No. 634,350. Patented Oct. 3, 1899.

A. H. HUTCHINSON.

ICE MAKING APPARATUS.

(Application filed May 4, 1898.)

(No Model.) 2 Sheets—Sheet 1.

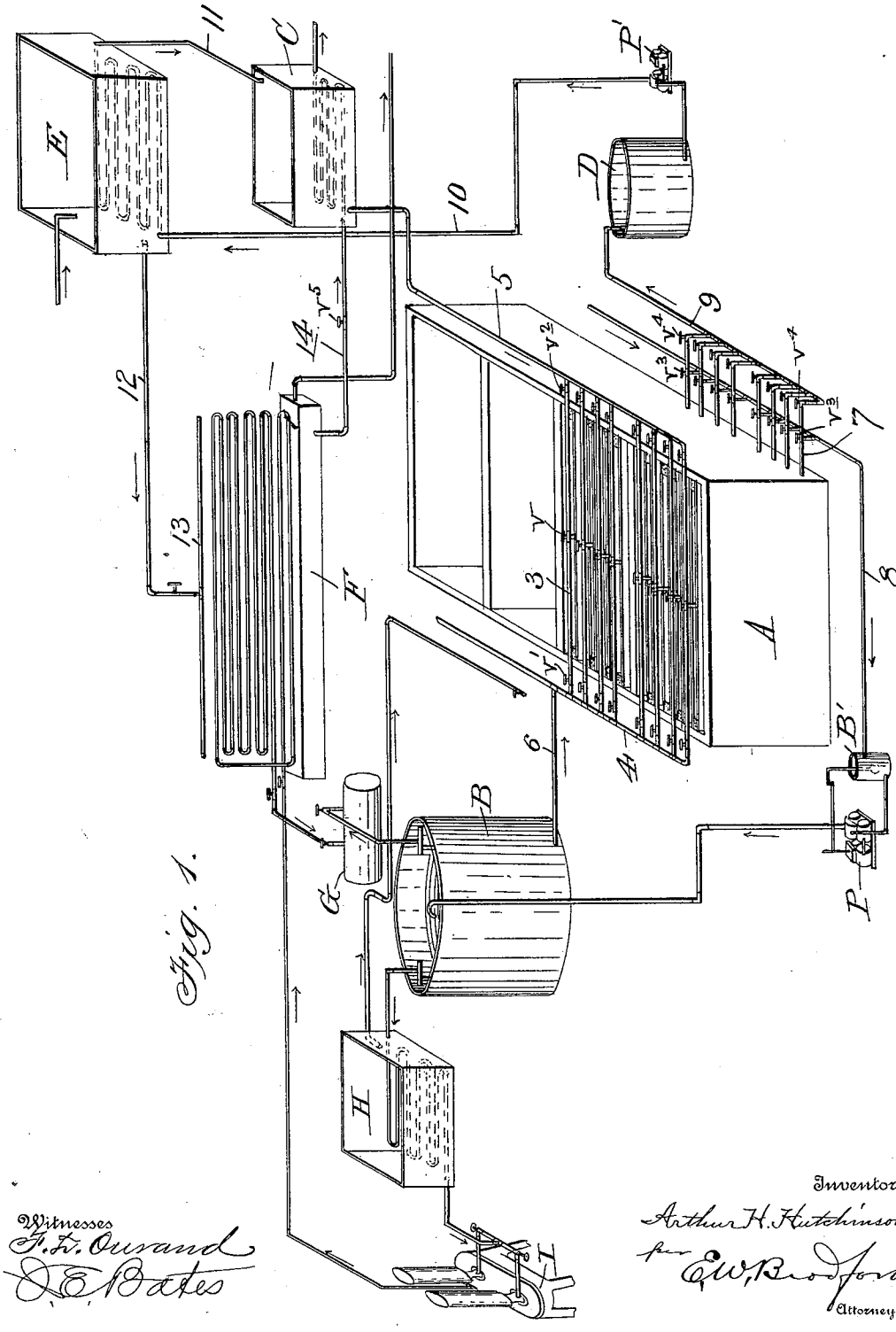


Fig. 1.

