(No Model.)

2 Sheets—Sheet 1

S. W. JOHNSON.

ICE MAKING TANK.

No. 539,363. Patented May 14, 1895.

Fig. 1

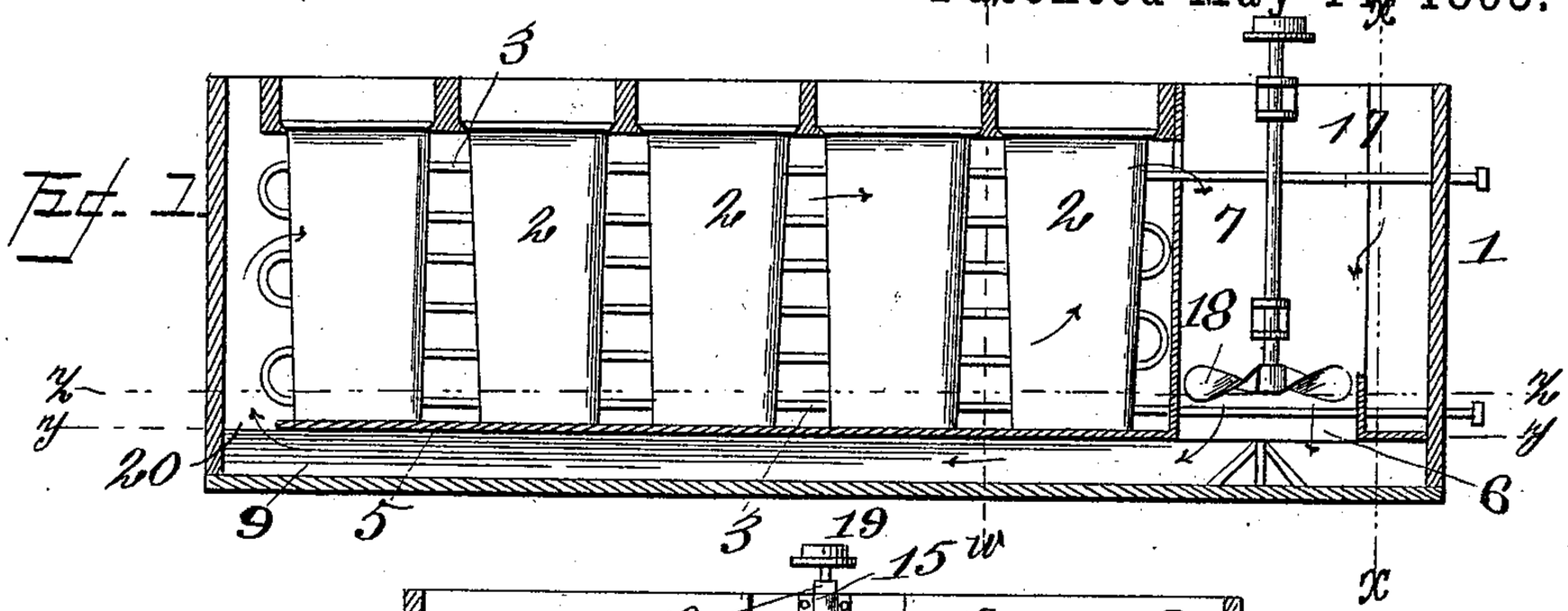


Fig. 2

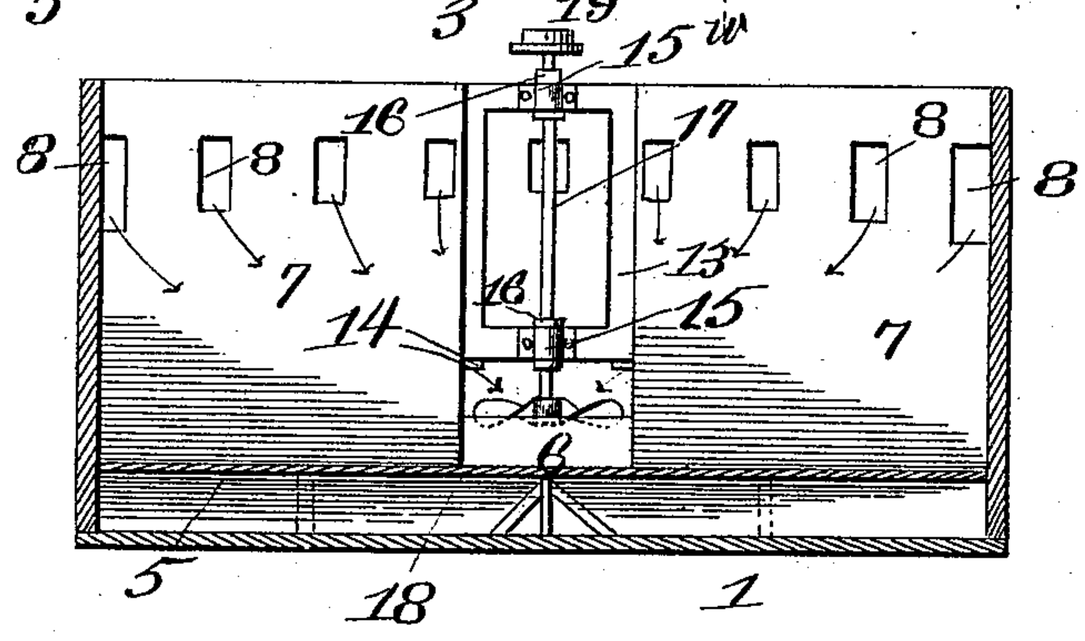
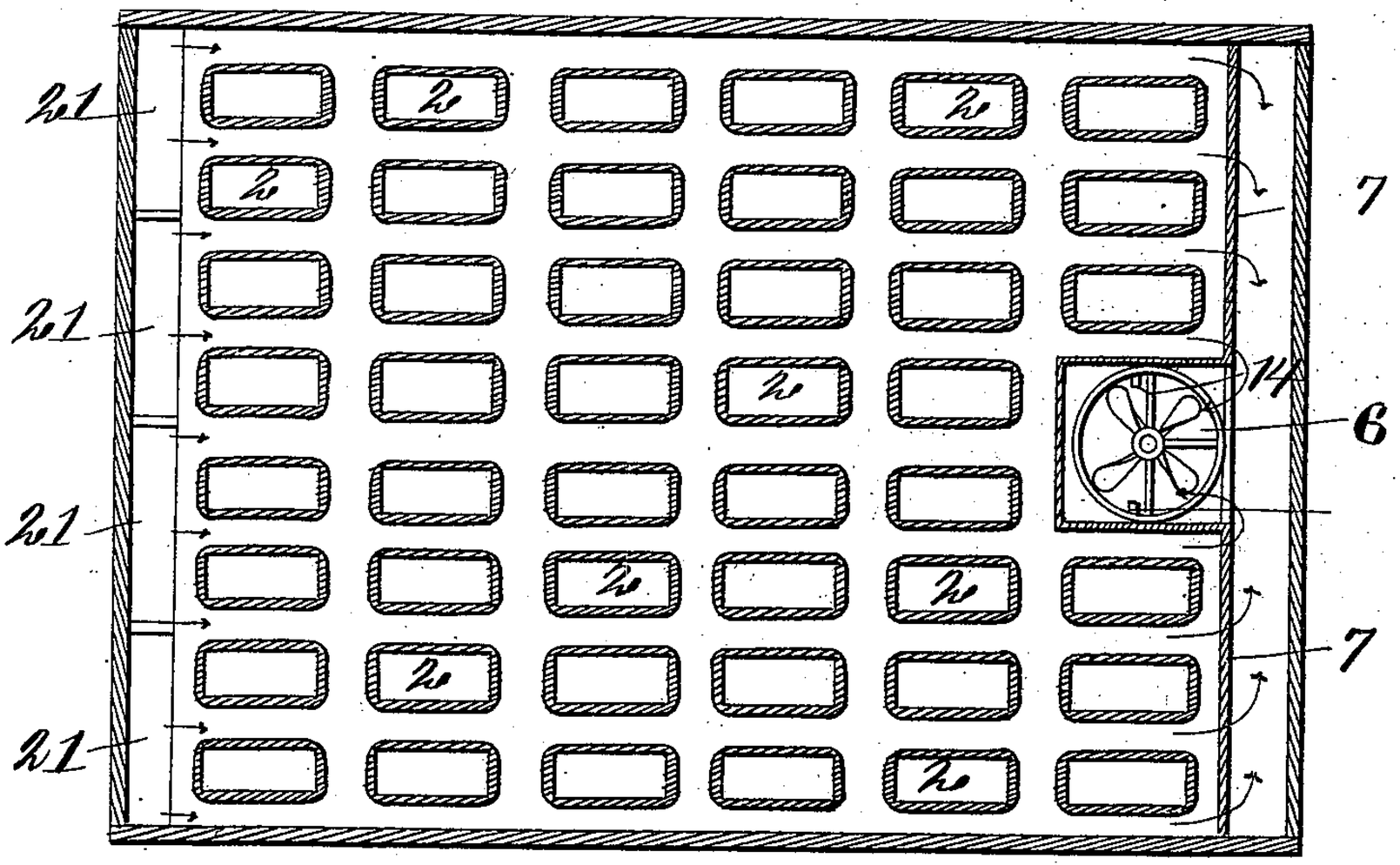


