

(No Model.)

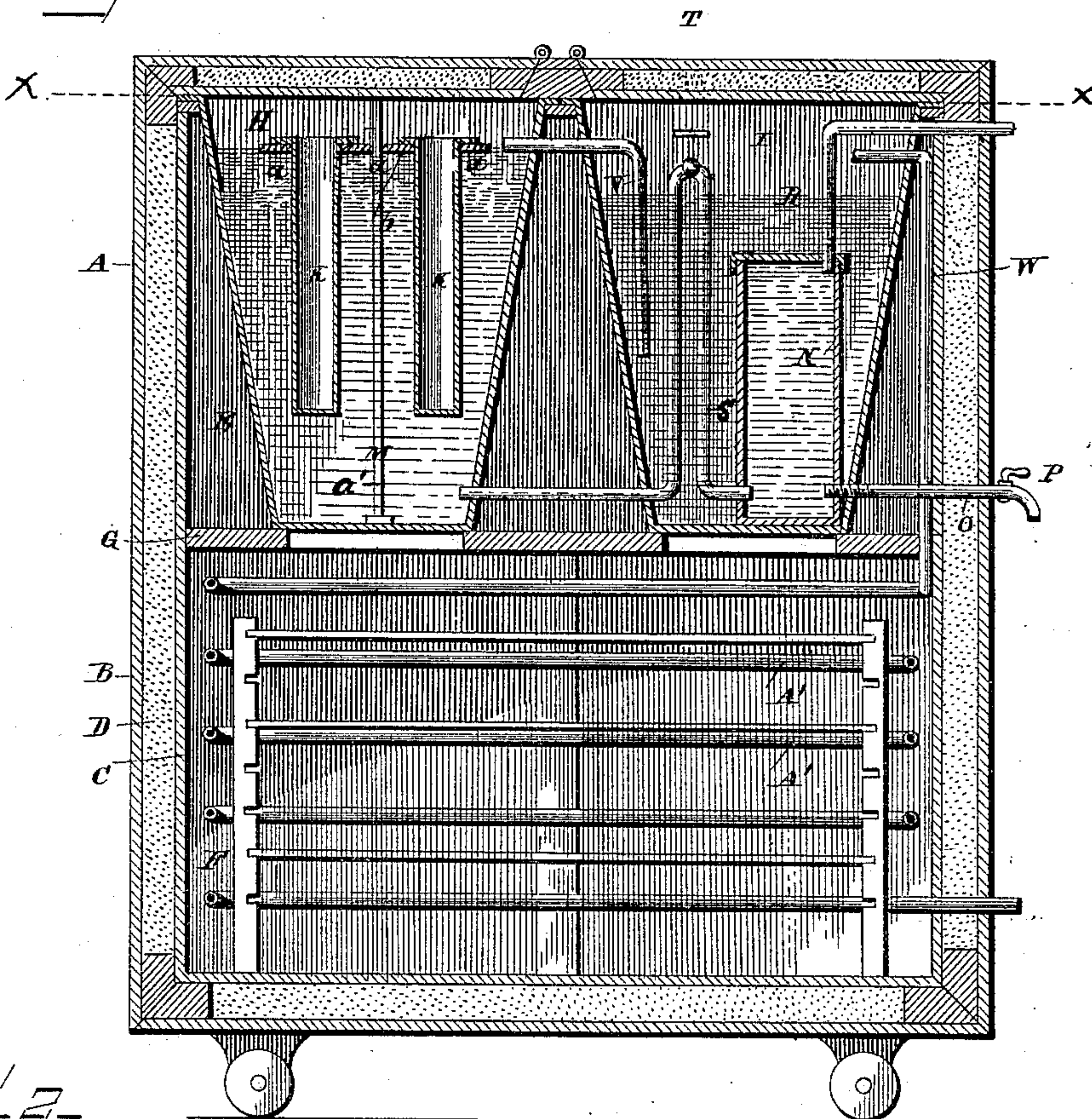
F. A. SMITH.

ICE MAKING AND REFRIGERATING MACHINE.

