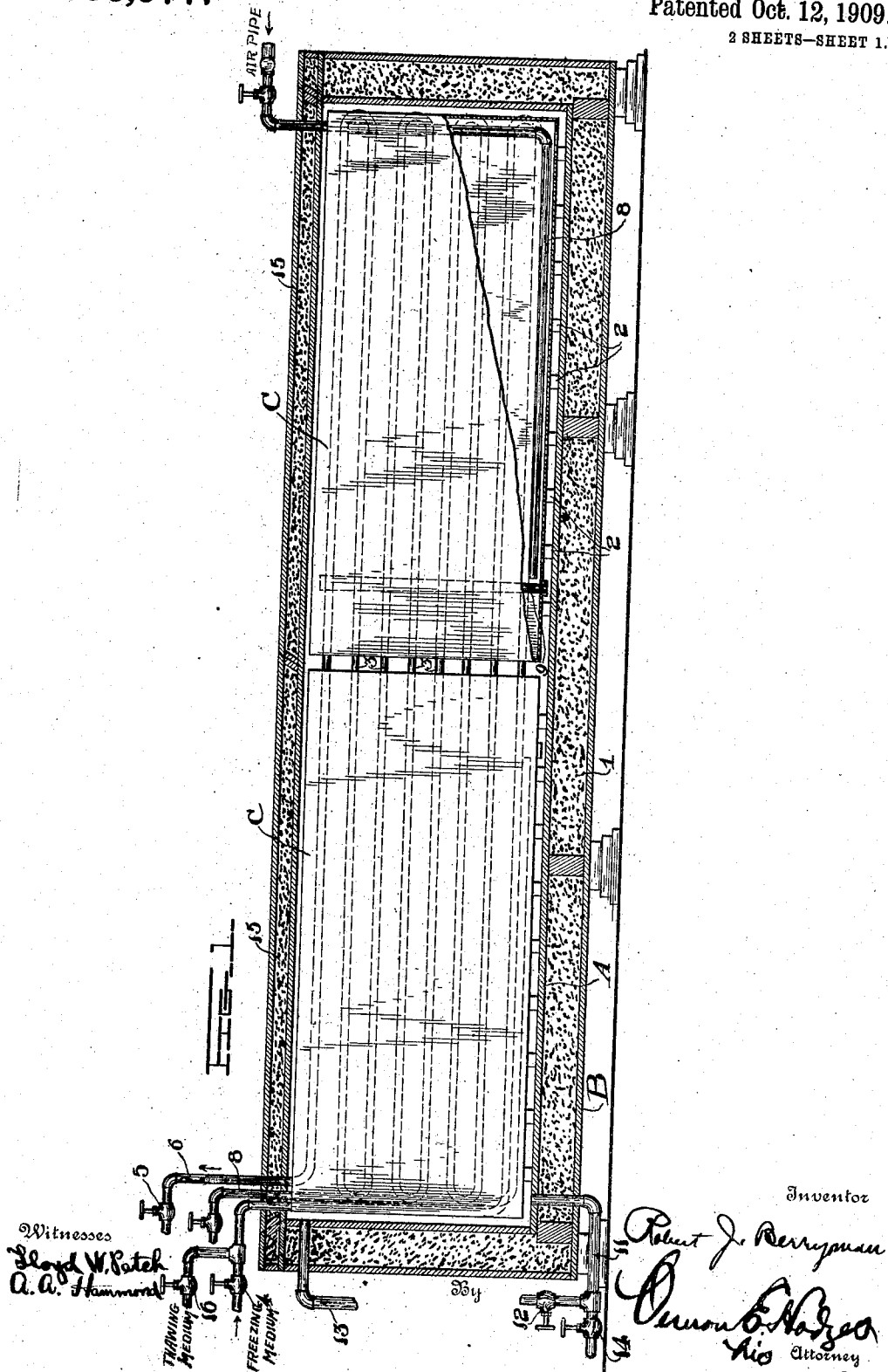


R. J. BERRYMAN.
METHOD OR PROCESS FOR THE MANUFACTURE OF ARTIFICIAL ICE.
APPLICATION FILED FEB. 6, 1907.

936,977.

