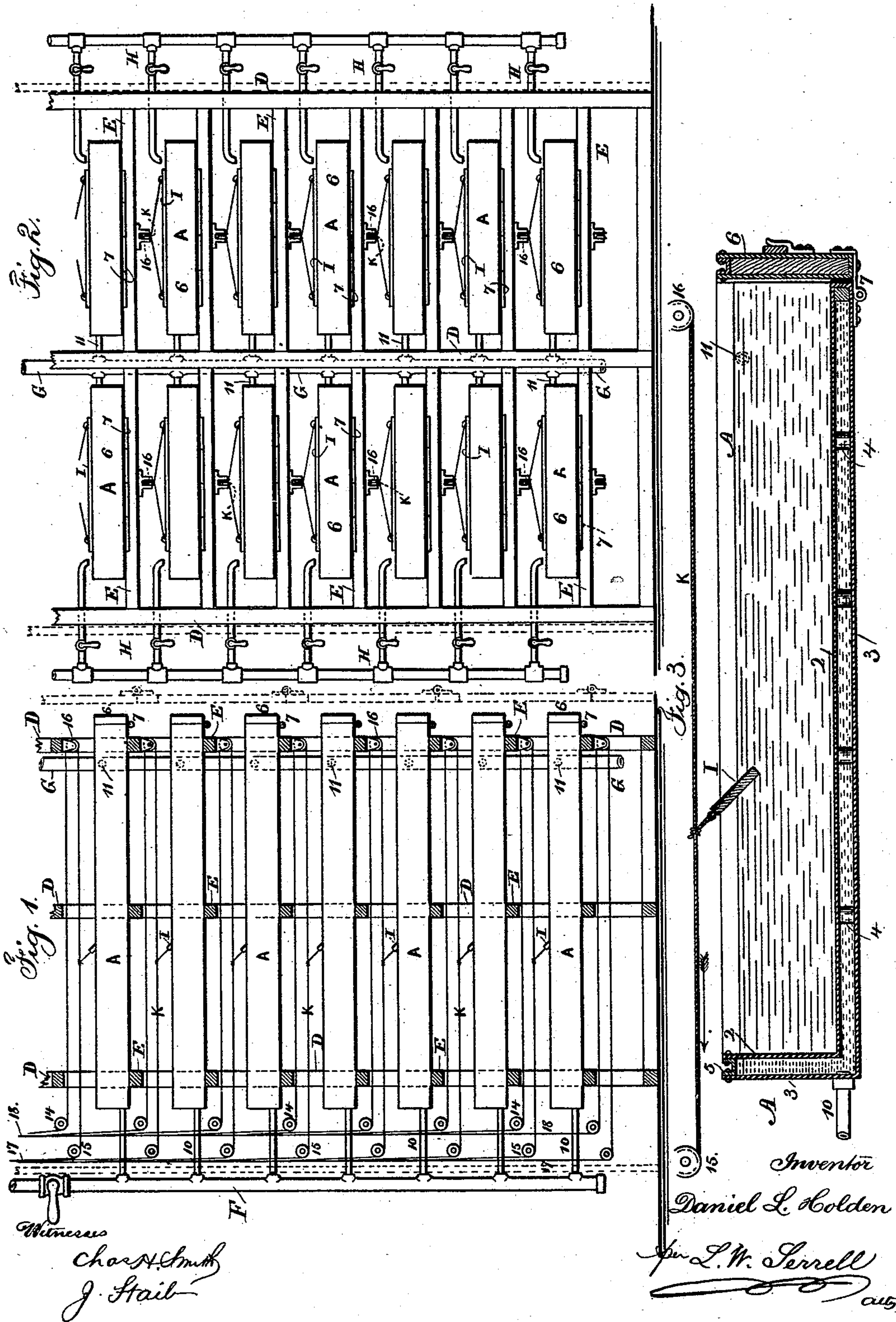


D. L. HOLDEN.
ICE MAKING MACHINE.

Patented Mar. 29, 1892.



UNITED STATES PATENT OFFICE.

DANIEL L. HOLDEN, OF NEW YORK, N. Y.

ICE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 471,684, dated March 29, 1892.

Application filed March 23, 1891. Serial No. 386,004. (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 Ice-Making Apparatus, of which the following is a specification.

In freezing blocks of ice difficulty is experienced in rendering the same clear and transparent, because the ice crystals are more or less separate, like snow, instead of being compact and crystalline, and bubbles of air are confined therein.

My present invention is for promoting the solid, transparent, and crystalline character of the ice and preventing the retention of bubbles of air or gas or the formation of vacuum-cells.