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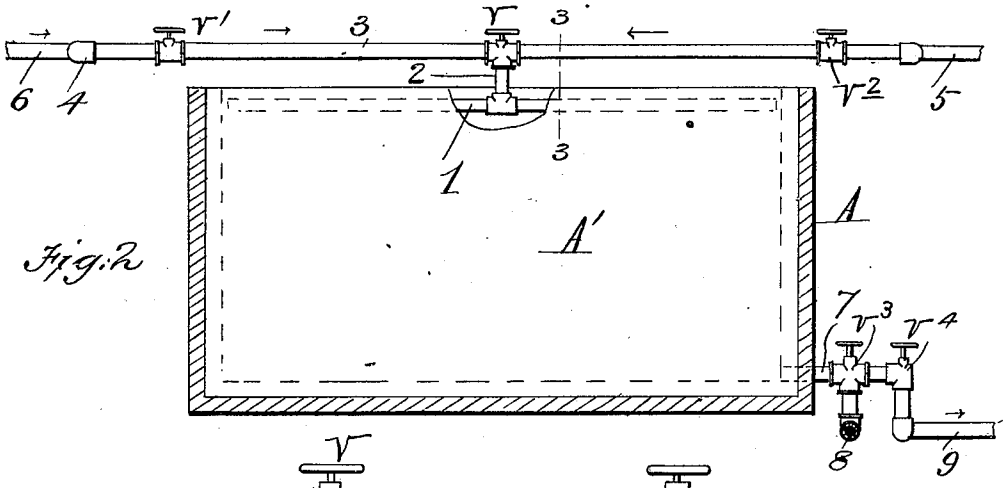


Fig. 2.

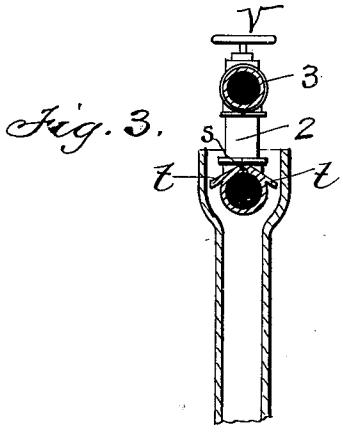


Fig. 3.

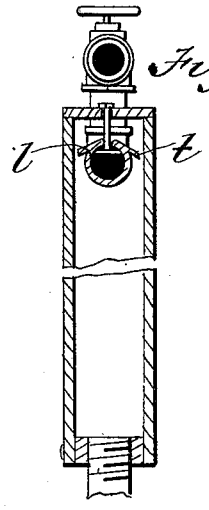


Fig. 4.

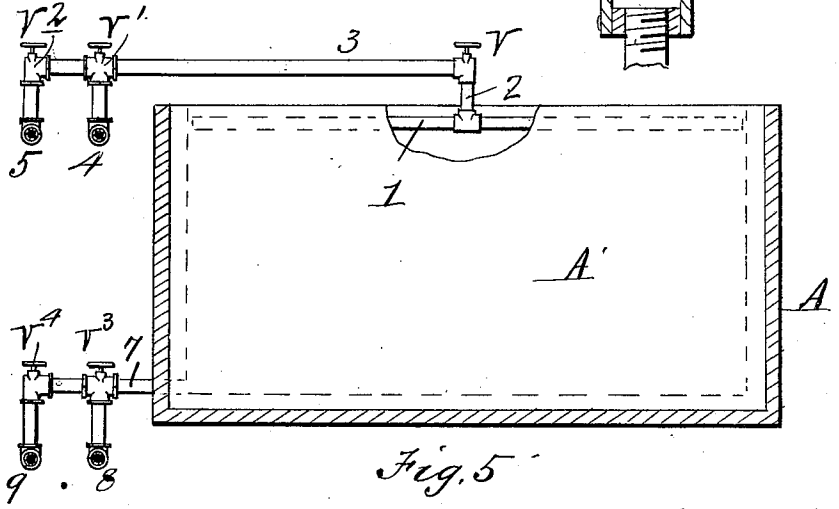


Fig. 5.

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UNITED STATES PATENT OFFICE.

ARTHUR H. HUTCHINSON, OF WAYNESBOROUGH, PENNSYLVANIA, ASSIGNOR TO THE FRICK COMPANY, OF SAME PLACE.

ICE-MAKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 634,350, dated October 3, 1899.

Application filed May 4, 1898. Serial No. 679,699. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR H. HUTCHINSON, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Ice-Making Apparatus, of which the following is a specification.

My said invention relates to certain improvements in the arrangement of parts of an ice-making apparatus of that character known as the "plate" system.

It consists chiefly in the arrangement of parts for circulating the freezing and the thawing mediums through the freezing-cells and in various arrangements of the details, whereby improved results are secured, as will be hereinafter more particularly described and claimed.

