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APPARATUS FOR MAKING CLEAR CAN ICE.

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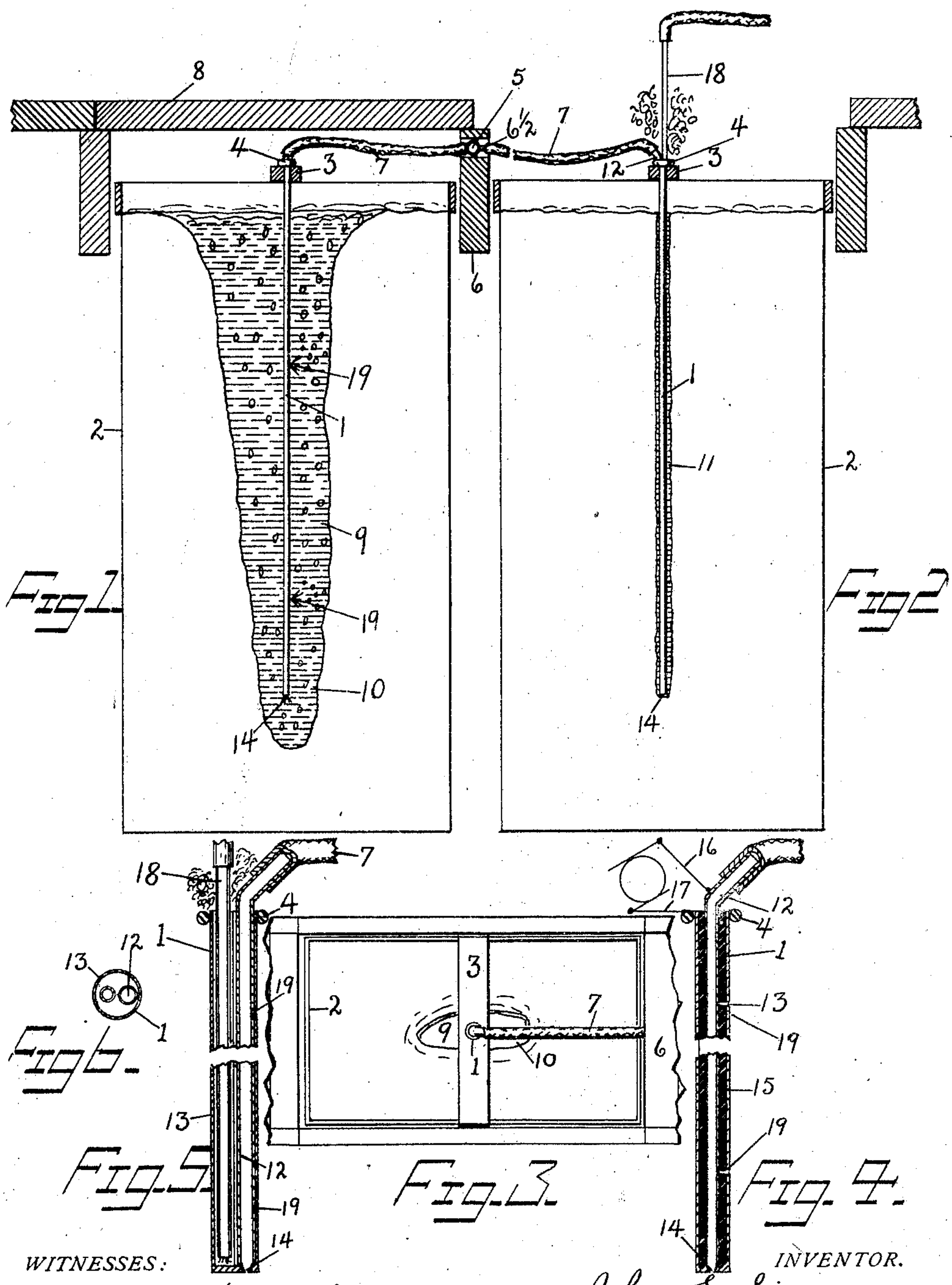

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APPARATUS FOR MAKING CLEAR CAN-ICE.

1,012,108. Specification of Letters Patent. Patented Dec. 19, 1911.

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To all whom it may concern:

Be it known that I, JOHN E. SIMON, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented an Improvement in Apparatus for Making Clear Can-Ice, of which the following is a specification.