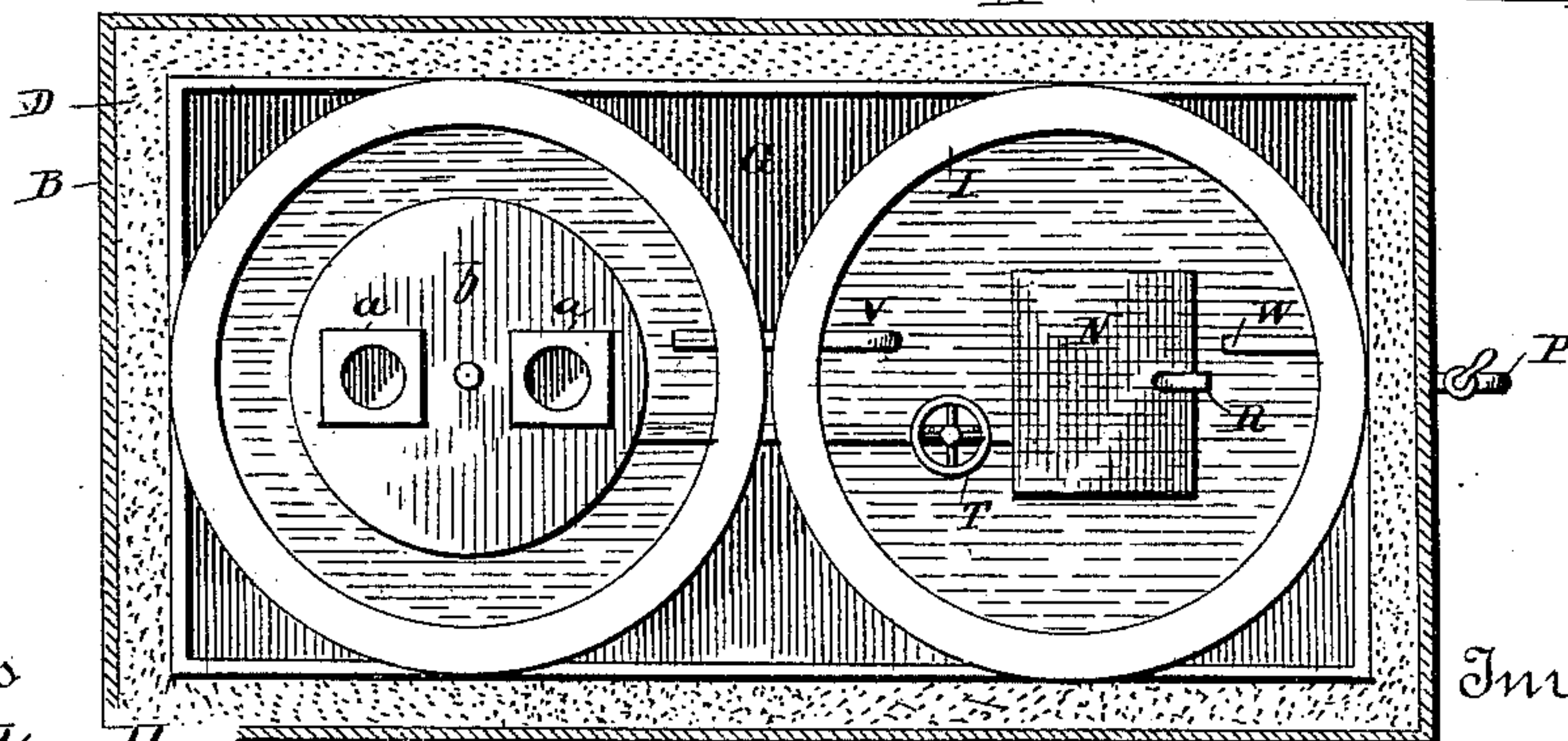
No. 349,064.

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*Fig 1*



*Fig 2*



Witnesses

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# UNITED STATES PATENT OFFICE

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## ICE-MAKING AND REFRIGERATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 349,064, dated September 14, 1886.

