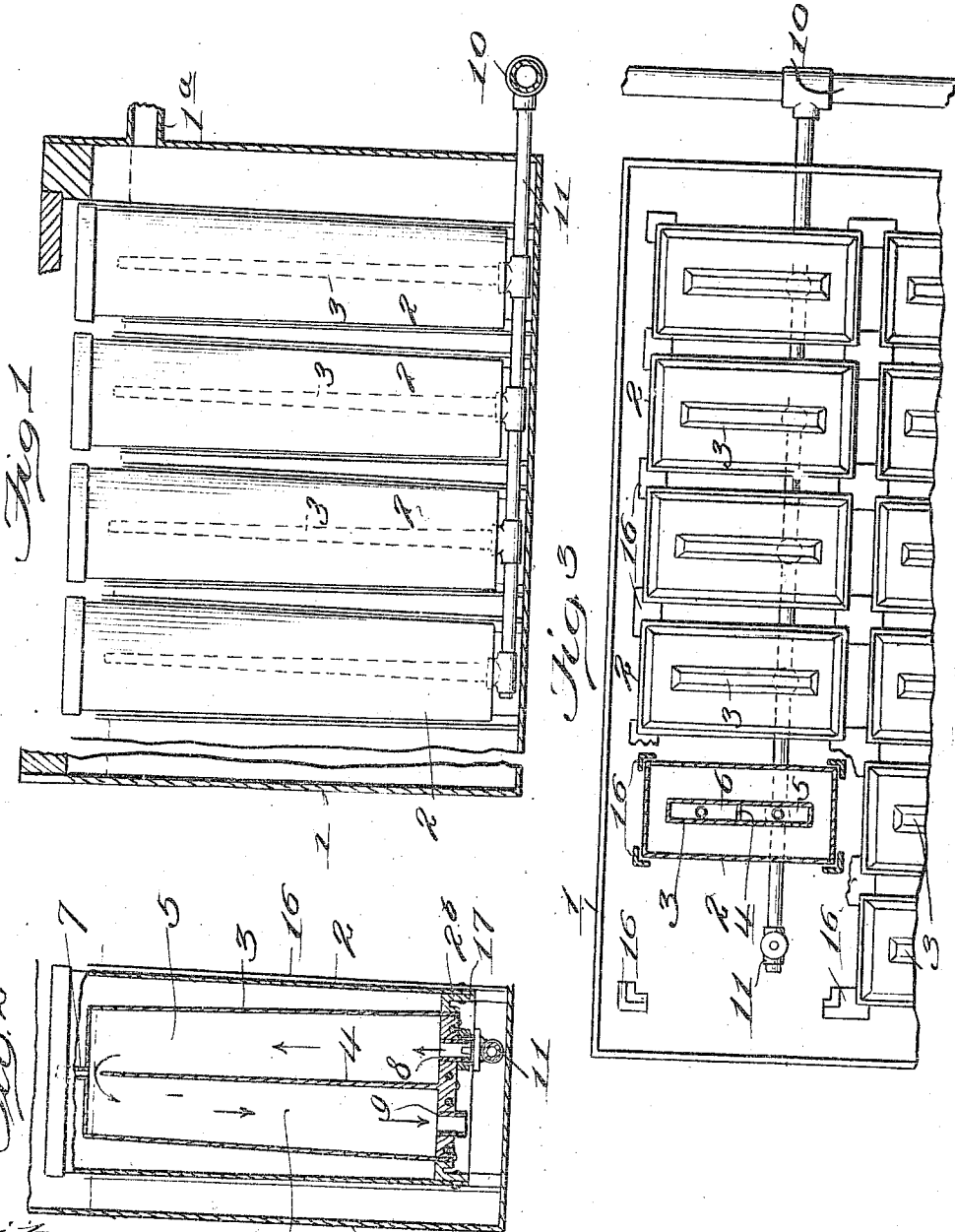


J. B. HOWE.  
 ICE MAKING APPARATUS.  
 APPLICATION FILED DEC. 4, 1909.

973,434.