Referring to the accompanying drawings, which are made a part hereof and on which similar letters and figures of reference indicate similar parts, Figure 1 is a perspective view showing the principal parts of an ice-making apparatus of the character specified including my improvements; Fig. 2, a cross-section through the freezing-tank, showing one of the freezing-cells therein in elevation; Fig. 3, a detail section on the dotted line 3 3 in Fig. 2; Fig. 4, a similar view showing a modified form of the freezing-cell; and Fig. 5, a view similar to Fig. 2, showing a modified arrangement of pipes.

In said drawings the portions marked A represent the freezing-tank; B, the brine-tank; C, the thawing-brine tank; D, a receiving-tank; E, the water-supply tank; F, the ammonia-condenser; G, the ammonia-reservoir; H, the storage-tank, and I the machine.

The freezing-tank A, brine-tank B, water-supply tank E, ammonia condenser F, reservoir G, storage-tank H, and machine I, and the general arrangement and operation of the important parts of the apparatus are all of a well-known character and need no special description, my improvement relating particularly to the method of circulating the freezing and thawing agents through the cells to form the ice thereon and remove it therefrom, as before stated. Said several parts will not therefore be particularly described, being shown only that the operation of the apparatus may be more clearly understood.

The cells employed are each preferably of the form shown in Fig. 3, being narrow and having the brine-supply pipe 1 located in a widened portion at the top thereof. Said pipe is perforated on its upper side with elongated perforations or slots *s*, from the sides of which lips *t* taper downwardly and outwardly to the sides of the cell, and it is connected by a coupling 2 with the pipe 3, which extends across the tank above each cell. A valve *v* is provided by which the communication between said pipes 1 and 2 is regulated. Valves v' and v^2 are also provided in the pipe 3, one at each side of the tank, to be used as will be presently described. Each of said pipes 3 connects at one end with the pipe 4, which extends along one side of the tank, and with a pipe 5 at the other end, which extends along the opposite side of the tank. Said pipe 4 is connected, by means of a pipe 6, with the brine-tank B, which is preferably located above the tank A, so that the brine will flow therefrom into the cells under a constant or even pressure. The pipe 5 leads to the thawing-brine tank C. A discharge-pipe 7 leads from the bottom of each of said cells and connects both with a pipe 8 and a pipe 9, which run along one side of the tank at the bottom parallel with each other. Valves v^3 and v^4 are provided to regulate the flow into one or the other, as desired, as will be presently explained. The pipe 8 discharges into a receiving-tank B′, from which the brine is pumped by a pump P back into the brine-tank B. The pipe 9 leads into the receiving-tank D, from which the brine which has been used for thawing purposes is pumped by a pump P′ through a pipe 10 up into the water-supply tank E, forced through a coil therein, and then discharged into the tank C through pipe 11. Of course tank B could be placed on a line with tank A and a pump used for the circulation of the brine, if preferred; but generally I prefer the arrangement shown, as the circulation by means of a pump cannot be made even at all times.

Instead of the arrangement of pipes 4, 5, 8, and 9 on opposite sides of the tank, as shown in Figs. 1 and 2, they may all be ar-

ranged on the same side, as shown in Fig. 5, as will be readily understood.

The operation of the apparatus is as follows: One or more of the compartments of tank A (said tank being divided into compartments by cross-partitions, as shown in Fig. 1, to render portions of said tank capable of independent use, as is common) being ready for freezing, the valves v, v', and v^3 are opened, the valves v^2 and v^4 being closed. The tank B being located above the tank A the brine flows therefrom under considerable and constant pressure and is discharged through the elongated perforations or slots in the top side of the pipe 1 and flows down over each side of the cell in a thin sheet and out through pipe 7 into pipe 8 and tank B', from which it is pumped by pump P back into tank B and used over again. This operation is continued until ice of the desired thickness has been formed on the sides of the said cells, when the valves v' and v^3 are closed and the valves v^2 and v^4 are opened. The thawing-brine of a suitable temperature then flows from tank C into said cells the same as the freezing-brine, out through pipe 7 into pipe 9 and tank D, from which it is pumped by pump P' back to tank C, through the coil in the tank E, serving to lower the temperature of the water in said tank E and increase its efficiency, when it is discharged through pipe 12 and sprinkling-pipe 13 over the coil of the ammonia-condenser F, thus permitting the machine to be operated at lower pressure than otherwise and effecting a considerable saving in the cost of operation.

The tank C is designed to contain sufficient brine for one day's use in the thawing and is used only for thawing purposes, it being of the temperature required to produce the best results and after being cooled by passing through the cells in its use is again warmed by being passed through the water-supply tank E, as described, at the same time lowering the temperature of the water therein. If it is desired to have it of a still higher temperature, water from the ammonia-condenser F can be passed through a pipe 14 and a coil in the bottom of said tank C until the temperature desired is reached, a valve v^5 being provided in said pipe 14 for this purpose. Steam from any source can also be employed in this coil in tank C, if found desirable.

