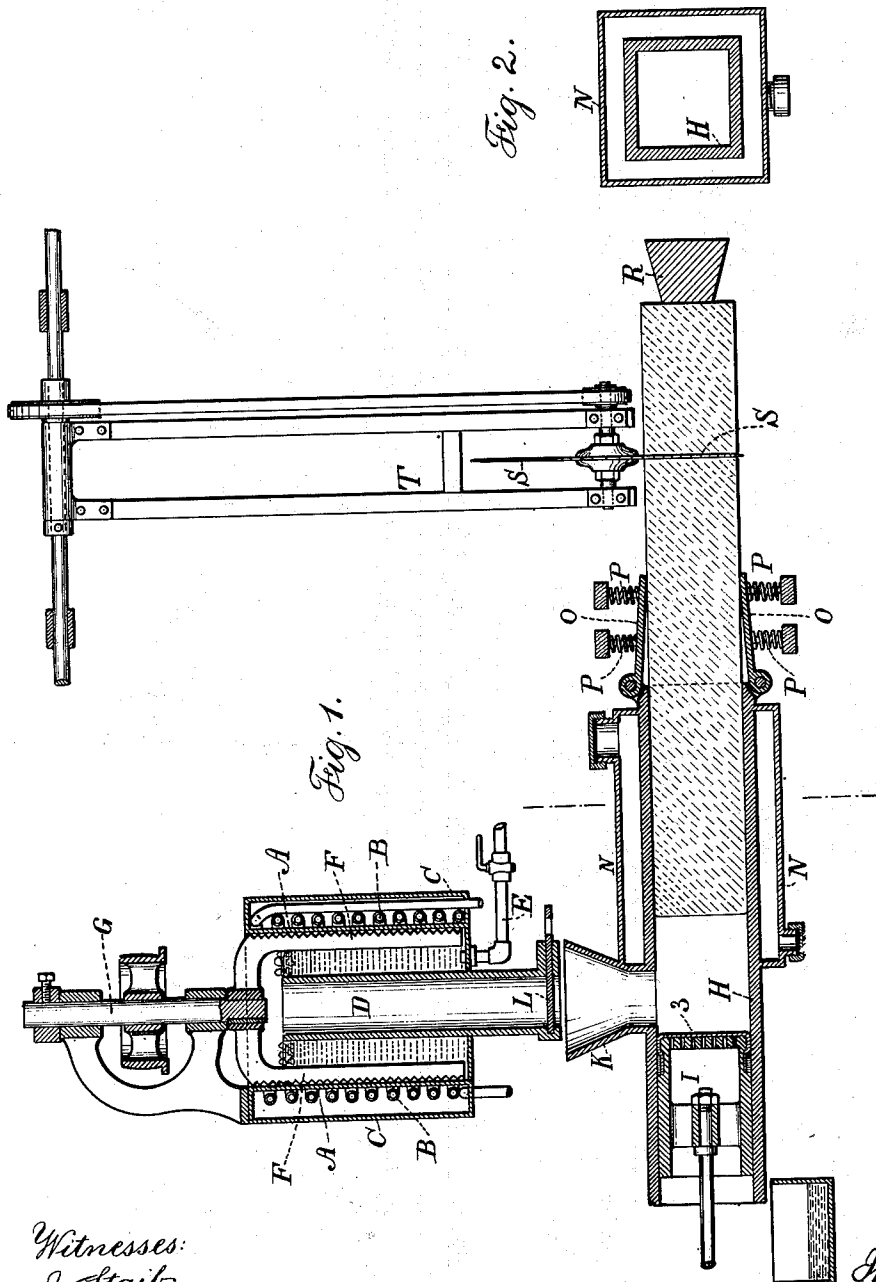


(No Model.)

D. L. HOLDEN.
APPARATUS FOR MANUFACTURING ICE.

No. 530,526.

Patented Dec. 11, 1894.



Witnesses:
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UNITED STATES PATENT OFFICE.

DANIEL L. HOLDEN, OF NEW YORK, N. Y., ASSIGNOR TO KATHRYN M. HOLDEN, OF SAME PLACE.

APPARATUS FOR MANUFACTURING ICE.

SPECIFICATION forming part of Letters Patent No. 530,526, dated December 11, 1894.

Application filed April 18, 1892. Renewed May 5, 1894. Serial No. 510,225. (No model.)

To all whom it may concern:

Be it known that I, DANIEL L. HOLDEN, a citizen of the United States, residing in the city and State of New York, have invented an Improvement in Apparatus for Manufacturing Ice, of which the following is a specification.

The object of the present invention is to consolidate chips of ice into blocks with rapidity so that such blocks of ice may be clear and free from bubbles of air.

In carrying out my invention a vessel is employed containing water, and such vessel is exposed to a refrigerating action, so that ice is formed in layers upon the vessel, and the layers of ice are scaled off progressively by the action of a cutter, and the ice chips or cuttings floating in the water are passed away over the edge of a pipe by which they are conveyed to a press, such press being preferably in the form of a square tube or trunk containing a piston that acts upon the chips of ice in their moist condition to press them firmly together and the temperature is such that the ice rapidly solidifies and the operations are continued progressively, the piston being drawn back and a second cake consolidated and the first one forced along in the trunk and delivered from the same in such a manner that it may be separated by sawing or otherwise, thus producing blocks of ice of uniform size and with great rapidity.