Patented Oct. 18, 1910.

3 SHEETS—SHEET 1.



Witnesses:  
*Robert Conitt,*

Inventor  
 John B. Howe  
 By *James L. Morris*  
*Att'y.*

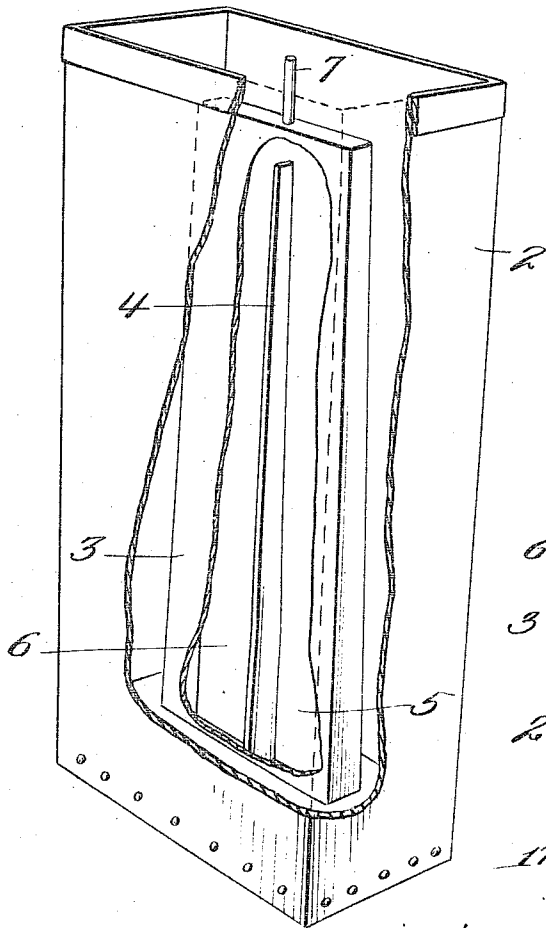
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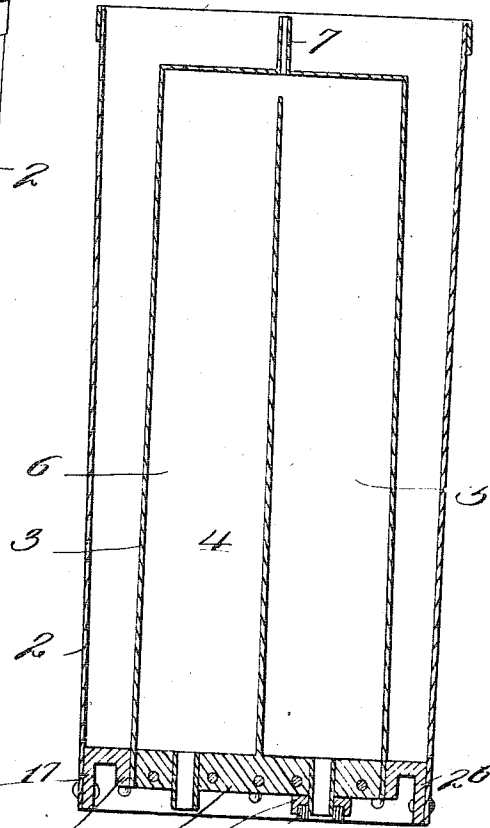
Patented Oct. 18, 1910.

3 SHEETS—SHEET 2.

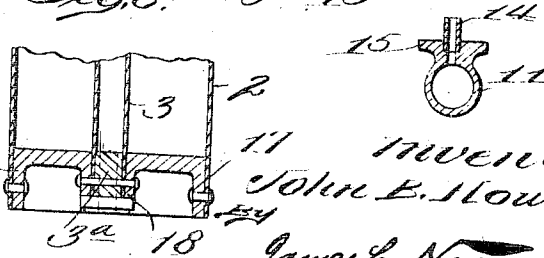
*Fig. 4*



*Fig. 5*



*Fig. 6* 18 3a 12 13



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3 SHEETS—SHEET 3.

