D. L. HOLDEN.

Apparatus for Making Ice.

No. 207,278. Patented Aug. 20, 1878.

Fig. 1.

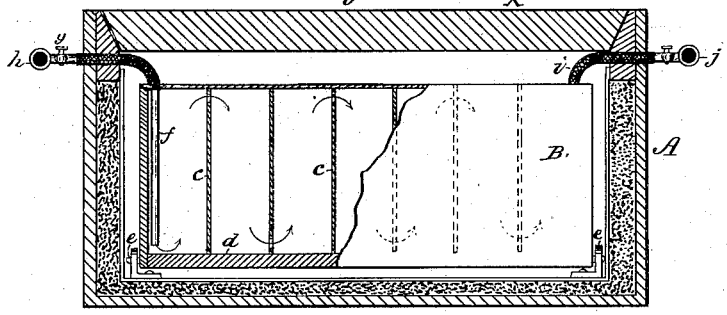

Fig. 2.

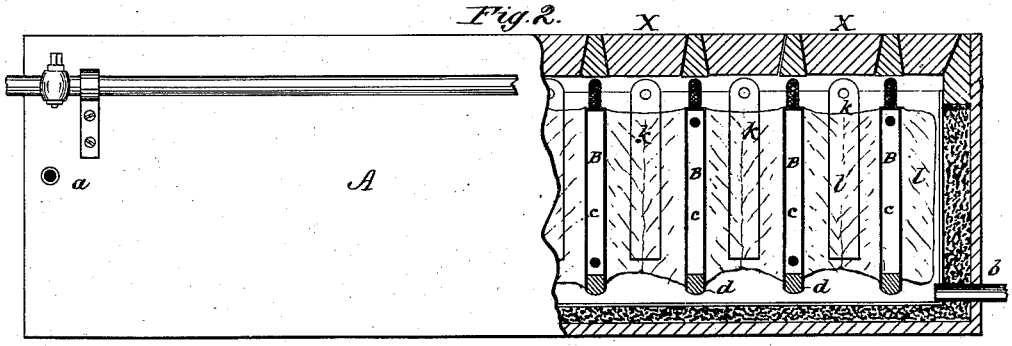

Fig. 3.

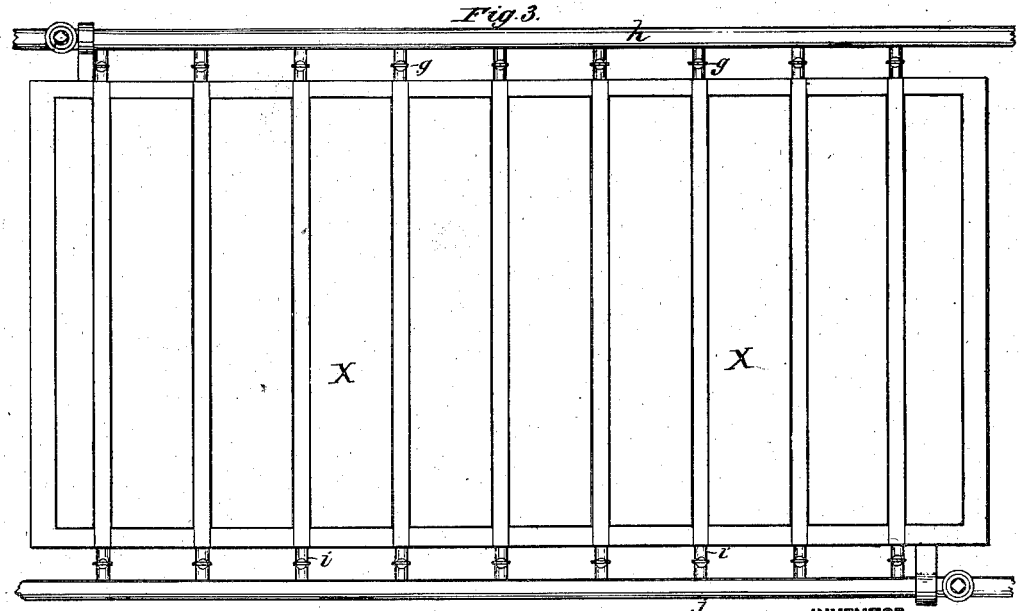

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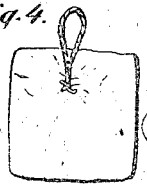
Fig. 4.



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IMPROVEMENT IN APPARATUS FOR MAKING ICE.

Specification forming part of Letters Patent No. **207,278**, dated August 20, 1878; application filed May 13, 1878.

To all whom it may concern:

Be it known that I, DANIEL L. HOLDEN, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Ice-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a transverse section with one of the receptacles for the non-congealable fluid broken out. Fig. 2 is a side view, with one end in vertical longitudinal section. Fig. 3 is a plan view. Fig. 4 is an artificial block of ice having a hand-hold frozen therein.

This invention relates to an improvement upon that feature of an ice-machine known as the "congealer," or apparatus in which the congelation of the water is effected. It relates more particularly to that form of congealer in which receptacles containing a cold non-congealable liquid are immersed in a tank of pure water, so as to freeze upon the outside of said receptacles blocks of ice without incorporating the impurities of the water.

The invention consists, first, in pivoting the receptacles for the non-congealable liquid at the bottom, and connecting them by flexible pipes with the main inlet and discharge pipes, so that the said receptacles may be slightly rocked to one side upon their bottom pivots, to permit the easy removal of the unbroken block of ice formed between any two such receptacles.

The invention also consists in the method of subdividing such large blocks of ice, which consists in freezing flat metal blades in the said block, and afterward striking a blow upon the blade to divide the block at the desired point.