In the drawings Figure 1 is a vertical section illustrating the improved apparatus, and Fig. 2 is a cross section of the solidifying trunk.

The vessel A is of any suitable size or shape, preferably cylindrical and it is adapted to the freezing operation; for which purpose pipes B containing ammonia or similar frigerific material are employed by which the vessel A is reduced to the proper temperature. When the vessel A is made in the form represented it is advantageous to surround the same with a non-conducting jacket C, and within the vessel A is a stand pipe D open at the top end, and water is admitted into the vessel A and around the stand pipe D by any suitable supply pipe, preferably the pipe E at the bottom of the vessel with a regulating cock thereon, so that the water may flow in progressively

and float the ice and such ice passes over the top of the stand pipe D and falls down through the same.

It is to be understood that the vessel A is preferably of sheet metal and there are within the same the revolving scrapers or cutters F of any suitable character. I have represented the same as upon a fork supported by the shaft G which is rotated by competent power, and the scrapers or cutters F scale off the ice as the water freezes upon the interior surface of the vessel A.

The solidifying trunk H is preferably horizontal and rectangular and it contains the piston I, and there is upon the trunk H a hopper K into which the ice crystals or chips can be admitted from the stand pipe D by a slide valve L or any other suitable device, or if desired the crystals or chips of ice can fall directly from the stand pipe D into the hopper K.

I prefer to make the piston I hollow and to perforate the operative end of the same and to cover the end of the piston with suitable woven material such as bagging, as represented at 3, and the piston I receives motion from a crank and connecting rod or by a screw or any other suitable power, so that the piston rod gives motion to the piston I and carries the ice crystals or chips along within the solidifying trunk H and applies the necessary pressure to cause the particles of ice to adhere together in the presence of moisture and freeze into a solid block, and I remark that a jacket may be provided at N around the solidifying trunk H to which ammonia or other frigerific material may be admitted to reduce the temperature of the solidifying trunk and permit the solid freezing of the ice. During the operation of pressing the block of ice, the surplus water will run through the perforated piston and out at the open end of the solidifying trunk and the same may be caught in any suitable vessel and returned to the vessel A in its cold condition so as easily to be reduced to the temperature necessary for forming ice.

It is advantageous to employ friction clamps O set up by suitable springs P at two or more sides of the cake of ice, as it is projected from the end of the solidifying trunk H, in order

that the ice may be detained while the necessary pressure is exerted upon the same by the piston, and as the block of ice issues from the solidifying trunk its movement may be arrested by a stop R, and I prefer to employ a circular saw S hung in the frame T and rapidly rotated by suitable power, so that by moving the frame T the saw may be brought across the block of ice to saw off a section thereof, which block will slip down between the saw and the stop and can be received upon any suitable trough or conveyer. In this manner blocks of uniform size are rapidly frozen and delivered from the machine; and the refrigerating action is very direct upon the ice, so that when it is scaled off the temperature thereof is insufficiently low to cause the consolidation within the trunk H under the pressure of the piston I.

It will be apparent that in the present improvements I overcome a great difficulty that has heretofore existed in ice making machinery, because the ice is a comparatively poor conductor and the thicker the layer of ice the more intense must be the cold to continue the freezing operation.

In the present improvements a comparatively thin layer of intensely cold ice is produced and the same is immediately scaled off and another layer is frozen, so that a greater quantity of ice is produced in the same time by the frigerific action.

I am aware that efforts have been made to obtain ice by freezing the same upon a moving surface and scaling the ice off and subjecting the same to pressure.

In my improvement the ice as it is scaled off the congealing surface is allowed to float and the water at the top becomes the coldest and the ice floats over the edge of the stand pipe, and the water that accompanies the same lessens the quantity of air present with the ice. Hence when the ice is pressed and consolidated it is clear and free from air bubbles.

I claim as my invention—

1. The combination in an ice making apparatus of a water holding vessel, means for reducing the temperature and forming ice on

a surface of such water holding vessel, means for cutting or scaling off the ice progressively from such surface so that it floats, a surface over which the ice is discharged, a receptacle for the ice crystals and adhering water, and means for pressing such ice to consolidate the same, substantially as specified.

2. In an ice making apparatus a refrigerating vessel having an overflow and a water supply pipe to the same, in combination with a scraper for removing or cutting the layer of ice from the surface of the refrigerating vessel, whereby the ice chips or scales are caused to accumulate and overflow with only the adhering water, substantially as set forth.

3. The combination with the refrigerating device of a water holding vessel, on the surface of which ice is formed, a gradual water supply to said vessel, and means for cutting or scaling off the ice progressively so that it floats and is discharged by the accumulation, substantially as specified.

4. The combination with the refrigerating device of a water holding vessel, on the surface of which ice is formed, a gradual water supply to said vessel, and means for cutting or scaling off the ice progressively so that it floats and is discharged by the accumulation, a trunk into which the ice scales are received in their moist condition and a piston and means for moving the same to consolidate the ice substantially as specified.

5. The combination with the refrigerating device of a water holding vessel, on the surface of which ice is formed, a gradual water supply to said vessel, and means for cutting or scaling off the ice progressively so that it floats and is discharged by the accumulation, a trunk into which the ice scales are received in their moist condition and a piston and means for moving the same to consolidate the ice, and a saw for sawing off the ice into blocks as projected from the trunk substantially as specified.

Signed by me this 13th day of April, 1892.
DANIEL L. HOLDEN.

Witnesses:

GEO. T. PINCKNEY,
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