This invention relates to the manufacture of ice in cans and is an improvement on the apparatus for which I obtained Letters Patent of the United States, No. 614,773, dated November 22nd, 1898. As will be seen by reference to said patent, air was injected into the water in the can which was being frozen, through the instrumentality of a flexible tube, terminating in a straight, rigid weight-tube. It has been found that the flexible tube of said patent permits the weight-tube to move about and swing in the water, on account of the air issuing therefrom with a certain amount of force. While thus moving or swinging, after the walls of the ice have attained considerable thickness and the remaining pocket, in the middle, which still contains water, has been reduced in size, the weight-tube sometimes comes into contact with the ice which forms the walls of the pocket and sticks and becomes firmly embedded in the ice, so that it cannot be removed without severing the block of ice. Consequently tubes have sometimes necessarily been left in the ice and lost to the manufacturer and have been detrimental to the appearance of the resulting ice block.

One of the objects of the present improvement is to obviate the difficulties just mentioned.

Other objects are, to thoroughly agitate the water while in process of freezing; to agitate the water, by means of air injected therein, near the bottom of the can; to inject the air at the center of the lower part of the can by means of a tube; to remove the air tube easily from the ice, and thus permit it to be frozen in; and to produce a solid, clear block of ice from plain water which has not been distilled or boiled, and save fuel.

The manufacture of can-ice, from water derived from the ordinary sources of supply, such as springs, wells, rivers, and reservoirs has generally resulted in an unsatisfactory product, because there are usually mineral, organic and gaseous impurities in such water. These become firmly locked in the embrace of the water crystals during the process of freezing, and when liberated at the time the ice is used may be objectionable or injurious to health. The air and other gaseous matter in the water being frozen is crystallized out in the form of minute globules, which are locked in the embrace of the crystals, and by reflection and refraction of the light which may pass through the ice block, impart objectionable whiteness to the ice. Artificial ice is therefore generally made from distilled water, but this is expensive and not always free from volatile impurities which may have passed over in the process of distillation. Furthermore, distilled water, when cold, readily absorbs circumambient gases, such as ammonia, so that the middle of the block may contain undesirable qualities from this cause. It has been found that these objectionable features are altogether eliminated by constantly agitating the water during the process of freezing and carrying the gaseous ingredients away by means of a vehicle such as air, kept constantly flowing through the water. It was also found that if the water was constantly agitated, mineral and organic impurities were crowded out by crystallization and constantly forced toward the middle of the can, while the gaseous impurities were carried off by the air which was kept constantly flowing through the water.

A further object is to accomplish these desirable results.

The objects mentioned have been attained by means of the apparatus illustrated in the accompanying drawings in which—

Figure 1 is a vertical sectional view; Fig. 2, a vertical sectional view, showing the air tube embedded in the ice and released; Fig. 3, a top plan view; Fig. 4 a vertical sectional view of the air tube arranged for heating by electricity; Fig. 5, a vertical sectional view of the air tube, and a steam tube applied thereto; and, Fig. 6 is a cross-section of Fig. 5.

Similar reference numbers refer to similar parts throughout the several views of the drawings.

A rigid metal tube, 1, is suspended in the middle of an ice can, 2, by means of a bar, 3, which rests upon the top of opposite sides of the ice can. The bar 3 is preferably a wooden board of approximately ⅝ of an inch in thickness and 2 inches wide. A hole, the size of the outside diameter of tube 1, is bored through the middle of bar 3, perpendicular to its widest plane. The tube 1 is inserted in this hole with a snug fit, so that the tube is rigid in the bar. A collar, 4, is secured on the upper end of tube 1, which forms a stop for the tube, to prevent its passing through bar 3. It will be understood that by this means tube 1 is kept in constant vertical alinement in the middle of the can. An air line is provided by a pipe, 5, embedded in a tank partition, 6, which is provided with nipples, 6½, over which are placed flexible tubes, 7, adapted to conduct air from pipe 5 to the upper end of tube 1. The flexible tube 7 and the upper end of tube 1 are so arranged that they come below and do not interfere with the tank covers, 8, which are customarily placed over the cans and which form the floor of the tank. By these instrumentalities air from pipe 5 is injected into the water, 9, in can 2, near the bottom of the can, so that it passes upward through the water in the form of bubbles, as shown in Fig. 1. As the ice forms on the walls of can 2 the walls of the ice block become thicker, and a pocket, 10, (Fig. 1) is formed in the middle of the block.

