipes or cylinders; to avoid the employment of a water-spray to produce a sheet of ice on the pipes; to provide novel means whereby an automatic circulation of inclosed and confined air is effected through the preserving-chamber and the refrigerating-chamber, in which the pipes or cylinders are arranged for the passage of the cooling agent, such as compressed and cooled volatile gas, common air, or non-congealable pickle; to provide such an arrangement of pipes or cylinders in the refrigerating-chamber that if it becomes necessary they can be utilized to support ice as the refrigerating agent, and to provide in such arrangement means for the collection and escape of the drippings from the ice or from the condensed moisture, to prevent the same from falling upon the floor of the preserving-chamber. These objects I accomplish in the manner and by the means hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view illustrating my improved refrigerator, and Fig. 2 a sectional view showing pieces of ice in the receiver formed by the pipes.

Referring to the drawings, the numbers 1 indicate the walls of an apartment or chamber, 2, to be refrigerated, such walls being insulated, as at 3, through the medium of any suitable material, to provide non-conducting walls. In the upper portion of the apartment or chamber 2 is the refrigerating-chamber 4, created by the vertical wall 5 and bottom inclined wall, 6, each being double, and insulated by suitable material, as at 7, to provide non-heat-conducting partitions, which terminate adjacent to the top wall and one of the side walls of the preserving apartment or chamber, as at 8 and 9, for circulation of the inclosed air. In the refrigerating-chamber are two series of pipes, 10, arranged horizontally or otherwise one above the other in vertical array, and a horizontal line of pipes, 11, arranged one beside the other, the whole constituting a box-like receiver for ice. The horizontal line of pipes is above and adjacent to the inclined bottom wall of the refrigerating-chamber, which wall is provided at its outer edge with a flange, 12, whereby a drip-pan is created to receive and carry off drippings from any ice that may be placed in the receiver or from condensed moisture, thus preventing the same from entering the preserving-room. The pipes 10 are arranged in vertical lines one above the other, in order that when they give up the frozen moisture on their surfaces the drip shall be from one to the other to avoid spattering. The pipes may be of any suitable form, or they may be cylinders or the like, arranged as shown, and are to be connected with the means used to produce cold—such as a supply of volatile gas, as ether or ammonia, or of common air—which, when compressed and cooled and allowed to expand into the vacuum pipes or cylinders, will absorb heat in proportion to the extent of rarefaction or expansion of the controlled gas or air; but, if desired, the pipes 10 can be connected with any suitable pumps for forcing the refrigerating agent through the pipes. As the manner of delivering a refrigerant to and circulating it through pipes in refrigerating apparatus is well known, I do not deem it essential to illustrate any particular mechanism for accomplishing such object.

The cooling may be effected by a circulating fluid, a rarefied gas or other cooling agent in the pipes, and in practice the cold air will flow freely out at the bottom of the refrigerating-chamber into the preserving-apartment, and the warmer air from the latter, which contains moisture will pass into the refrigerating-chamber at the top, the pipes affording ample provision for this automatic and continuous circulation of the air inclosed by and confined

in the preserving and refrigerating chambers. The internal motion or circulation of the air is effected by the cooling-pipes, which are generally covered with frost or frozen moisture, and the air by contact with the pipes is rendered exceedingly dry by giving up its heat and moisture upon the freezing-surface of the pipes, and consequently by its increased weight or gravity, due to its cold dry state, it falls from the pipes or condensing-chamber to the preserving-apartment below, where its temperature is somewhat raised and its capacity for taking moisture increased.

If from any cause—such as accident to the machinery supplying the fluid or other cooling medium to the pipes or cylinders—it should be desirable to employ blocks of ice to produce a low temperature, such ice can be supplied to the receiver created by the vertical and horizontal lines of pipes, such pipes constituting bottom and side walls to support the ice. The process of circulation will in such event be the same, differing therefrom in degree only.

The insulated walls of the preserving-chamber and the non-heat-conducting walls of the refrigerating or condensing chamber are important for perfect and effective refrigeration, and as the preserving-chamber is closed the circulation is only in the inclosed air within the structure, so that cold dry air is always supplied to the articles to be preserved.

Inasmuch as the drip-pan is under the vertical and horizontal lines of pipe, it will be obvious that water from the ice or from condensed moisture will be received into the pan and can escape by a conduit or tube, 13, thus preventing the drippings from falling upon the floor of the preserving-chamber.

By my invention I utilize the force of the volatile gas or other cooling agent in the pipes to effect the automatic and continuous circulation of the inclosed air through the two chambers, which provides a very efficient and desirable means of refrigeration and preservation.

I am aware that it is not broadly new to circulate a refrigerating agent through pipes or coils in a refrigerating apparatus; also, that pipes have been arranged in a cluster to constitute a gas receiver or holder for cooling-chambers; also, that a preserving-chamber has been provided with non-conducting walls and with an ice-box having non-conducting walls, and in communication with the preserving-chamber at top and bottom, the bottom wall of the ice-box having a horizontal layer of pipes for containing water to be cooled by the ice in the ice box. Such features of themselves are therefore disclaimed.

Having thus described my invention, what I claim is—

1. The combination of the preserving-apartment formed by non-conducting walls, the refrigerating or condensing chamber formed by non-heat-conducting walls, and the pipes or cylinders for the passage of the cooling agent, said pipes or cylinders being arranged horizontally and vertically to constitute a receiver for ice within the condensing-chamber, substantially as described.

2. The combination of the non-conducting walls composing the chamber, the non-heat-conducting walls constituting one side and the bottom of the condensing-chamber, and the bottom wall being within the preserving-chamber to provide a drip-pan, and the pipes or cylinders for the passage of the cooling agent, said pipes or cylinders being arranged horizontally and vertically above the drip-pan to constitute a receiver for ice within the condensing-chamber, substantially as described.

3. The combination, with the preserving-apartment, the condensing-chamber, and the drip-pan in the bottom of the latter, of the lines of pipes for the cooling agent arranged to create the bottom wall and side walls of a receiver for containing and supporting pieces or blocks of ice within the condensing-chamber, said condensing-chamber being in communication with the preserving-apartment by top and bottom passages, and the vertical lines of pipes composing the ice-receiver, being adjacent to the vertical wall of the condensing-chamber and the walls of the preserving-apartment, respectively, substantially as described.

4. The combination of a preserving-apartment, a condensing chamber having its upper and lower portions in communication therewith, and constituting a drip-pan, and lines of pipes or cylinders arranged in the condensing-chamber to receive the refrigerating gas or other agent, and also constituting the horizontal bottom and vertically-arranged side walls of a receiver for containing and supporting blocks or pieces of ice within the condensing-chamber, whereby an automatic circulation of inclosed air is effected through the preserving and condensing chamber, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ANDREW J. CHASE.

Witnesses:

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