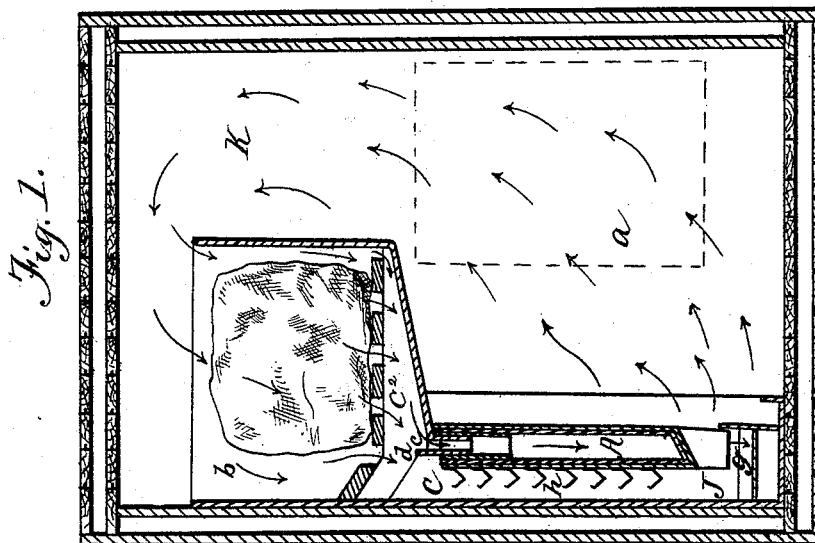
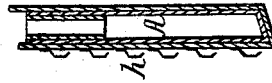
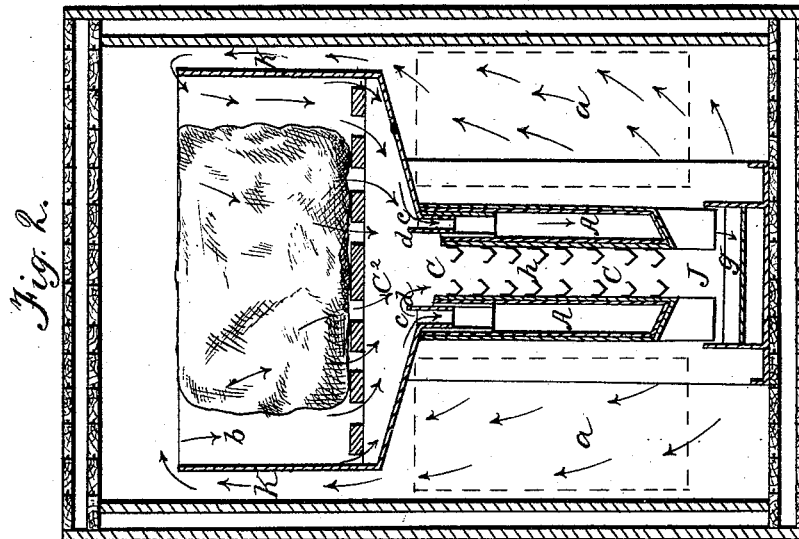


C. M. BIDDLE.

REFRIGERATOR.

No. 347,560.

Patented Aug. 17, 1886.