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



Witnesses
Lloyd W. Patch
A. A. Hammond

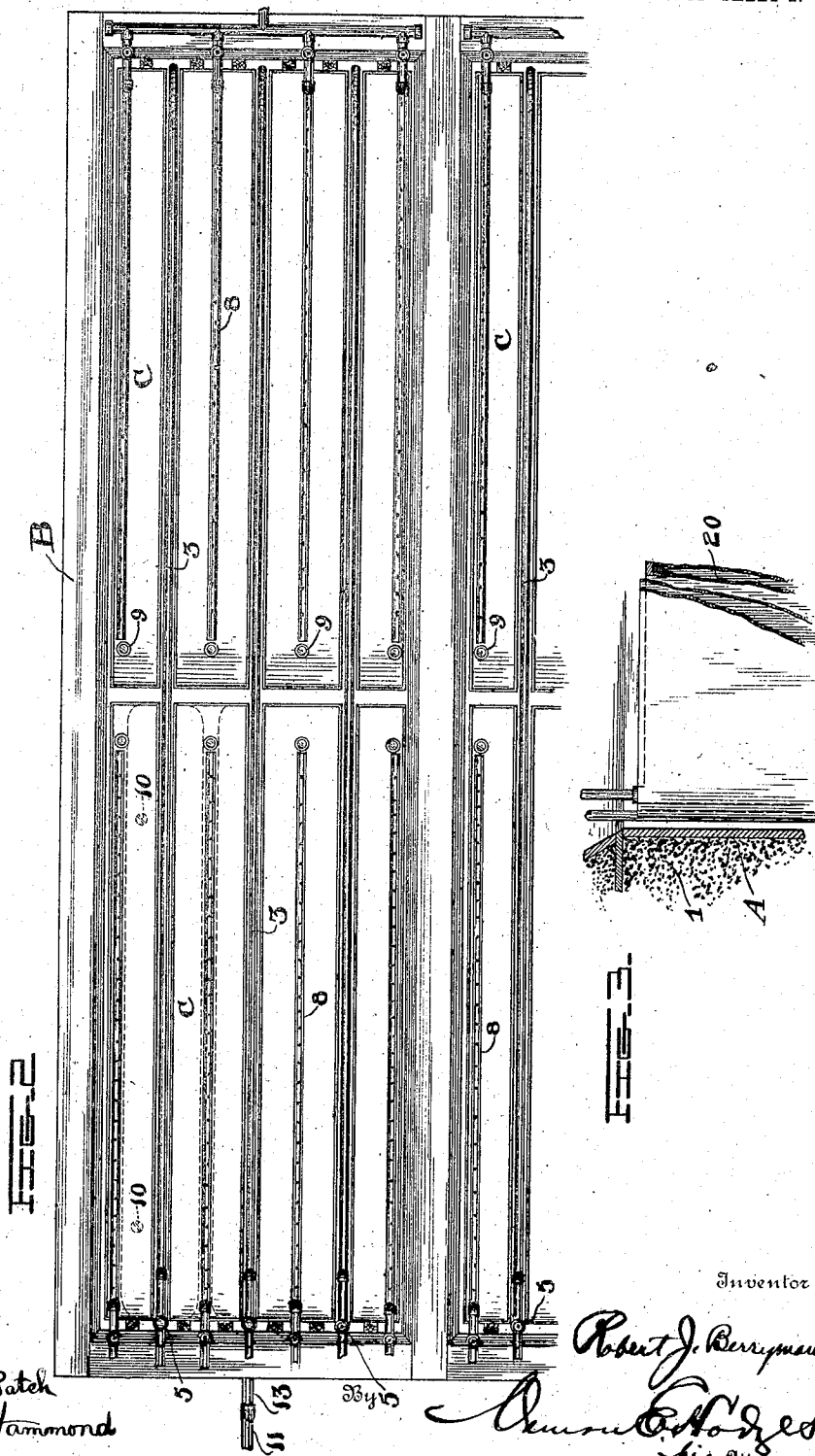
Inventor
Robert J. Berryman
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Lloyd W. Batch
A. A. Hammond

Inventor

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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 per-
 fectly transparent, and free from foreign
 5 particles and all impurities, and that any
 impurities in the water are frozen out and
 remain in the residue of water at the cen-
 ter of the cans, for which reason I prefer
 to stop the freezing process when the cakes
 10 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
 15 any impurities there may be in suspension,
 is then allowed to drain off. Should the
 plugs become frozen, they are easily re-
 moved by introducing warm water or other
 medium into them previous to pulling them
 20 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
 25 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 open-
 ing through the ice formed at the bottom of
 the can for the discharge of the impure
 30 water at the core out through the orifice at
 the bottom of the cans. In this way a per-
 fectly clear and transparent block of ice is
 formed, which is absolutely free from im-
 purities.
 35 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
 40 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
 45 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
 50 valve 16. In this way the ice is freed from
 the cans and may be lifted therefrom with-
 out 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
 55 out.

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

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 ob-
 tained, and it is handled with greater con-
 venience and economy. Heretofore in can
 65 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 re-
 moving the ice from the can without dis-
 turbing the can, in this invention, and
 70 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
 75 of the several parts described without de-
 parting from the spirit and scope of my in-
 vention, 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 manu-
 facturing and harvesting ice, which consists
 85 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 recep-
 90 tacle.

2. The herein-described method of manu-
 facturing ice which consists in submerging
 cans exposed on all surfaces and containing
 a measured or predetermined quantity of
 95 water to be frozen into two plates of ice, in
 a fluid medium, then conducting a refriger-
 ating medium through said fluid medium
 whereby to reduce its temperature and cause
 the freezing of the measured quantity of
 100 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.
 105

3. The herein described method of manu-
 facturing ice which consists in freezing wa-
 ter simultaneously from the several walls
 and bottom of the cans, molding an outlet
 through the ice formed on the bottom of the
 110 can in alinement with an orifice in the bot-
 tom 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
 115 of the can.

4. The herein-described method of manu-
 facturing ice which consists in surrounding
 a measured quantity of water inclosed in a
 suitable receptacle with a freezing fluid
 120 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
 125 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 manu-
 facturing artificial ice, which consists in 130

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.