Fig. 9.



Fig. 8.

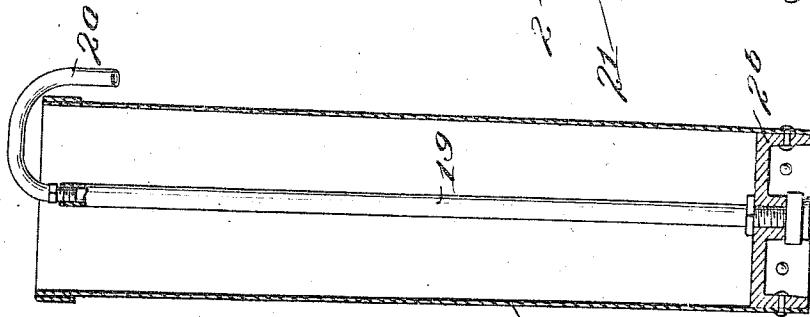
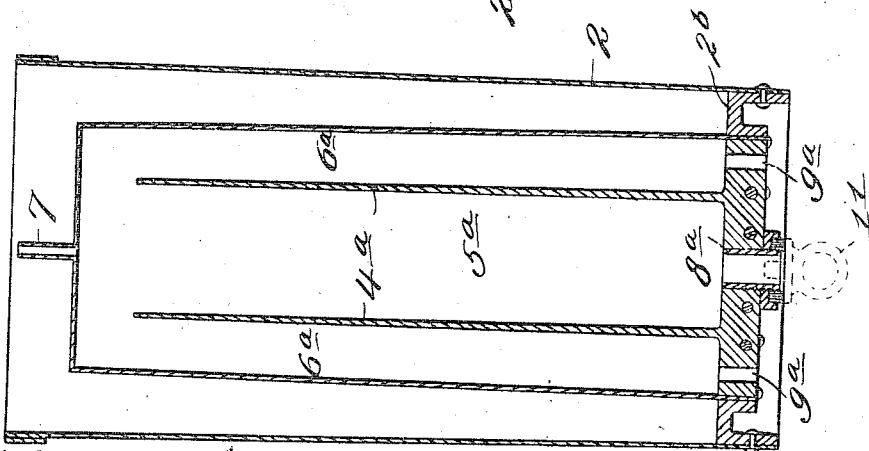


Fig. 7.



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# UNITED STATES PATENT OFFICE.

JOHN B. HOWE, OF NASHVILLE, TENNESSEE

## ICE-MAKING APPARATUS.

973,484.

Specification of Letters Patent. Patented Oct. 18, 1910.

Application filed December 4, 1909. Serial No. 531,431.

To all whom it may concern:

Be it known that I, JOHN B. HOWE, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Ice-Making Apparatuses, of which the following is a specification.

This invention relates to new and useful improvements in ice making apparatuses of that general type which involves a battery of water containing cans and means for producing the circulation of a refrigerant to congeal the water in the cans.

The object of the invention is an improved apparatus in which the time necessary for the production of the ice is reduced about seventy-five per cent.; the capacity of the plant is increased; the ice produced is of superior grade; and the cost of installation is less than that of the known systems.

Embodiments of the invention are illustrated, by way of example, in the accompanying drawings, wherein—

Figure 1 is a longitudinal sectional view of an apparatus in accordance with the present invention; Fig. 2 is a transverse sectional view thereof; Fig. 3 is a top plan view, partly in section; Fig. 4 is a detail perspective view of a water containing can, with a wall broken away to show the interior construction; Fig. 5 is a central vertical section of such a can; this figure also shows, in detail, the relation of the can and a circulating header; Fig. 6 is a detail cross section of the bottom portion of the can; Figs. 7, 8 and 9 are central vertical sectional views of alternative forms of cans.

Similar characters of reference designate corresponding parts throughout the several views.