Witnesses:-  
R. E. Grant  
G. E. Tucker

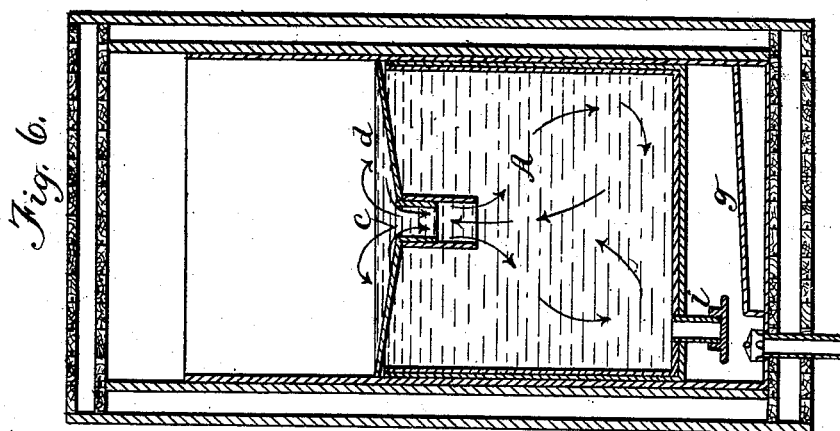
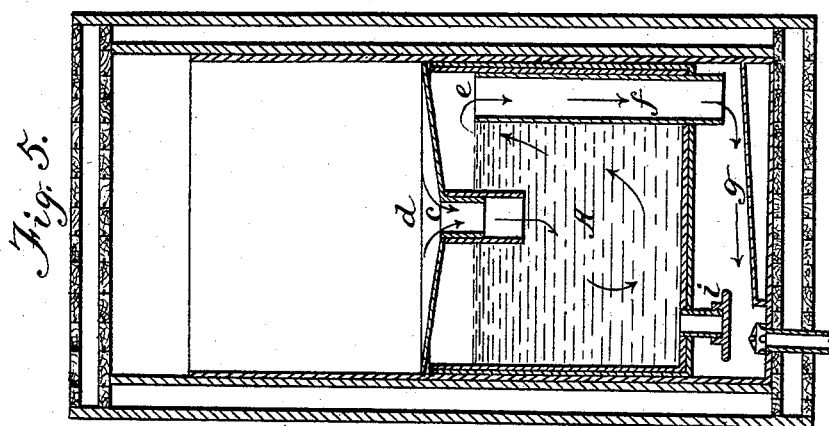
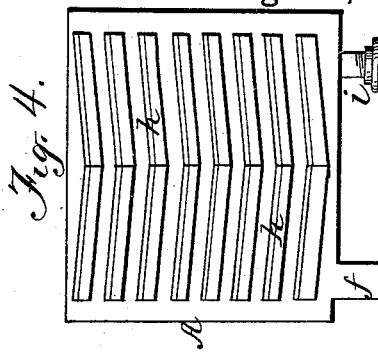
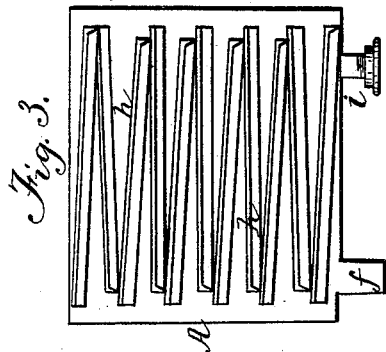
Inventor:-  
Clement M. Biddle,  
by Johnson & Johnson,  
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# UNITED STATES PATENT OFFICE.

CLEMENT M. BIDDLE, OF PHILADELPHIA, PENNSYLVANIA.

## REFRIGERATOR.

SPECIFICATION forming part of Letters Patent No. 347,560, dated August 17, 1886.

Application filed January 26, 1886. Serial No. 189,843. (No model.)

### *To all whom it may concern:*

Be it known that I, CLEMENT M. BIDDLE, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented new and useful Improvements in Refrigerators, of which the following is a specification.

The object of my improvement is to provide a cold surface for condensing the moisture in the air of a refrigerator to maintain a dry, pure, cold preserving atmosphere. For this purpose provision is made for retaining and utilizing the cold drip within a water-back, which constitutes the wall or walls of a cold-air flue communicating with the ice-box and with an air-tight preserving-chamber. The water-back in the cold-air flue may be supplemented by sheet metal troughs or sheds arranged upon its wall or walls, placed in alternate inclined positions, one above the other, for the collection and carrying off the water of condensation, and to increase the area of the condensing-surface. Provision is made for carrying off the cold drip from the water-back either by an overflow within the latter or by the exterior wall-troughs, in either case the drip filling the water-back for chilling its surface and its supplemented sheet-metal troughs or sheds, and the inflow and the overflow taking place at the top of the water-back.

The accompanying drawings illustrate the application of my improvement to a refrigerator in which the confined cold air is maintained in circulation within the preserving-chamber without change.

Figure 1 represents the refrigerator in vertical section; Fig. 2, a similar view of a refrigerator having two preserving-chambers. Fig. 3 shows in side elevation the water-back having its flue-wall supplemented by moisture-condensing troughs, and Fig. 4 a similar view showing moisture-condensing sheds. Fig. 5 is a vertical section taken through the water-back, showing its interior overflow; and Fig. 6 is a similar view showing the exterior overflow of the water-back.