Application filed March 27, 1886. Serial No. 196,761. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK A. SMITH, a citizen of the United States, residing at Steelton, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Domestic Refrigerators and Devices for the Manufacture of Ice, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making a part of this specification.

My invention relates to improvements in domestic refrigerators, and to devices for the manufacture of ice.

15 The object of my invention is to provide a cheap and reliable device for refrigerating purposes for domestic and other uses, by which the articles contained in the refrigerator are preserved, fresh water reduced to the proper temperature for drinking purposes, and at the same time the temperature in some one of the compartments reduced to the ice-forming or freezing point.

My invention consists in passing the freezing-mixture, after it has performed its work in cooling the drinking-water and in the production of ice, through a coil of pipes arranged within the preserving-chamber of the refrigerator, whereby all the units of cold are utilized.

30 My invention consists, further, in certain details of construction, which will be fully described hereinafter, and pointed out in the claims.

Referring to the drawings, Figure 1 is a vertical sectional view of my improved apparatus. Fig. 2 is a horizontal sectional view on the line *xx*, Fig. 1.

A indicates the main body of the refrigerator, which is composed of an outer wall, B, and an inner wall, C, with an intervening space between the two walls, which is filled with any suitable non-conducting packing material, D, as is common in the construction of refrigerators.

45 The interior of the refrigerator is divided into upper and lower compartments, E and F, respectively, by the horizontal partition G, the lower portion or compartment, F, being provided with a door and shelves, and used as a storage-chamber for meats, fruits, vegetables, &c., while the upper compartment, E, is used for containing the devices and chemicals which produce the cold or reduced temperature.

H and I are recesses or tanks located in the compartment or chamber E, and made of any suitable material, but, by preference, of a metal which will not be affected by the chemicals or salts they are intended to contain for producing the reduced temperature. The vessel H is designed to be used as the freezing or ice-forming vessel, and is provided with suitable cans K, for holding the pure fresh water, which is to be formed into ice, said cans being provided with flanges *a*, adapted to rest on the edges of recesses formed in the float *b*, by which means the cans K are held in position in the freezing-mixture, M, contained in the vessel H. The float is provided with a central aperture, through which the guide-rod *a'* is passed, the lower end of said guide-rod being secured to the bottom of the vessel H, and by which means the cans K and float B are held in position, and are free to slide up and down on the guide-rod.

N is a fresh-water tank located in the bottom of the vessel I, and is provided with a drain-pipe, O, and stop-cock P, through which the cooled water is drawn for drinking and other purposes, said tank being provided with a fresh-water-supply pipe, R, which leads to and connects with a hydrant or other convenient water-supply.

S is a pipe leading from the bottom or lower portion of the fresh-water tank N, and extends up to near the top of the vessel I, and is led down again by a return-bend to the bottom of the tank I, where it is led through the walls thereof into the lower portion of the vessel H. The pipe S at the top of the bent portion is provided with a stop-cock or regulating-valve, T, by which the supply of fresh water to the tank H is regulated.

V is an overflow or equalizing pipe leading from the freezing-vessel H to the cooling-vessel I, one end of which extends down into the vessel I, so as to discharge the cold solution from the freezing-vessel H into the cooling-vessel I, near the bottom thereof, and thus utilize the low temperature of the solution coming through it in cooling the water in the tank N and pipe S.

W is an overflow-pipe, which enters the cooling-vessel I near the top, and extends down and through the storing or preserving compartment F by a series of coils, A', and, finally, out through the side of the refriger-



ator to a suitable receptacle, from whence the solution is taken to a suitable evaporating apparatus, where the salts are recovered for further use.

