J. P. JONES.

Congealing Plate for Ice Machine.

No. 202,265. Patented April 9, 1878.

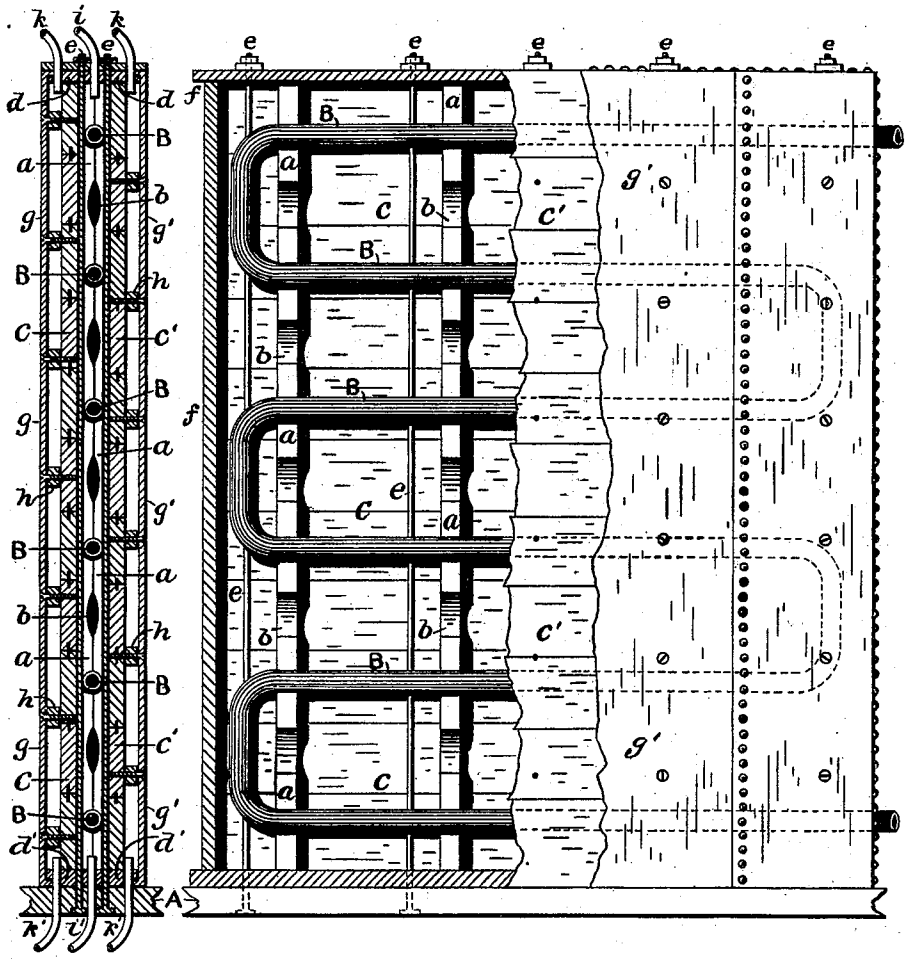

FIG. 1.

FIG. 2.

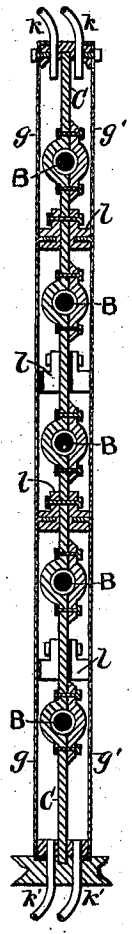

FIG. 3.

ATTEST.

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IMPROVEMENT IN CONGEALING-PLATES FOR ICE-MACHINES.

Specification forming part of Letters Patent No. **202,265**, dated April 9, 1878; application filed October 10, 1877.

To all whom it may concern:

Be it known that I, JOHN P. JONES, of Gold Hill, in the county of Storey and State of Nevada, have invented certain new and useful Improvements in Ice-Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a true, clear, and complete description of my invention.