Referring more particularly to Figs. 1, 2 and 3, the numeral 1 designates a tank in which brine or any other refrigerating mixture is contained or circulated, and the numeral 2 designates cans which are arranged at suitable intervals in the tank, and which contain water to be frozen into blocks of ice. Each can 2 is provided with an interiorly located arrangement for conducting the refrigerating medium through the central portion of the can. In this manner the body of water contained in each can is subjected, simultaneously, to the influence of the refrigerant in the tank and to the influ-

ence of the refrigerant circulating through the can and hence is, at the same time, frozen from the walls of the can inward, and from the center of the can outward. The time of congelation is thus materially reduced and the uniformity and superior grade of the product is assured.

In the example shown in Figs. 1 to 5, the arrangement for conducting the refrigerant through the central portion of the can consists of a box, as 3, which is arranged centrally in each can, being wholly inclosed therein, and which has a central vertical partition, as 4, terminating short of the upper wall of the box and dividing the latter into communicating circulating channels 5 and 6, the mixture flowing upwardly in the former and downwardly in the latter. The box 3 at its upper end is provided with an air tube, as 7, which serves as a vent to prevent the trapping of air in the upper portion of the box, an action which would retard the circulation of the refrigerant. The box 3 at its lower end is provided with a pair of depending nipples, as 8 and 9, which communicate with the respective channels 5 and 6 and project through the bottom of the can. The refrigerant is admitted to the box through the nipple 8, flowing upwardly through the channel 5 and downwardly through the channel 6, and leaving the box through the nipple 9. The refrigerant is supplied, as usual, by a pump (not shown) and flows through a manifold, as 10. In the arrangement shown wherein the cans are disposed in parallel rows, lateral headers, as 11, are connected to the manifold 10, each header 11 extending under a row of cans and supplying the refrigerant which flows through the boxes 3. The refrigerant, when it leaves the boxes 3, flows directly into the tank 1, thus causing a continuous agitation and circulation of the contents of the latter. The tank 1 is provided with an outlet pipe, as 12, which is suitably connected to the pumping apparatus in a manner to complete the circulation system. The headers 11 are each provided with nipples, as 14, and with flanges, as 15, circumscribing the nipples. (See Fig. 5.) The nipples 14 project loosely into the nipples 8 and the flanges 15 afford seats for the latter. By virtue of the described relation of the nipples, the cans may be readily removed and replaced, the circulation of the

refrigerant is efficiently promoted, and connections of a positive character are dispensed with.

To guard against loss of the refrigerant as it enters the box 3 and a consequent waste of power, it is preferred to employ a positive sealing means, shown in detail in Fig. 5, and consisting of a gasket, as 12, which is fitted in a cup-shaped ring, as 13, that is threaded upon the nipple 8, the gasket 12 bearing against the flange 15.

In order to center the cans with relation to the nipples 14, vertically disposed angle iron guides, as 16, are provided (see Fig. 3). The corner portions of the cans conformably fit into these guides, as shown. Consequently, in placing the cans in the tank, the path of their downward movement is determined by the guides and it follows that when the cans have reached the termination of their downward movement, the nipples 8 surround the nipples 14.

In order to strengthen the structure, the bottom 2<sup>b</sup>, of each can, consists of a cast or malleable iron plate, having a depending circumscribing flange, as 17, which is riveted or otherwise secured to the sides of the can and having a central opening, receiving the lower portion of the box 3, and bounded by a depending flange, as 18, which is riveted or otherwise secured to the sides and bottom of the box. The bottom of the box 3 likewise consists of a cast or malleable casting 3<sup>a</sup>, between which and the flange 18 the vertical walls of the box are fitted, as shown in detail in Fig. 6.