Fig. 3



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(No Model.) 2 Sheets—Sheet 2.

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ICE MAKING TANK.

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Fig. 4.

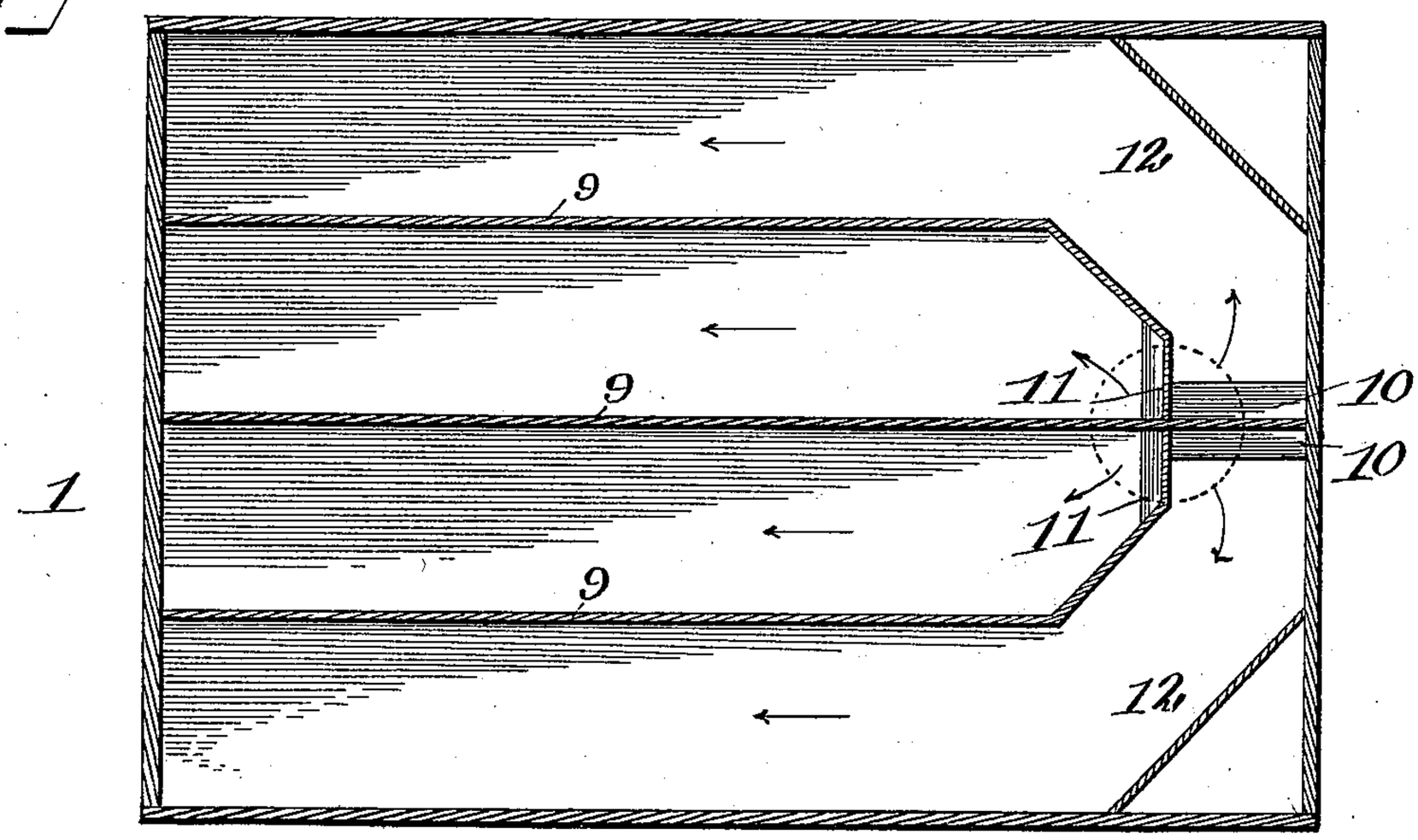

Fig. 5.

