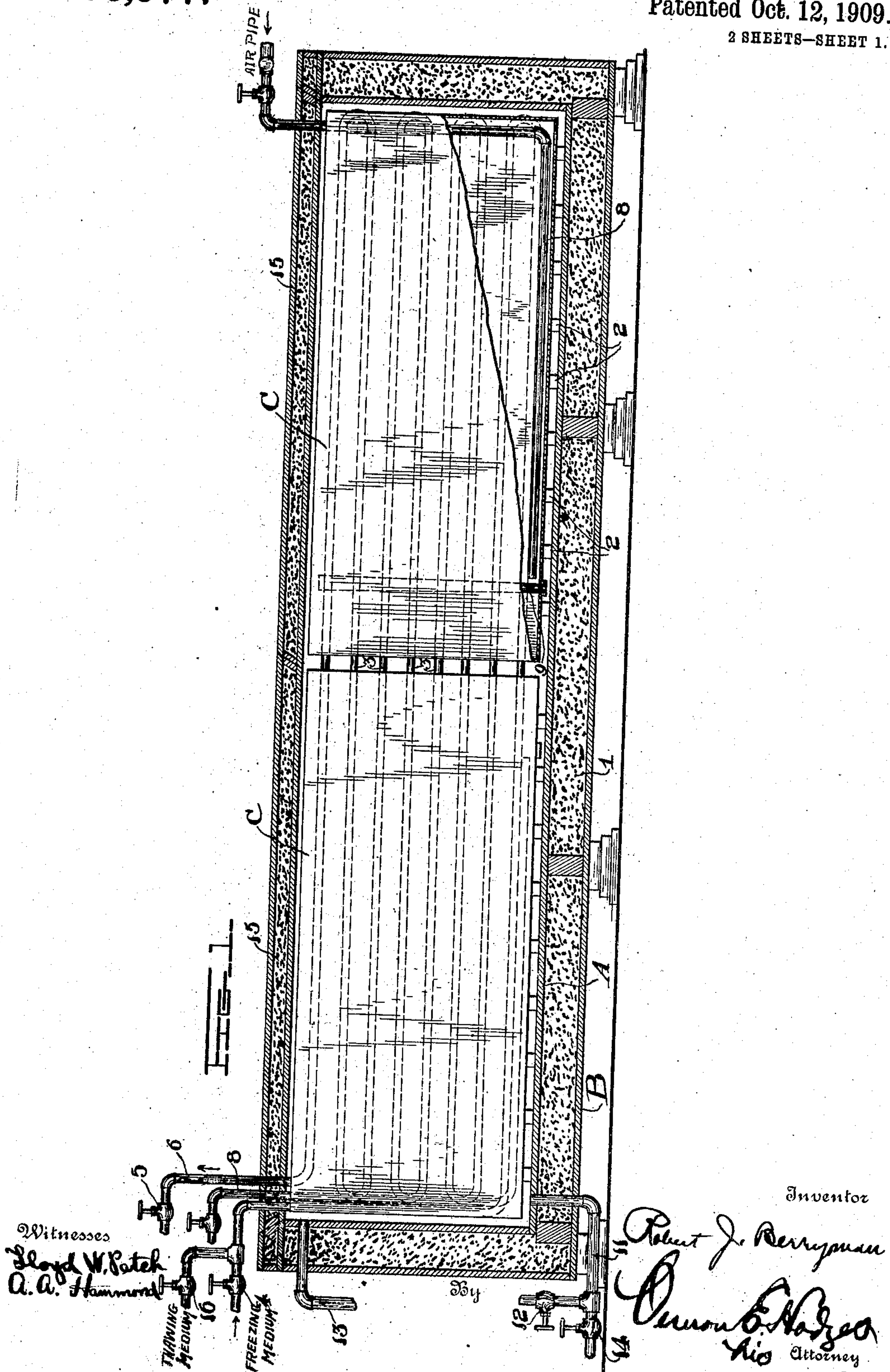


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APPLICATION FILED FEB. 6, 1907.

936,977.

Patented Oct. 12, 1909.  
2 SHEETS—SHEET 1.