My improvements relate to that portion of an ice-machine known as the "congealer," and to that particular class of congealing apparatus in which the ice is formed on freezing-plates, whether the same be used in connection with a freezing-tank and submerged therein, or in connection with devices for spraying the water thereon in flowing streams.

Various provisions have heretofore been made for detaching the ice from freezing-plates—as, for instance, by the withdrawal of the refrigerant from the plate, followed by the introduction either of the refrigerant in a gaseous state at a higher temperature, or some other suitable fluid at the required temperature; and, again, by providing a separate set of pipes alternating in the plate with the pipes containing the refrigerant, and introducing into said separate pipes any fluid having the desired temperature, the refrigerant being meantime removed or rendered inactive; and, still further, by providing within the plate a chamber for containing the channels or pipes for the refrigerant, and also a non-congealable liquid which surrounds said pipes, so that this latter liquid may be withdrawn and liquid at a higher temperature introduced.

In the construction of all kinds of channeled freezing-plates numerous joints are incidentally requisite in the metallic pipes that contain the refrigerant, and in all plates as heretofore constructed these joints are liable to become deranged and leaky, as a natural consequence of the alternate contraction and expansion of the metal due to the extremes of cold and heat requisite for the congelation of water and the detachment of the ice from the plates.

One object of my invention is to effect the detachment of the ice from the plate by employing fluids at a suitably high temperature without exposing the pipes containing the refrigerant to undue and injurious alternate contraction and expansion.

With no plate as heretofore constructed has it been possible to detach ice from one side thereof and leave the ice intact on its opposite side. It often occurs that ice will form much more rapidly on one side of a plate than on the other, and a loss therefrom occurs if there be on one side ice of unmerchantable thickness when the opposite side is fully charged with ice which must be detached; and another object of my invention is to provide for the detachment of ice from one side of a plate without materially affecting the ice formed on the opposite side.

With the channeled freezing-plates heretofore constructed for receiving a non-congealable liquid surrounding the pipes containing the refrigerant it is necessary for detaching the ice to remove the whole, or at least a considerable volume, of said liquid; and another object of my present invention is to effect the rapid detachment of ice from either or both sides of the plate by the removal of a minimum quantity of the non-congealable liquid, and also to effect the detachment of the ice by the circulation of the same fluid at a higher temperature, so that the moment the ice is detached the circulation may be terminated and the freezing process promptly resumed.

For the accomplishment of either or all of the ends stated, my invention consists in a freezing-plate provided with freezing-surfaces on opposite sides thereof, and independent chambers at the rear of each freezing-surface.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 represents one of my plates in transverse vertical section, and Fig. 2 represents the same partially in side view and partially in longitudinal section. Fig. 3 represents, in transverse vertical section, another form of freezing-plate embodying my invention.

However it may be constructed, the plate should have an ample base, as at A, for location on the floor of a congealing-room or the bottom of a tank, as the case may be.

The pipe for the refrigerant is shown at B, coiled in a manner well known.

It is preferable that a pipe be employed, as shown; but any other form of chamber for containing the refrigerant may be used in connection with my invention, which does not relate to that portion of the plate, it being understood that in all such plates there must be a supply and a discharge of some kind of refrigerant suitable for ice-making.

In Figs. 1 and 2 these pipes are shown to be supported by wooden uprights *a*, placed at intervals, and having lateral openings therein, as at *b*. To these uprights wooden walls, as at *c* and *c'*, are secured, so that the space intervening contains the pipe B, and constitutes a chamber for containing a non-congealable liquid. The cap at *d*, foot-piece at *d'*, and the bolts *e* serve to strengthen the structure and to so compress the splined boards of the walls *c c'* as to secure tight joints.