It will be understood that the rigid tube 1 cannot vibrate so as to come into contact with the walls of the pocket 10, and therefore the air will flow from the tube until the ice is frozen up to the end of the tube. When the pocket 10 contains only about two quarts of water, it is found that this water is heavily loaded with impurities and usually quite turbid. If the freezing operation were continued these impurities would no longer be crystallized out and there would be formed an objectionable core in the block of ice. The water in pocket 10 is, therefore, pumped out by means of a flattened tube, (not shown in the drawings), and the pocket may be filled with distilled water, which contains no air, and the freezing completed.

When the ice has formed about the lower end of tube 1 it becomes firmly embedded in the ice. The air tube 1 is therefore so constructed that it may be heated while embedded in the ice, so that the ice immediately in contact with the tube is melted, forming a thin film of water, as shown at 11, (Fig. 2). The tube 1 may then be easily withdrawn from the ice. The opening left by the tube is then filled with water, which is quickly frozen, resulting in a solid block of clear, pure ice.

To provide for the heating of tube 1, while still in the can embedded in the ice, the tube is constructed as more particularly illustrated in Figs. 4 and 5.

The modification of tube 1 shown in Fig. 4 is adapted for heating by means of electricity, and to this end the air tube comprises an inner air tube proper, 12, and an outer tube, 13. The tube 12 is soldered or otherwise secured to the tube 13 at its lower end, and somewhat contracted at 14, so as to form a nozzle, by which the air is forcibly projected downward into the water and agitates it. The lower end of tube 13 is closed, so that water is prevented from entering the space between the tubes.

Insulation, 15, is inserted between tubes 12 and 13. A conductor, 16, is connected with tube 12 and a conductor, 17, with tube 13, at the upper end of the tubes and with a suitable source of electric current. The tube 13 is formed of such thinness and material that it has sufficient resistance to the current to become suitably heated, while the tube 12 is made of such body and material that it conducts the current freely. It will thus be seen that when it is desired to remove the tube 1 from the ice, an electric circuit is completed through the tube, and the outer tube 13 becomes sufficiently heated to melt the ice immediately in contact therewith.

In the modification shown in Figs. 5 and 6, the inner tube 12 is fastened in the outer tube 13, similarly as in Fig. 4, but the outer tube 13 is somewhat larger in this case and tube 12 is placed against the inner wall of tube 13, so that a sufficient space is left in tube 13 for inserting a steam-tube, 18. In this case, when it is desired to remove tube 1 from the ice, tube 18 is inserted in tube 1, so that its lower end nearly reaches the bottom of tube 1 and steam, from a suitable source, not shown in the drawings, is injected into the outer tube 13 (Figs. 2 and 5). In the latter case it is preferred to make the outer tube 13 of tube 1 of brass or other good conductor of heat.

The wall of tube 1 is provided with one or more orifices, 19, to allow air to issue from tube 12 into the water 9. These orifices provide for the agitation of the water after the nozzle at the lower end of the tube has been frozen in and the air ceases to flow therefrom. By this means the pocket 10, after pumping out, may be filled with plain water and a clear, pure block of ice may be attained without any distilled water.

I also contemplate using a single tube extending to and making electrical contact with the bottom of can 2. This tube is made of tin plate or sheet steel, of such thinness as to be heated by an electric current. In this case only on pole need be applied to the tube, the current passing into the can and the brine tank.

I have preferred to filter and dry the air which is used through tube 12, because such air, being deprived of impurities is not liable to leave water of condensation in the tube and block up the nozzle 14, as moist air is.

Before removing tube 1 from the ice, tube 7 is removed from nipple 6½ of pipe 5 and both tubes are taken from the can together, when they may be laid aside and used again when the can is refilled.

It will be appreciated that by the method carried out with this apparatus, the water of which the ice is made need not be distilled and therefore a great saving is effected, and yet as pure and as clear ice is formed as that made from distilled water; in fact, distilled water frequently absorbs and carries in solution gaseous impurities which would be entirely removed by the apparatus described, and which are found in the ice made from such water in ordinary practice.

Having thus described my invention, so that any one skilled in the art pertaining thereto, may construct and use it, I claim—

1. In apparatus for making clear ice in cans, a tube for conveying air downward through the water in a can suspended in the can and provided with means for heating the tube.

2. In apparatus for making clear can ice, a tube suspended in an ice can provided with a compartment for conveying a fluid for agitating the water to be frozen and a compartment for means for heating the tube.

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