Witnesses  
Lloyd W. Patch  
A. A. Hammond

Inventor

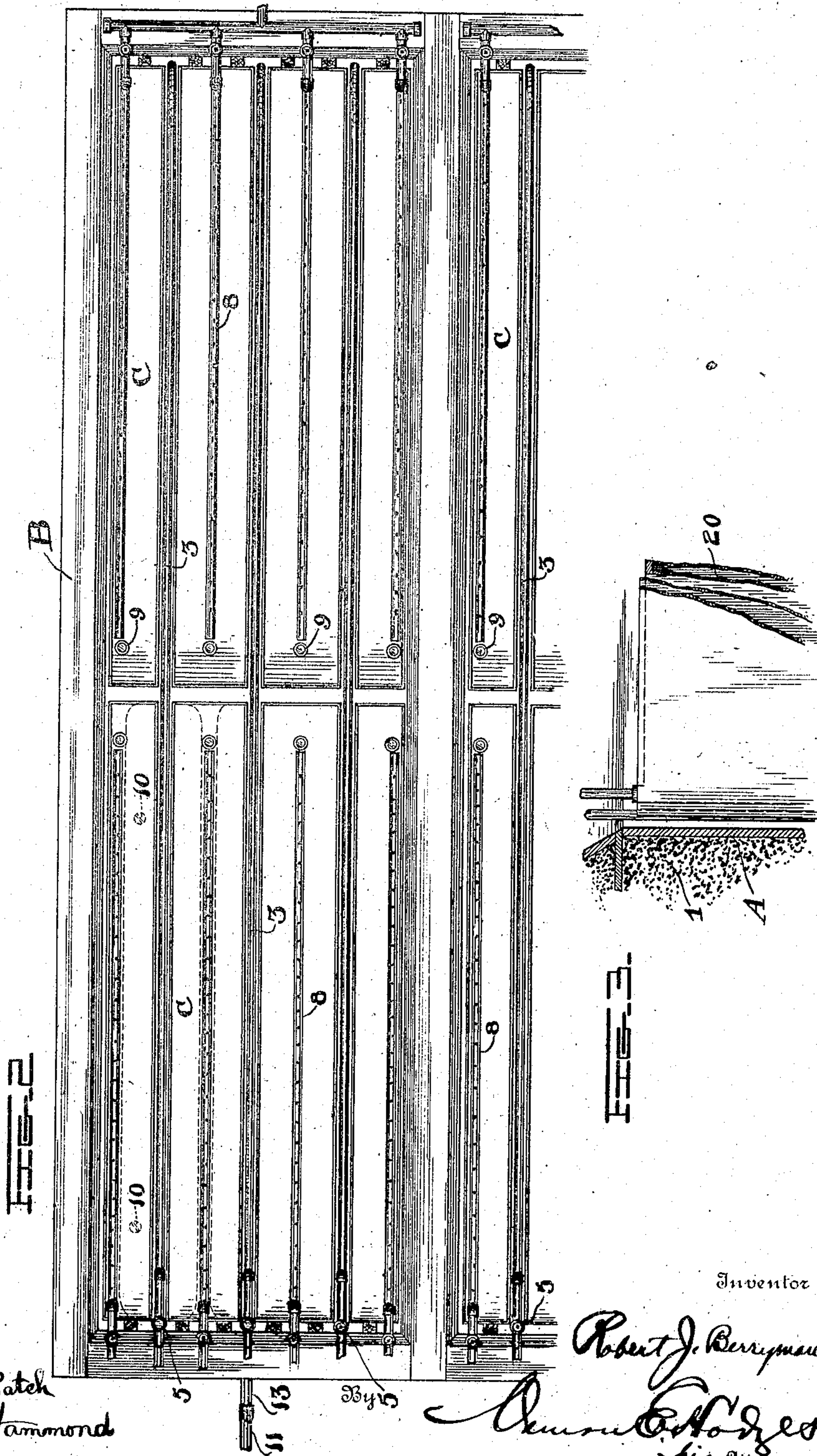
Robert J. Berryman  
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his Attorney



# UNITED STATES PATENT OFFICE.

ROBERT J. BERRYMAN, OF ANNAPOLIS, MARYLAND, ASSIGNOR OF ONE-HALF TO  
MARIANNA BUDD BERRYMAN, OF ANNAPOLIS, MARYLAND.