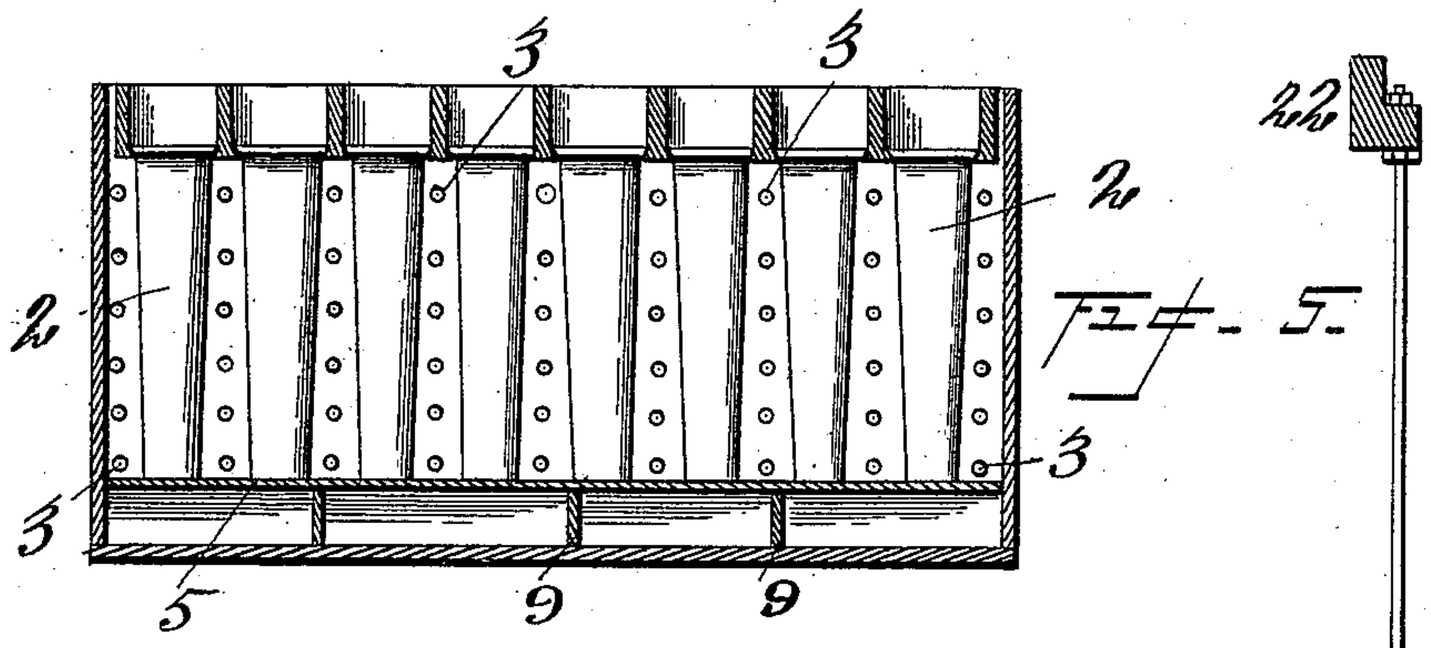

Fig. 6.

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UNITED STATES PATENT OFFICE.

SAMUEL W. JOHNSON, OF NEWPORT NEWS, VIRGINIA.

ICE-MAKING TANK.

SPECIFICATION forming part of Letters Patent No. 539,363, dated May 14, 1895.

Application filed April 21, 1894. Serial No. 508,517. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. JOHNSON, a citizen of the United States, residing at Newport News, in the county of Warwick and State of Virginia, have invented certain new and useful Improvements in Ice-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in the freezing tanks of ice-machines, in which the cans or molds containing the water to be frozen are placed in rows alternating with coils of pipe containing the refrigerating gas, and the remaining space being filled with brine, but more particularly to the novel means employed to circulate the brine.