5 In practical operation the vessels H and I are charged with the proper amount of the cooling or refrigerating salts, preferably nitrate of ammonia, and the valve T opened, so as to supply the vessel H with the proper  
10 amount of water to dissolve the salts, the force of the water which enters the vessel H under pressure being sufficient to agitate the salt, thus dispensing with any mechanical devices or means for stirring or agitating the salts.  
15 When the vessel H has filled, the overflow passes out through the pipe V into the vessel I, where the cooling liquid is utilized to reduce the temperature of the water in the vessel N and pipe S, and in this way the initial  
20 cooling of the fresh water is accomplished by the overflow from the freezing-tank H. When the solution or overflow from the tank H has reached a certain height in the tank I, the surplus or overflow is carried off through the  
25 pipe W and conducted through the coil of pipe in the compartment F, and reduces the temperature of the same. By bringing the pipe W into the refrigerating or preserving chamber F near the top thereof the cooling-  
30 liquid in its passage therethrough gives off its greatest cold in the top of said chamber, the cold air settling down into the chamber F and keeping the articles therein contained at the proper preserving temperature.  
35 As a further means of utilizing all of the cold from the vessels H and I, openings are formed in the partition G, directly underneath the vessels or tanks, so that the cold air or refrigerating-currents thrown off from  
40 the bottom of said vessels will enter the chamber F.  
Instead of having a solid partition, G, I may form the same of a series of slats, or I may secure and support the tanks H and I  
45 in any suitable manner at their tops to the casing of the refrigerator, and thus dispense entirely with the partition, and allow all of the cold-air currents coming from the tanks H and I to settle down into the chamber F;  
50 and instead of coiling the pipes A' around the sides of the chamber F, I may find it convenient and desirable to simply coil the same in the top thereof, and by this means utilize all the units of cold. By closing or partly  
55 closing the valve T the water is retained in the pipe S and tank N, and cooled to any desired temperature before it is introduced into the freezing-tub, and by opening the valve T fully the salts are stirred or agitated in the  
60 tank H to any desired extent by the force of the current of water.

After the first filling of the tanks or vessels H and I with salts, and when the cooling or freezing operation is fairly under way,  
55 the freezing-tub H only is replenished with the salts, the overflow of the cold liquid from this vessel into the vessel I being sufficient

to accomplish the initial cooling of the fresh water in the tank N and coil S.

I am aware that it is not new to cool a body of water by the addition of a salt thereto, bringing this body of cooled water into contact with the walls of another vessel containing pure water, and thereby reducing the temperature of the pure water almost to the temperature of the water containing the salt, then dissolving salt in the pure water previously cooled, and thus reducing its temperature, by which operation ice can be formed in a vessel immersed in the second body of water, and which vessel and its contained water are subjected to the cooling due to the dissolving of the cooling agent in the first as well as the second vessel, and such I do not claim.

Having thus described my invention, what I claim is—

1. In a refrigerator for domestic uses and other purposes, the combination of two tanks or vessels filled with a solution of nitrate-of-ammonia salt, a pipe connecting said tanks for carrying the overflow from the freezing to the cooling tank or vessel and discharging said solution near the bottom of said cooling-tank, a fresh-water-supply pipe leading from a fresh-water tank located in the cooling-tank to the bottom of the freezing-tank, and a regulating-valve located in the fresh-water-supply pipe, to regulate the flow of water into the freezing-tank, whereby the fresh water is cooled before it comes in contact with the freezing-mixture, and the solution is agitated or mixed in the freezing-tank by the force of the incoming water, as set forth.

2. In a refrigerator for domestic and other uses, the guide-rod *a'*, secured in the bottom of the freezing-tank, in combination with the floating disk *b* and cans K, whereby the cans are held in position in the freezing-solution, as set forth.

3. In a refrigerator for domestic and other uses, the combination of the two tanks H and I, placed close together and connected by means of the overflow-pipe V with the fresh-water tank located in the cooling-tank F, and connected to the freezing-tank H by means of the pipe S, and the valve T, for controlling the admission of the fresh water to the freezing-tank, as set forth.

4. In a refrigerator for domestic purposes and other uses, the combination of the devices, substantially such as described, for the continuous production of cold, with the overflow-pipe W and coil A', located in the preserving-chamber of the refrigerator, whereby all the units of cold are utilized, as set forth.

In testimony whereof I have hereunto set my hand this 25th day of March, A. D. 1886.

FRANK A. SMITH.

Witnesses:

T. H. BOYER,  
W. C. MURDOCK.