METHOD OR PROCESS FOR THE MANUFACTURE OF ARTIFICIAL ICE.

936,977.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed February 6, 1907. Serial No. 356,046.

*To all whom it may concern:*

Be it known that I, ROBERT J. BERRYMAN, a citizen of the United States, residing at Annapolis, in the county of Anne Arundel and State of Maryland, have invented certain new and useful Improvements in Methods or Processes for the Manufacture of Artificial Ice, of which the following is a specification.

My invention relates to an improved method or process for the manufacture of artificial ice, and the primary object of this invention is to provide means for forming ice in cans and removing it from the cans without the necessity of removing the cans from the tank.

Another object is to provide an improved method of manufacturing ice in cans whereby it is possible to remove and dispose of all impurities in the water during the process of freezing thereby obviating the necessity of first distilling and filtering the water preparatory to the manufacture of transparent can ice.

With the foregoing objects and others in view, my invention consists in freezing the water in cans so located in a tank that space is left on all sides thereof, and after the completion of the freezing process introducing a thawing medium in the spaces around the cans, whereby the ice formed is thawed from the cans and it is rendered removable without moving the cans.

My invention further consists in the method of manufacturing ice which consists in freezing it in cans from one or both sides to a predetermined depth, and subsequently draining the water left remaining in the cans.

My invention further consists in the method of manufacturing ice which consists in freezing it in cans from one or both sides to a predetermined depth, and subsequently draining the water left remaining in the cans, and agitating the water in the cans during the freezing process.

My invention still further consists in certain procedure which will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings:—Figure 1 is a longitudinal, vertical section through the machine. Fig. 2 is a top plan view with the covers removed. Fig. 3 is a modification.

The tank A is preferably of steel, although it may be made of any suitable material and it is supported in a suitable framework B, between which and the tank there is a heavy insulation 1, of any suitable material. Inside of the tank A there are located as many cans C, C, as the capacity of the tank will admit, according to the size of the plant. These cans C, C, are preferably made of galvanized iron as is customary, and they are made in the desired dimensions. For example, the larger or inside cans are say 26 or 28 inches thick by 44 inches deep and anywhere from 5 to 15 feet in length, whereas the outside cans are about one-half the thickness of the inner cans and in other dimensions preferably the same. These tanks rest upon blocks 2, 2, extending across the bottom of the tank A, and they are so arranged within the tank that space is left entirely around each can. In the spaces intervening between every two cans, coils of pipes 3, 3, are placed for conducting the refrigerific mixture through the machine, this mixture being introduced through the valve 4, and after it has passed through the coils, it is returned through valve 5 in the return pipes 6. In lieu of the coils plate 20 might be employed as shown in Fig. 3, for the ammonia gas or other cold liquid used in the freezing process. As the freezing mixture extends alongside the cans, the water in the cans freezes from opposite sides, toward the center, so that two cakes are formed in all but the outside cans, in which latter only one is formed, as the freezing mixture only extends along one side of them. If the freezing process continues sufficiently long, the two cakes of ice thus formed, will come together at the center, and form a single block of ice, and if desired, this may be done in every instance. For obvious reasons, which I will mention, however, I prefer that these cakes should not freeze together, and my reason for this is that it is my purpose in my method of manufacturing ice not to boil, and distil the water used in the manufacture of the ice in order to remove the impurities, but on the contrary to use raw or ordinary river or spring water, and by agitating the water in the cans while freezing it, I conveniently accomplish this by the introduction of compressed air or ozone through pipes 8, 8, liberating it through perforations or openings in the



pipes so that it rises through the water, and by not freezing the cores of the cakes or blocks of ice, that the ice formed is perfectly transparent, and free from foreign particles and all impurities, and that any impurities in the water are frozen out and remain in the residue of water at the center of the cans, for which reason I prefer to stop the freezing process when the cakes of ice freeze to a point within about two inches or so of each other, whereupon the hollow plugs 9, 9, are removed from the cans and the water remaining in the cans between the cakes which catches and holds any impurities there may be in suspension, is then allowed to drain off. Should the plugs become frozen, they are easily removed by introducing warm water or other medium into them previous to pulling them out. In the intermediate cans these plugs are located in the center of the cans, whereas in the outer cans they are near the outer edge as indicated in Fig. 2. These hollow plugs taper gradually from the point where they enter the orifices in the bottoms of the cans upwardly, and thus when thawed loose they have served as a mold to form an opening through the ice formed at the bottom of the can for the discharge of the impure water at the core out through the orifice at the bottom of the cans. In this way a perfectly clear and transparent block of ice is formed, which is absolutely free from impurities.