In ice machinery the cans of water are usually introduced into the brine and then removed after the water is frozen and plunged into hot water to loosen the block of ice. I find that a gentle movement of the water as it is cooled produces a deposit of any dirt or foreign matter and the liberation of air or gases, and this agitation, continued during the freezing operation, promotes the crystallization of the ice and renders the same clear and transparent. I make use of pans with double sides and bottoms, through which refrigerating-fluid is caused to circulate during the freezing operation, and these pans are set closely together, so as to promote the cooling operation and exclude external heat, and as soon as the freezing operation is completed hot brine is caused to circulate through the double pans to detach the blocks of ice, which are slid out endwise after the opening of movable ends to such pans.

In the drawings, Figure 1 is a side elevation, and Fig. 2 is an end elevation, of my apparatus; and Fig. 3 is a longitudinal section, in larger size, of one of the pans and the devices therewith connected.

Each pan is comparatively shallow, and it is of the internal dimensions suitable for the required sizes of ice cakes. The pans A are made with double sides and bottoms, the interior sheets 2 and exterior sheets 3 being riveted together at 4 and provided with rim-bars 5, that come between the edges of the sheets and to which they are riveted. One end of each pan is preferably closed and

double, and made in the same way as the sides. The other end is open, but provided with a stopper or end 6, that can be opened or closed. It is preferably hinged at 7 to the bottom and provided with a packing of rubber or other elastic material between the bottom and the sides and clamping devices for holding such end water-tight in position when in use.

The pans A are associated together in any desired manner, preferably in vertical ranges supported by posts D and cross-bars E at suitable distances apart, and the nests or ranges of pans should be inclosed at the sides and ends to lessen atmospheric influence. Vertical pipes F are provided with branches 10 to the respective pans and also vertical pipes G with branches 11, and these pipes are so arranged that cold brine or similar liquid can be caused to flow down the pipe F through branches 10 along through between the inner and outer sheets of the pan, and by the branches 11 and pipe G to the cooling device of the ice-making machine.

Water, by preference, either filtered or distilled, is supplied into the pans by the pipes H to the required depth, either at once or gradually during the freezing operation.

I employ agitators in the water preferably in the form of slats I, that are connected to the cords K, that pass around pulleys 14 15 16 to the actuating ropes or chains 17 18, and these are moved by a crank and connecting-rod or similar means, so that the slats are drawn along in the water from one end to the other of the water and back again, and it is advantageous to have this motion comparatively slow, and in practice the slight movement thus produced renders the ice clear and crystalline and free from air-bubbles, vacuum-cells, and seams. The constant movement of the slat will prevent it being frozen into the block of ice.

As soon as the ice is frozen sufficiently the cold brine or freezing-liquid is allowed to run out of the apparatus, and in its place hot brine or similar liquid is run through the apparatus rapidly and sufficiently only to thaw the ice that is in contact with the bottom and sides of the pans, and during this operation the ends of the pans are opened, and as soon as the blocks or cakes of ice are detached from

the pans the hot liquid is run off and the blocks are slid endwise out from the pans on any suitable chutes or carriers to the place of storage or delivery.

5 It is preferable to entirely inclose the apparatus with partitions, as shown by dotted lines, of boarding with non-conducting material, and at the side of such inclosure adjacent to the movable ends of the pans there
10 are to be doors to give access to the pans in removing the blocks of ice.

In cases where the gaseous ammonia is conveyed to the refrigerating-pans it is advantageous to provide ammonia-pipes in the brine
15 that is contained in the double sides and bottom of the still.

I do not claim a range of pans with movable ends and water-supply pipes. In my improvements the supply to the separate pans being
20 gradual through the small branch pipes from the supply-pipe F overflows from each pan and passes off by the pipes 11 and G without the pans being exposed to the pressure of a high column of water. Hence the pans are
25 not liable to injury by pressure. I am also aware that rigid agitators have been employed in the water that is being frozen; but the

same either become frozen into the ice or interfere with the cake being solid. In my improvement the agitator, being moved by a
30 flexible connection, rises above the ice and moves over the same as the water freezes.

I claim as my invention—

1. The combination, with the pan in an ice-making apparatus, of an agitator that is free
35 to rise and fall and a flexible connection from the same to a motor, whereby the agitator is moved in the water, but is free to accommodate itself to the ice as it is formed and to be moved over the same, substantially as speci-
40 fied.

2. The combination, with the ranges of pans in an ice-making apparatus, of agitator-slats, horizontal cords between the pans and pulleys
45 for the same, and flexible connections between the cords and slats, whereby the agitators can be moved during the freezing operation, substantially as specified.

Signed by me this 16th day of March, 1891.

DANIEL L. HOLDEN.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.