The objects of the invention, are, first, to provide means by which the brine shall be maintained in constant and rapid circulation; second, to provide means by which the circulation shall be maintained at a uniform rate of speed in every part of the tank; third, to provide means by which the brine shall be circulated with the smallest expenditure of power, and, fourth, to provide means by which the circulating device can be quickly and readily removed from the tank for repairs.

With these objects in view the invention consists in the novel construction and arrangement of the various parts, as will be hereinafter more fully described, and specifically set forth in the claims.

In the acompanying drawings, Figure 1 represents a vertical section of the freezing-tank of an ice-machine provided with my improved circulating device; Fig. 2, a vertical section of the same on line *x x* of Fig. 1; Fig. 3, a horizontal section on line *z z* of Fig. 1; Fig. 4, a horizontal section on line *y y* of Fig. 1; Fig. 5, a vertical section on line *w w* of Fig. 1; and Fig. 6, a vertical section of the freezing-tank, showing applied thereto a modified form of my improved removable propeller-wheel.

Referring to the drawings, the numeral 1 indicates a freezing-tank of the usual or ordinary construction; 2, the galvanized-iron cans or molds containing the water to be frozen; 3, the coils of pipe through which the refrigerating gas is circulated, and 4 the water-line below which all space in the tank, not otherwise utilized, is filled with strong brine.

The numeral 5 indicates a water-tight false floor, which extends the whole width of the tank and from the front end to within about ten inches of the rear end of said tank. This floor is placed about nine inches above the bottom of the tank and is parallel with the same, and is provided near its front end with a circular opening or port 6. A vertical water-tight partition 7, rises from the false floor, and, inclosing three sides of the circular opening 6, extends from side to side of the tank. The three sides inclosing said opening and the front wall of the tank form a well for the propeller wheel, to be hereinafter described. In the partition 7, opposite each space between the rows of cans or molds, is a port 8, through which the brine returns to the front of the tank, as will be hereinafter explained.

The numeral 9 indicates three partitions, situated between the false floor and the bottom of the tank and dividing the width space into substantially four equal parts. The center partition extends from one end of the tank to the other, while the other two extend from the rear and before freezing the front ends converge and are united by a lateral partition, which crosses the center partition, directly beneath the circular opening or port 6, as shown in Fig. 4. By means of this construction of the two outside partitions more brine is delivered to the two outside spaces than to the middle ones. Between the lateral partition and the front wall of the tank, the center partition 9 is provided, on opposite sides, with a deflecting-board 10, set at an angle of forty-five degrees; the lateral partition being also provided with a similar deflecting-board 11. These deflecting-boards, being arranged directly beneath the opening or port 6, serve to deflect or change the course of the water, forced down through said opening or port, from a vertical to a horizontal course. Deflecting-boards 12 are placed at the front corners of the tank to turn the flow of water from the front back toward the rear of the tank.

The numeral 13 indicates a frame movably supported, between the side walls of the well,

upon cleats 14, (Fig. 3) or otherwise. Journaled in bearings 15 on said frame and supported by collars 16, is a shaft 17, which carries at its lower end a propeller-wheel, 18, and at its upper end a pulley 19. The frame being movably supported is quite an important feature, as it can be lifted out of the wall and replaced at will. In cases where the wheel is journaled stationary, it is necessary to draw the brine in order to obtain access to the wheel to make repairs, thus causing considerable loss.

The numeral 20 indicates a space at the rear of the tank, not covered by the false floor, said space being divided into four ports 21 by the partitions 9. Through these ports the brine, forced under said floor and between said partitions rises and flows between the cans or molds.

In the modification, shown in Fig. 6, the movable frame 13 is dispensed with, the upper end of the shaft 17 being journaled in a box secured to a truss-timber 22, of the roof and the lower part in a box secured to a bridge-tire, 23, in the tank. To prevent undue strain on the shaft, the propeller-wheel is brought as near as possible to the lower journal-box, and the opening or port 6 is cased up about half way between the false floor and the brine-line. The shaft and wheel is readily removable, and the circulation is effected equally as well with the propeller-wheel arranged as just described as with the one previously described. One of the great advantages of this method of circulation, is that the brine is not lifted but simply circulated, the only power required being that which is simply necessary to overcome the friction of the brine passing through the ports, which power is very small compared to the loss of friction in the brine pumps, in common use, which, being outside of the tank, constantly absorb heat while the herein described circulating device, being inside of the tank, causes no loss in temperature.

