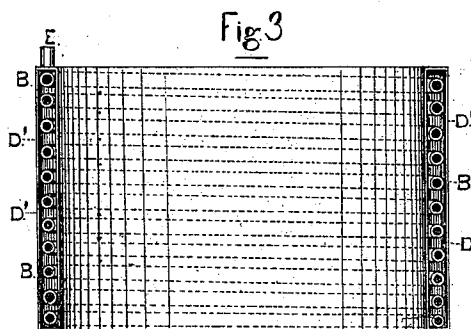
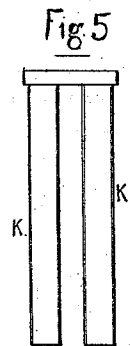
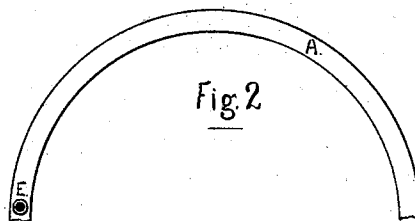
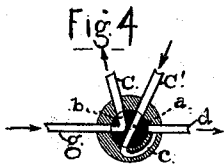
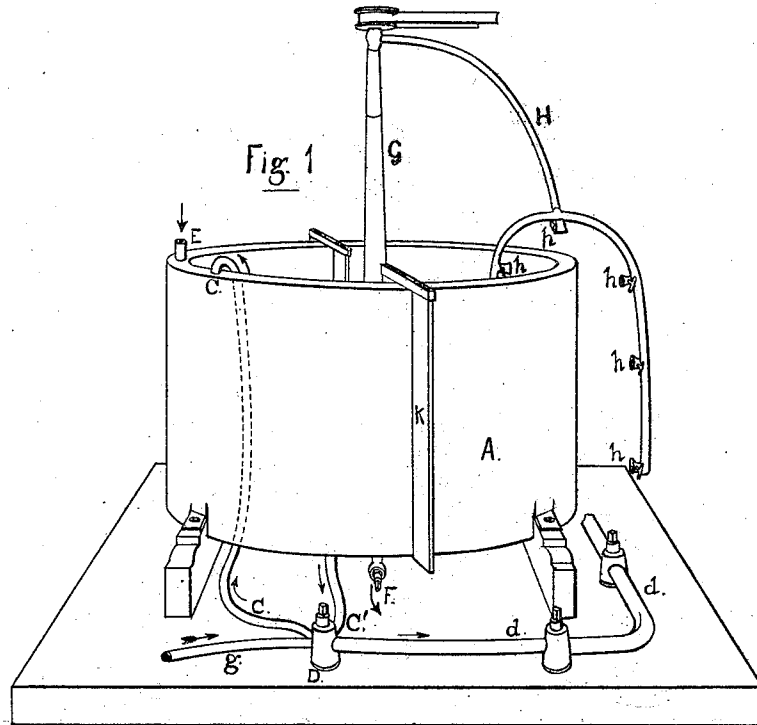


S. B. MARTIN.

ICE-MACHINE.

No. 173,315.

Patented Feb. 8, 1876.



Witnesses
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Inventor
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By his Atty
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UNITED STATES PATENT OFFICE.

SAMUEL B. MARTIN, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN ICE-MACHINES.

Specification forming part of Letters Patent No. **173,315**, dated February 8, 1876; application filed April 22, 1874.

To all whom it may concern:

Be it known that I, SAMUEL B. MARTIN, of San Francisco, in the county of San Francisco and State of California, have invented an Improvement in Machines for Manufacturing Ice and for refrigerating purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters marked thereon.

This invention relates particularly to the congealer or freezing apparatus of that class of ice-machines in which the evaporation of the volatile liquid is employed to abstract heat from the freezing-plate, which is in direct contact with the water to be frozen; and it consists mainly, first, in causing the freezing agent and the agent employed to detach the ice to flow alternately through independent passages or channel-ways in a congealer or hollow freezing-plate; second, in the employment of an independent passage-way in the freezing-plate, adapted to permit the flow of water of a suitable temperature for detaching the ice; and, third, the combination of the following elements in an ice-machine: a hollow plate adapted to permit the formation of ice upon its sides, an internal pipe or system of pipes adapted to contain the freezing agent, and an independent channel-way within the freezing-plate, adapted to permit the flow of water to detach the ice. It consists, further, in certain details of construction, which, in connection with the foregoing, will be fully described hereinafter.

In the drawings, Figure 1 represents a perspective view of my invention; Fig. 2, a partial plan view of the freezing-plates; Fig. 3, a vertical sectional elevation of the same; Fig. 4, a transverse elevation of the two-way cock, and Fig. 5 a side elevation of the water-tubes.

To enable others to use my improved processes and the apparatus for carrying them out, I will proceed fully to describe the same.

A represents a hollow freezing-plate, preferably cylindrical in form, which is constructed of any proper material and suitably held upon any supporting base. B, Fig. 3, represents a pipe coiled within the congealer or hollow freezing-plate, with an intervening space, D', between the divisions of the coil, as shown.

C represents a connecting-pipe, uniting the upper end of the coiled pipe B to the two-way cock D; and C', a similar pipe, uniting the lower end of pipe B to the same two-way cock. This two-way cock is represented in transverse section in Fig. 4.