The invention also further consists in freezing a looped cord into the blocks of ice, which constitutes a permanent hand-hold for handling the said blocks.

In the drawing, A represents the tank, insulated with a poor conductor of heat, and provided with an inlet, *a*, and an outlet, *b*, which inlet is employed for introducing fresh water into the tank, and which outlet serves to drain the uncongealed portions of water in the bottom of the tank containing the sediment. Transversely within this tank are arranged metallic receptacles B for the non-congealable fluid. These receptacles have baffle-plates *c*, to cause the cold fluid to thoroughly traverse the same in passing through the length of the said receptacles from one side of the tank to the other. The bottoms *d* of these receptacles are made of wood or some poor conductor of heat, to prevent the water upon the outside from freezing to the bottom, and said bottoms are pivoted at their ends to angle-irons *e*, so as to allow the receptacles to have a slight oscillatory or rocking movement, for the purpose hereinafter described.

Upon one side of the tank, and dipping into the bottoms of each of the cold-fluid receptacles, are pendent pipes *f*, which emerge through the side of the tank, and connect, through separate cocks *g*, with a continuous inlet-pipe, *h*, running the whole length of the tank, and having communication with the outlet-pipe from the refrigerator of an ice-machine, (not shown,) by which the non-congealable fluid is refrigerated. Upon the opposite side of the tank, and into each of the receptacles B, are arranged pipes *i*, which open through separate cocks into a discharge-pipe, *j*, extending the whole length of the tank, and communicating with the inlet-pipe of the refrigerator of the ice-machine, so that the non-congealable fluid, which is charged with the heat extracted from the water to be frozen, may be returned to the ice-machine and be again reduced in temperature.

Both the connections of the pipes *f* with the continuous inlet-pipe *g* and the connection of pipe *i* with the continuous discharge-pipe *j* are made flexible, so as to allow the receptacles to be rocked upon their bottom pivots, as before stated, and for said connections sections of rubber hose are employed.

Now, as the circulation of the non-congealable fluid is kept up by the pumps of the ice-machine, the cold fluid, which is below the freezing-point, enters each of the receptacles through the pipes *f*, and, passing up and down around the baffle-plates in close contact with the metal walls, emerges through the pipes *i* upon the other side. Now, the tank A being filled with pure water, which surrounds the said receptacles, the effect of the cold traversing currents is to freeze upon the outside of

the receptacles B films of ice, which constantly increase in thickness until the crystallizing outer edges meet in the center, and unite to form solid blocks of ice between the said receptacles B. This congelation, however, only takes place upon the metal sides of the receptacles, and the ends of the receptacles which are packed and the bottoms which are made of wood do not freeze the water in contact therewith, and as there is always a layer of water near the bottom which is not frozen, and a gradually-diminishing wall of water between each two receptacles, the impurities in the water are thrown down into this uncongealed body of water at the bottom. Now, when the freezing is complete, the water containing the sediment and impurities is drawn off at *b*. This, it will be seen, makes the freezing process a refining one, and the product is pure, clean, and purged of all color and sediment.

In freezing the large blocks of ice between the receptacles B, which my invention contemplates, some means of removing and subdividing the blocks must be provided. In freezing, therefore, I suspend midway between the receptacles several metal blades, *k*, Fig. 2, having eyes or hand-holds in the top thereof. Now, when the freezing is complete, the non-congealable fluid is slightly warmed to loosen the blocks of ice from the receptacles, and the first half-block of ice, *l*, is lifted out by the eye of its blade through the first removable door, X, at the top. Now, when the next full-sized block, *l'*, is to be removed, the merit of arranging the receptacles to rock will be apparent, for the first receptacle will not allow the block to be removed until it is rocked to one side. This being permitted, however, by its pivots at the bottom and its flexible hose, the block is readily lifted out through the second door by its lifting-blades *k*, and so on.

In order to subdivide these large blocks equally and without loss, these blades *k* are made flat, and extend well down into the block, with the eye or head of the blade swelled to a greater thickness. Now, after the block is removed, the projecting ends of each of these blades is struck a slight blow with a hammer, which evenly divides the block in transverse direction without loss from fragments, and frees the blades for use again. In freezing these blades in the blocks of ice the blades, it will be seen, have a double function. I may, however, as a modification, freeze into blocks of ice of any size a loop of cord to form a hand-hold, as in Fig. 4, which is to be permanently and rigidly incorporated in the block as a new article of manufacture, which hand-hold will greatly facilitate the handling of the ice on the part of both dealer and consumer.

I am aware that bars of metal have been frozen into blocks of ice to constitute a hold to handle them by; but they were not embedded in and designed to go with the smaller blocks of ice for retail purposes, but were only employed for handling the larger blocks, which were afterward subdivided and the metal bars removed. These, it will be seen, did not constitute a complete article of manufacture; and metal bars, moreover, would not be applicable for use as hand-holds in retailing, as they are liable to rust, are too expensive, and their conductivity would allow them to soon melt out. I therefore confine this feature of my invention to a block of ice provided with a flexible cord.

Having thus described my invention, what I claim as new is—

1. The method of subdividing large blocks of ice without loss, which consists in freezing rigid blades in said blocks, and then dividing the block by a blow upon the blade, as set forth.

2. The receptacles B for the non-congealable fluid, pivoted at their bottom, and having flexible inlet and outlet connections at the top, and immersed in and combined with the tank A for the fresh water, as and for the purpose described.

3. As a new article of manufacture, a block of ice having a piece of cord frozen into the same to constitute a permanent hand-hold, substantially as described.

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Witnesses:
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