The cap and foot-piece at each side project beyond the outer edge of the wooden walls, and the end pieces of the structure, as at *f*, are of a corresponding width. The freezing-surfaces are the outer surfaces of the thin iron or steel plates at *g* and *g'*, which are composed of several widths of plate, riveted together to form water-tight joints. These plates are secured by bolts or screws to the cap, foot-piece, and the ends of the plate, and also to the wooden walls by screws which are provided with thimbles, as at *h*, for securing a uniform space between the inner surface of the thin plate and the wooden walls, and also to impart to the thin plates a desired degree of rigidity. With a plate thus constructed there are three separate and distinct chambers. The central chamber, which contains the pipe B, is filled with any non-congealable liquid by way of pipe *i*, and it may be withdrawn on occasion by way of pipe *i'*. In practice this liquid remains undisturbed, its function being merely to serve as a convenient means of communication between the wooden walls and the pipe B, and, if the outer metal plates were not employed, the wooden walls, the pipe, and the non-congealable liquid would constitute a channeled plate, on the wooden surfaces of which ice of fine quality could be formed, but from which the ice could not be detached, except by the withdrawal of the liquid and the substitution of a warmer liquid, which would necessarily expose the refrigerant-pipe to alternate contraction and expansion, and also lower the ice on both sides simultaneously.

The spaces between the metallic plates and the wooden walls in each instance constitute separate chambers, each of which is provided with an induction-pipe, *k*, and an eduction-pipe, *k'*, whereby a non-congealable liquid—preferably glycerine—may be supplied and withdrawn. Ordinarily these chambers have a width between the plates and wooden walls which is not more than two or three times greater than the thickness of the metal plates, which, for small apparatus, need not be greater than one-sixteenth of an inch, so that a very thin volume of glycerine will serve as a means of communication from the plate to the wooden wall.

In operation the latent heat from the water to be frozen passes through the thin metallic plate, the glycerine in the outer chamber, the wooden wall, the non-congealable liquid in the internal chamber, into the pipe, and thence away with the circulating refrigerant. During congelation, therefore, my improved plates of the construction shown operate in the same manner as the channeled plates heretofore patented by Martin and Beath.

It is well known that, although wood is an imperfect conductor of heat, ice can be formed on a wooden wall interposed between the water to be frozen and a pipe or other suitable chamber containing the refrigerant; and it is because the wood is a slow conductor that I prefer the wooden walls shown and described, so that after ice has been properly formed on the metallic surfaces I can withdraw the glycerine or other non-congealable liquid from the outer chambers and introduce a fresh supply at a higher temperature, sufficient to detach the ice without affecting the temperature of the non-congealable liquid in the inner chamber.

The pipes which communicate with the outer chambers are to be connected with a tank containing the same kind of non-congealable liquid, and also with a pump, by branch pipes provided with cocks, so that as the cold liquid is withdrawn warmer liquid may be injected in like proportion, in order that just as soon as the ice is detached the circulation may cease and the freezing process be promptly resumed. The thin metal plates, being good conductors of heat, promptly respond to the variation in temperature, and the detachment of the ice is readily attained without materially affecting the temperature of the body of the plate, and I am enabled to perform the detaching operation by the employment of a minimum quantity of fluid of the requisite higher temperature, and thereby obviate any undue loss of the freezing powers of the apparatus.

While I prefer the wooden walls and the intermediate chamber already described, I am well aware that they can be dispensed with, while retaining in the plate freezing-surfaces on opposite sides thereof and independent chambers at the back of each plate for the reception of a non-congealable liquid.

As an instance of this, I have shown in Fig. 3 a congealing-plate at C with pipe B, substantially as heretofore shown in the patent to Martin and Beath, before alluded to. This plate constitutes a central partition between the independent chambers back of the two freezing surfaces or plates *g* and *g'*. In this construction wooden blocks, as at *l*, are bolted to opposite sides of the plate C at intervals, and to these the outer plates are secured. The two chambers are provided with induction and eduction pipes, as before described. The warmer non-congealable liquid may be em-

ployed in either chamber without materially affecting the temperature of the liquid in the other, and therefore ice may be detached from one surface, leaving that on the opposite surface intact, and without exposing the pipes B to undue contraction and expansion.

It is obvious that the mechanical details in the construction of my improved congealing-plates may be largely varied, and I do not therefore limit myself to the precise constructions shown and described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

A congealing-plate for ice-machines which has freezing-surfaces on its opposite sides, and is provided with a separate chamber at the rear of each freezing-surface, substantially as described.

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Witnesses:
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