C C' represent the pipes united to the upper and lower ends of the pipe B, coiled within the freezing-plate. *g* represents the connecting-pipe, extending to a receiver containing the volatile or vaporizing liquid. *d* represents a pipe connecting with the two-way cock, which is adapted to control the flow of the volatile liquid to the next congealer in the series, if a number are employed in connection with each other. *c* represents an internal passage bored in a wall of the cock, which is adapted to connect the pipe C' with the pipe *d* when the cock is in the position shown in the drawing. *b* represents a right-angled passage in the cock, adapted to connect the pipe *g* with the pipe C when the cock is in the position shown. When the cock is turned about a quarter-revolution in the proper direction, communication with the pipes C C' is cut off, and direct connection is made between the pipes *g* and *d*. E represents an inlet-pipe, through which water of a suitable temperature is introduced into the space or channel-way between the coils of pipe B, the same being discharged through the pipe F, Fig. 1. G represents a central post, adapted to revolve by means of the belt and pulley, as shown in Fig. 1. H represents a pipe attached to the revolving post G, and adapted in any suitable manner to receive a continuous supply of water, which is provided at its lower extremity with an inverted U-shaped pipe, having independent cocks *h h*, as shown, the arms of the pipe being adapted to discharge water upon each side of the cylindrical freezing-plate. K K represent flat metallic tubes, united at their upper ends by a strap or cross-piece, which are adapted to rest upon the cylindrical freezing-plate, as shown in Fig. 1.

It is designed to employ a number of these congealers in a single machine, each congealer being independent of the others, while constituting a part of the same machine. In this case the volatile or vaporizing liquid is passed successively through the congealers, the ma-

chine being so operated that vaporization is effected after passing through the last congealer and reaching the compressing-pump.

The connecting-pipe is enlarged in diameter from each succeeding congealer in the series, in order that the expansion of the liquid, as it flows onward and takes up more and more heat, may be provided for.

The operation of the machine is as follows: The volatile liquid, flowing from the receiver through pipe *g*, enters the two-way cock *D*, and from thence passes through pipe *C* into the upper end of pipe *B*, coiled within the freezing-plate *A*, and from thence passes out through the two-way cock into the pipe *d*, and onto the next congealer in the series.

In passing through the freezing-plate the heat is abstracted therefrom, and water being sprayed upon its sides, the same is formed into ice. When this becomes of sufficient thickness the flow of volatile liquid is temporarily cut off from the main pipe *g* by a cock, (not shown,) and the compressing-pump being continued in operation, the volatile liquid is withdrawn from the coils of pipe *B*. When this is accomplished the two-way cock *D* is turned in such manner as to close communication with the pipes *C* *C'*, and open communication with the pipes *g* and *d*. The cock in the main pipe *g* may now be open, when all the congealers of the series may be in active operation, excepting the one cut off by the cock *D*.

To detach the ice, water of a suitable temperature is permitted to flow into the pipe *E* through the space or channel-ways *D'*, between the coils of pipe *B*, and out at *F*, by which means the temperature of the plates is raised sufficiently to permit the ice to be removed.

For the purpose of dividing the ice the flat tubes *K* *K* are also filled with water of a suitable temperature, by which means their temperature is raised sufficiently to permit them to be removed, and by the insertion of an iron bar in the space occupied by them the ice is readily separated.

Some of the advantages of the described construction are as follows: By the employment in the freezing-plate of two independent passages, the operation of freezing and detaching can be carried on alternately without injuriously affecting the freezing agent when the ice is being detached, it being simply withdrawn without being heated by the operation, as is sometimes done. By the employment of independent passages for the detaching agent

it is not necessary to admit the water into the pipes containing the volatile liquid, so that the difficulty of removing again the moisture after using these pipes for the detaching agent is entirely avoided, and the manufacture of the ice is, consequently, much facilitated. By the employment of the spraying apparatus with the inverted *U*-shaped arms and the independent regulating-cocks, the discharge of water to any particular part can be regulated. By means of the two-way cock and the connecting-pipes, one congealer of the series may be cut off without interfering with the operation of the others.

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

1. In the manufacture of ice, I claim the method described, consisting essentially in causing the freezing agent and the detaching agent to flow alternately through independent passages or channel-ways in a hollow freezing-plate, substantially as described.

2. In an ice-machine, the combination of the following elements: first, a hollow plate to permit the formation of ice upon its sides; second, an internal pipe or system of pipes, to contain the freezing agent; third, an independent channel-way within the freezing-plate, to permit the flow of water to detach the ice, all substantially as described.

3. The congealer described, consisting of cylinder *A*, the internal pipes *B*, and the independent spaces or channels *D'* within the cylinder, having suitable inlet and outlet openings, the apparatus as a whole being adapted to permit the freezing agent and detaching agent to be used alternately, but independently of each other, substantially as described.

4. The combination of the two-way cock described with the permanent pipes *g* *d* *C* *C'*, the cock having the permanent passage *c* and the revolving passages *a* *b*, as described.

5. A series of congealers, substantially as described, and a distributing-pipe uniting the congealers, the diameter of which increases with each successive congealer, substantially as described.

In witness whereof I have hereunto set my hand and seal.

SAML. B. MARTIN. [L. S.]

Witnesses:

C. W. M. SMITH,
E. PATTEN.