The operation of the device is as follows: Power being applied to the pulley, from the compressor (not shown) or other suitable source, the propeller-wheel is set in motion. The brine is forced down through the port 6 and being divided into four currents by the partitions 9, pass up through the ports 21 and is delivered evenly across the whole end of the tank. By means of the deflectors the flow of the descending current is materially assisted to a horizontal flow, and the brine as it rises through said ports 21 flows between the cases or molds, absorbing the heat from the water contained therein, which heat is in turn absorbed from the brine by the refrigerating gas in the coils. The brine returns to the propeller-wheel through the ports 8, the depth of which it will be observed, increases in proportion to their distance from the propeller-wheel. This is intended to compensate for the loss of friction caused by the brine passing through the outer ports having a longer distance to travel to reach the propeller-wheel.

The importance of an even flow of brine across the whole width of the tank will be more apparent when it is considered that it is the universal practice to remove the rows of ice in regular rotation, commencing with the first row across the end of the tank. Much delay and annoyance is caused by the water in all of the cans or molds, in the same row, not being frozen at the same time, and regular freezing can only be secured by means of a uniform circulation of the brine.

In very large tanks it might be necessary to use two or more wheels, in which case, the entire arrangement could be duplicated.

I am aware that propeller-wheels have heretofore been used to circulate brine, and therefore do not broadly claim it in combination with a freezing-tank, but

What I do claim, and desire to secure by Letters Patent, is—

1. In an ice-machine, a refrigerating-tank constructed with a false bottom, which is situated above the bottom proper and provided, near the front end with a port to admit a downward current of brine, and at the rear end with a transverse opening or space to allow the current of brine to escape upward, said tank being divided into a series of longitudinal brine chambers extending from the rear of the tank and communicating with the port in the false floor, whereby the brine is evenly and uniformly distributed, substantially as specified.

2. In an ice-machine, a freezing-tank having a false bottom provided with a port to admit a current of brine, and a transverse opening to permit the escape of said brine, and a series of longitudinal vertical partitions, forming brine channels, said partitions so arranged and connected at their forward ends that the descending current of brine will be distributed into each channel, substantially as specified.

3. In an ice-machine, the combination, with a freezing-tank having a false floor, substantially as described, watertight partition, rising from said false floor and extending across the front end of the tank, as described, said partition so arranged as to form, in connection with the front end of the tank, a well around the circular opening or port in the false floor.

4. In an ice machine, a freezing-tank provided with a false floor and cross partition, substantially as described, a port arranged in the upper part of said partition, opposite each space between the rows of pans, through which ports brine is admitted to the chamber formed between the partition and the end of the tank.

5. In an ice machine, a freezing tank, provided with a false floor and cross partition, substantially as described, a series of ports near the upper part of said partition, the ports on each side of the middle port being success-

ively deeper as the distance from the center increases.

6. In an ice machine, the freezing-tank provided with the false floor 5 and having the ports 6 and 21 in combination with the partition 7 having the ports 8, as and for purposes set forth.

7. In an ice machine, the combination, with the freezing-tank provided with a well, of an upright shaft carrying at its lower end a propeller wheel, and journaled in bearings secured to a movable frame, suitably supported in said well, whereby the shaft, wheel, and frame can all be lifted out of the well, for repairs or other purpose, and returned to the same, as specified.

8. In an ice-machine, the combination, with the freezing-tank having a false floor provided with ports at each end, for the passage of the brine, a series of vertical partitions, placed longitudinally beneath said floor, and a vertical partition, rising from the false floor and provided with a series of ports, of a propeller-wheel, mounted on a movable frame situated in the well, formed by the vertical partition and the front wall of the tank, substantially as specified.

9. In an ice-machine, the combination, with the freezing-tank, having a false floor provided with suitable ports at the front and rear, a series of longitudinal vertical partitions, as described, and a transverse vertical partition forming, with the front wall of said tank, a central well, and provided with a series of ports, of a circulating device located in said well, whereby the brine is caused to circulate freely and evenly throughout the tank, substantially as specified.

10. In an ice-machine, the combination, with the freezing-tank having the false floor provided with ports 6 and 21, the partition 7 provided with ports 8, and the partitions 9 provided with deflecting-boards, of a circulating device consisting of a propeller-wheel 18, shaft 17 journaled in a movable frame, the movable frame 13, and the sustaining collars 16, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

SAMUEL W. JOHNSON.

Witnesses:
CLARA L. JOHNSON,
ELLEN A. JOHNSON.