In Fig. 4 I have shown the top of the cell closed and also the sides of the cell straight to the top thereof. It will be understood that such modification in form to suit varying conditions or desires in the several parts and arrangement of parts may be made without departing from my said invention, the leading features of which are, first, the arrangement whereby the freezing medium is circulated through the cells in a thin sheet or film, flowing over the sides thereof from top to bottom; second, the improved arrangement of parts whereby the thawing medium is supplied from a separate source from that of the freezing medium, and thus after once in complete operation its cooling effect on the condensing-water in the storage-tank is uniform and continuous and not intermittent, thereby maintaining a uniform temperature of the condensing-water and correspondingly a uniform pressure in the ammonia-compressor, and, third, the arrangement whereby additional heat as desired may be imparted to the thawing-brine by passing warm water or steam through a coil in the tank C. By these arrangements I secure a construction which is cheaper and better than others of the same general character now in use in that an even freezing and uniform thickness of ice are secured because of the even and uniform circulation at all times.

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

1. In an ice-machine the combination of the freezing-cells, the horizontal pipe with perforations in its side mounted in the top of each, the brine-supply pipe above each and connected to the pipe leading to the brine-tank B and also to another pipe at its opposite end leading to the thawing-brine tank C, the valves v' and v^2 therein, a discharge-pipe 7 leading from the bottom of each cell to a pipe which forms a return-circuit to the tank B and another pipe which forms a return-circuit to the tank C, valves for controlling the flow into one or the other of said pipes, as desired, and means for creating and maintaining the circulation, substantially as set forth.

2. In an ice-machine the combination of the cells, a pipe located in the top of each formed to discharge a downwardly-flowing horizontal stream therein, a brine-supply pipe connected with said pipe within said cells, a separate thawing-brine supply, a thawing-brine-supply pipe leading therefrom, also connected thereto, a discharge-pipe leading from the bottom of each cell and connected to a return-pipe leading to the brine-supply tank and also to the thawing-brine tank, and means for circulating the brine through said circuits, substantially as set forth.

3. In an ice-machine the combination of the cells, the pipe in the top of each formed to discharge therein, the pipe connected therewith leading to the brine-tank, another pipe connected therewith leading from a separate thawing-brine tank, valves for controlling the flow from one or the other to said pipe in the cell, a discharge-pipe connected with the bottom of each cell and leading to a pipe returning to the tank B and another returning to the tank C, valves for controlling the flow through one or the other, the pipe leading from the cell to the tank C passing through the water-supply tank E in its course, and means for creating a circulation through said pipes, substantially as set forth.

4. In an ice-machine the combination of the freezing-tank, the freezing-cells therein, the brine-distributing pipe in the top of each cell,

a discharge-pipe from the bottom of each cell, a thawing-brine-supply tank C communicating with the pipe in the top of the cell, means for returning said supply to the tank C, and a pipe leading from the ammonia-condenser through a coil in the bottom of said tank C and a valve therein for controlling the flow of water, whereby hot water from said condenser may be conducted through said coil in tank C when desired, substantially as set forth.

5. In an ice-machine, the combination of the cell, a device for discharging the freezing medium into the top thereof in thin sheets or films against its sides, an outflow-pipe at the bottom, and means for maintaining the circulation, substantially as set forth.

6. In an ice-machine, the combination, of the freezing-tank, the freezing-cells therein, the freezing-medium storage-tank, a complete circuit for the continual flow of the freezing medium during the operation of freezing from said tank, discharging into the top of said cells, flowing downwardly to the bottom thereof, out at said bottom and back to said tank, a separate storage-tank for a separate thawing medium, a complete circuit for the continual flow of said thawing medium during the operation of thawing from the tank where it is stored into the top of said cells, downwardly to the bottom thereof, out at said bottom and back to said storage-tank, and valves for opening one of said circuits and closing the other, and reverse, when desired, all substantially as set forth.

7. In an ice-machine, the combination, of the freezing-tank, the cells, a supply-tank for the thawing medium, a circuit therefrom through the cells, and a heating device in said tank or circuit supplied from a source of higher temperature than the normal temperature of the water, whereby additional heat may be imparted to said thawing medium, as desired, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Waynesborough, Pennsylvania, this 29th day of April, A. D. 1898.

ARTHUR H. HUTCHINSON. [L. S.]

Witnesses:
W. H. MANUS,
ALF. N. RUSSELL.