Any suitable construction of the refrigerator structure having an air-tight preserving-chamber may be used with my improvement. Doors for access to the preserving-chamber *a* and to the ice-box *b* are provided. At the top

of the food-containing chamber is placed the ice-box, which, as shown, may be in central relation to such chamber or at the side thereof. In either case the preserving-chamber communicates by a passage, *K*, with the top of the ice-box, and by a passage, *J*, at the bottom of a diving-flue, *C*, which opens into the ice-box, so that the vertical side or sides of said flue will join the inclined bottom of the ice-box. At the top of the air-circulating conduit a space, *C'*, is left below the ice-rack, to allow free circulation of air through the ice-box and conduit into and through the preserving-chamber, upon the principle of the greater specific gravity of the air within the preserving-chamber, into which said conduit opens at the floor, the air-circuit being completed by the top passage of the ice-box.

One or both of the walls of the air-dividing conduit is formed by a water-back, *A*, of metal plates, the water-containing chamber whereof is open at the top at *c*, so that the drip from the ice-box will run down into the water-back, and from thence pass off by overflow. The water-back extends from wall to wall in the chamber, and forms a trough, *d*, at the ice-box bottom, to collect the drip at the water-back inlet. The overflow from the water-back may be from its interior at the top at *e*, Fig. 5, by the pipe *f*, extending down and opening at the bottom of the water-back, so that the latter will be kept full of the cold drip and its air-conduit forming walls chilled thereby to form a moisture-condensing surface for the water in the air. For this purpose the water-back is combined with a drip-pan, *g*, at the floor, to receive the water of condensation which gathers upon the cold metal surface of the water-back in the flue and runs down its walls, from which it drops into the drip-pan. For increasing the area of the condensing-surface of the air-driving conduit I provide the water-back within the conduit with sheet-metal troughs or sheds *h*, which collect and carry off the moisture in the air, in addition to that collected and carried off by the cold walls of the water-back. The overflow from the water-back, however, may be by the backing up of the water out of its top inlet-opening, so that the cold drip, after filling the water-back, will overflow at its top opening, *c*, and run down into the wall-

troughs, passing from one to the other into the drip-pan, as in Fig 6, the overflow-pipe *f* not being used. When the wall-troughs are not used, the overflow is by the interior pipe, *f*, as stated, and instead of the troughs I may use metal plates upon the water-back, placed so as to shed the water of condensation and deliver it into the drip-pan. For this purpose the plates will be arranged like the troughs, inclined in opposite directions, and inclined downward from the water-back wall, so as to shed the moisture from the latter, and thus collect and deliver the moisture from one to the other next below. The water-back has a tap or plug, *i*, at the bottom, by which to clean it of dirt collections from the drip by drawing off the water. The drip pan is provided with a drain-pipe having a water seal, to prevent the escape of cold air. The collection of the cold drip and its overflow from a metal water-back which forms the wall of a diving air-conduit insures a uniform cold condensing-surface in the conduit, so that the circuit of air will pass out of the conduit, leaving upon its walls the moisture which it receives from the ice and the impurities and bad gases which it receives from the food. I prefer to make the walls of the water-tank of two or more plates for greater thickness, and thereby retain the cold to its fullest degree. When the overflow is from the interior of the water-back, I prefer to have the overflow-pipe terminate in the water seal of the drip-pan.

I claim—

1. The combination, in a refrigerator, of an ice-box, *b*, an air-circulating conduit, *C*, depending therefrom, open at the top and at the bottom, and an air-tight preserving-chamber, *a*, communicating with the bottom of said air-

conduit beneath the ice-box, and with the top of said conduit above the ice-box, with a metal water-back, *A*, forming one or both the walls of said circulating-air conduit, opening into the ice-box at the top of said air-conduit, and having an overflow, substantially as described.

2. The combination, with an ice-box and an air-tight preserving-chamber, of one or more metal overflow water-backs supplied by the cold drip, forming a vertical air-circulating conduit having wall moisture-condensing metal conductors, for the purpose specified.

3. The combination, in a refrigerator, of an ice-box, *b*, an air-circulating conduit, *C*, depending therefrom, open at the top and at the bottom, and an air-tight preserving-chamber, *a*, communicating with the bottom of said air-conduit beneath the ice-box, and with the top of said air-conduit above the ice-box, with a metal water-back, *A*, forming one of the walls of said air conduit, open at its top, and an overflow-pipe contained within said water-back, substantially as described, for the purpose specified.

4. The combination of the ice-box arranged to form an air-circulating flue, *C*, with metal troughs arranged on one side of the wall of said flue, a water-back arranged on the other side of said wall, and an overflow arranged within said water-back, all as shown and described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CLEMENT M. BIDDLE.

Witnesses:

CARROLL R. WILLIAMS,  
A. MORTON COOPER.