To facilitate the removal of the cakes or blocks of ice from the cans, eye-bolts or hooks or other devices 10, 10, may be frozen therein as a means for attaching the blocks to an overhead crane for removing them from the cans. Previous to removing the ice from the cans, its surfaces are thawed from the cans by introducing water or other liquid above freezing temperature from the pipes 11 through valve 12, which water or liquid surrounds every can filling the spaces left between them, and it is permitted to rise until it reaches the over-flow pipe 13. Or hot ammonia gas or liquid may be passed in coils or plates between cans by opening valve 16. In this way the ice is freed from the cans and may be lifted therefrom without difficulty. To remove the water from the tank A, the valve 14 in the pipe 11 is opened and the water is permitted to flow out.

Insulated covers 15, 15, are placed over the top of the tank in order to close it airtight.

From the foregoing I think I have made clear that the advantageous features of both can and plate ice are preserved while at the same time a better product is obtained, and it is handled with greater convenience and economy. Heretofore in can ice, it has been the usual practice to remove

the cans and dip them into a thawing vat in order to loosen and liberate the ice, but this labor and expense are avoided by removing the ice from the can without disturbing the can, in this invention, and furthermore by the process of this invention it is unnecessary to distil and filter the water used in the manufacture of the ice.

It is evident that slight changes might be resorted to in the form and arrangement of the several parts described without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction herein set forth, but:—

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The herein-described process of manufacturing and harvesting ice, which consists in surrounding the receptacle in which the ice is formed by a freezing fluid which fluid is reduced in temperature for freezing the contents of the receptacle, and subsequently heated for thawing the ice from the receptacle.

2. The herein-described method of manufacturing ice which consists in submerging cans exposed on all surfaces and containing a measured or predetermined quantity of water to be frozen into two plates of ice, in a fluid medium, then conducting a refrigerating medium through said fluid medium whereby to reduce its temperature and cause the freezing of the measured quantity of water, and subsequently substituting for said fluid, a thawing medium, whereby to heat the entire volume of thawing medium uniformly whereby to thaw the ice loose on all surfaces of the cans in which it is formed.

3. The herein described method of manufacturing ice which consists in freezing water simultaneously from the several walls and bottom of the cans, molding an outlet through the ice formed on the bottom of the can in alinement with an orifice in the bottom of said can, and finally thawing the mold loose from the ice, and draining the water contained in the center of the ice out through the hole in the ice and the bottom of the can.

4. The herein-described method of manufacturing ice which consists in surrounding a measured quantity of water inclosed in a suitable receptacle with a freezing fluid whereby said receptacle is exposed on all surfaces to the influence of the fluid, then conducting a refrigerant through said fluid whereby to cause it to freeze the measured quantity of water, and finally conducting a thawing medium through the fluid whereby to raise the temperature of the latter and cause it to thaw the ice loose.

5. The herein-described method of manufacturing artificial ice, which consists in



surrounding a can containing a measured or predetermined quantity of water with a freezing fluid, conducting a refrigerant through said fluid on two sides of the can  
5 containing the water to be frozen, whereby the temperature of the fluid is lowered as close to the water to be frozen as possible, whereby to simultaneously form two plates of ice from said measured or predetermined  
10 supply of water, and subsequently introducing a heating medium in its stead whereby

to quickly and simultaneously raise the temperature of the fluid adjacent to the outer surfaces of the ice to cause its release from the receptacle in which the ice is formed. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT J. BERRYMAN.

Witnesses:

VERNON E. HODGES,  
FLOYD W. PATCH.