In the alternative arrangement shown in Fig. 7, the box 3, instead of having a central partition wall, as 4, has two vertically disposed partition walls, as 4<sup>a</sup>, which terminate short of the upper end of the box and divide the same into three communicating circulation channels. The central channel, as 5<sup>a</sup>, corresponds to the channel 5 in the first arrangement described, in that the brine first enters thereinto through a nipple, as 8<sup>a</sup>, in communication with a header 11 in the manner described, and flows upwardly. The channels at each side of the box, as 6<sup>a</sup>, correspond to the channel 6, in that the brine flows downwardly therethrough and leaves the box through nipples, as 9<sup>a</sup>, the diameters of which are proportioned with respect to the diameter of the nipple 8<sup>a</sup>. The refrigerant passing through the nipples 9<sup>a</sup>, flows directly into the tank 1 and produces a continuous agitation and circulation of the contents of the latter.

In the arrangement shown in Fig. 8, the box 3 is not employed. In lieu thereof, I employ a centrally located vertical open ended pipe, as 19, in communication, in the manner described, with a header 11, and having attached to its upper end a flexible hose section, as 20. The section 20 hangs

goose-neck fashion, over a side wall of the can and discharges the refrigerant which passes upwardly through the pipe 19, into the tank 1. The section 20 is of smaller diameter than the pipe 19 and is fitted internally into the upper end of the latter by means of any suitable coupling device, in order that the removal of the block of ice from the can may not be interfered with.

In the arrangement shown in Fig. 9, a pipe coil, as 21, is employed as the means for conducting refrigerant through the can. This coil receives the refrigerant from the header 11, one end of the coil being formed as a nipple. In this figure I have shown a slight variation in the circulating system, which consists in employing a return manifold, as 22, (shown in dotted lines) which is suitably connected to the pump, and lateral headers, as 23, which project from the manifold 22 under the several rows of cans, in parallelism with the headers 11. The headers 23 are related to the outlet ends of the several coils in the same manner that the headers 22 are related to the inlet ends thereof.

In all of the forms described, after the treatment in the freezing tank, the cans are transferred to a thawing tank, similar in all respects to the freezing tank, except perhaps, that it may be of smaller capacity, and hot water is circulated through the arrangements within the cans and through the tank in the same manner that brine was circulated in the freezing operation, to thaw the ice sufficiently to provide for its ready removal in block form, from the can without clinging to the walls thereof or to the inclosed box, pipe, coil, or other interior conducting arrangement.

The improved apparatus herein described has, in actual practice, been found to accomplish all that is herein claimed. Not only is the initial cost of installation materially reduced but the cost of the plant as a whole is lessened since materially less floor space, per ton of ice, is required than in the standard arrangements, owing to the fact that the arrangement provides for an efficient product in cans of greater capacity, and hence of smaller number, per ton battery. The cost of the tanks is proportionately reduced. Moreover, in the use of the standard systems, the central portions of the ice cakes are reticulated with air cells. In the use of the present system, the trapped air is not confined in the heart of the cake but is evenly distributed therethrough. A superior product of uniform grade is thus produced.

Having fully described my invention, I claim:

1. In an ice making apparatus, a tank, a plurality of water containing cans disposed therein, refrigerant conducting means with-

in each can and provided with an inlet and an outlet, both opening through the bottom of the can and a refrigerant header in communication with the inlet of the conducting means, the outlet of the conducting means discharging into the tank.

2. In an ice making apparatus, a tank, a brine circulating header extending across the bottom thereof, a plurality of freezing cans arranged in the tank, each can having a closed bottom and having an interior brine conducting means, the inlet and outlet of which extends through said bottom, the inlets of the brine conducting means having operative association with the header but being without positive attachment thereto.

3. In an ice making apparatus, a freezing can comprising vertical sheet metal walls, a cast iron bottom fitted within the walls at their lower ends and positively attached

thereto, and a brine conducting means disposed within the walls, carried by said bottom and having an inlet which extends through said bottom.

4. In an ice making apparatus, a tank, a brine conducting header extending across the bottom of the tank, a plurality of freezing cans removably supported in the tank, and a brine circulating means within each can and provided with an inlet connection which is detachably and operatively associated with the header.

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

JOHN B. HOWE.

Witnesses:

CHAS. S. HYER,  
JOHN S. POWERS.