July 10, 1934. W. TAMM 1,966,150

DEVICE FOR PRODUCING ARTIFICIAL ICE

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Fig. 1.

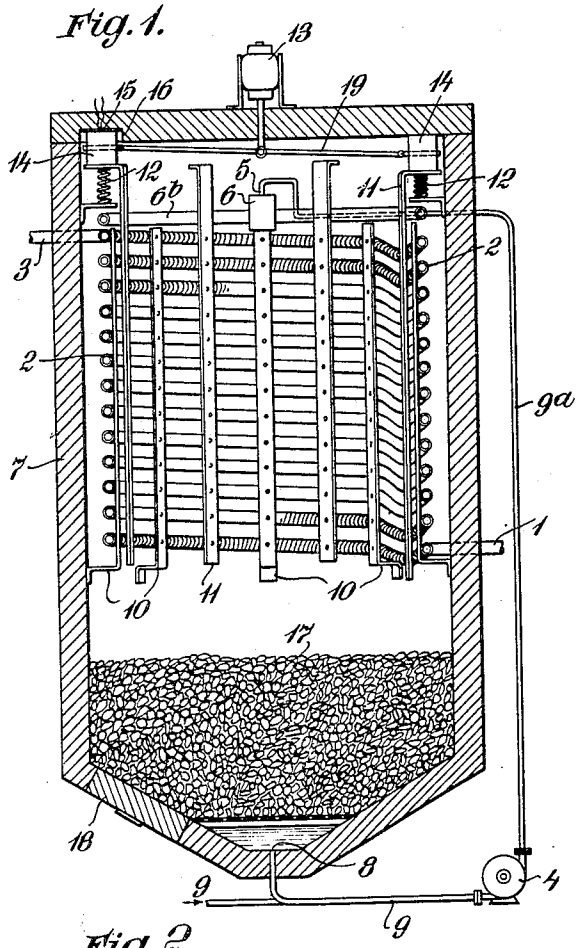
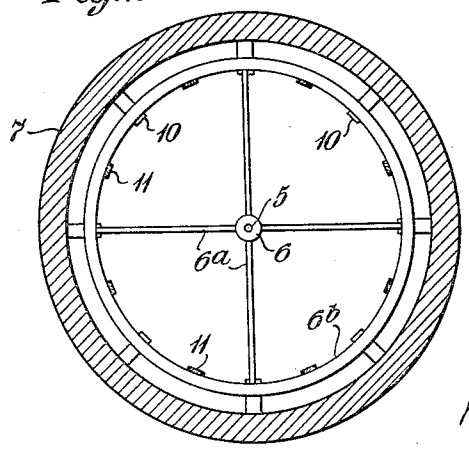


Fig. 2.



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DEVICE FOR PRODUCING ARTIFICIAL ICE

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6 Claims. (Cl. 62—105)

Besides the generally employed method of producing artificial ice in cells, several other methods have of late been proposed, the ice being manufactured in these other methods not in the form of oblong blocks, but in the shape of pieces resembling pieces of broken glass. In these other methods only a thin layer of ice is produced by bringing cold surfaces in contact with the water either by dipping the cold surface into the water or by making the water ripple over the cold surface. The thus produced thin layer of ice is removed from the cold surface either physically, viz. by thawing it off, or mechanically, viz. by any suitable mechanical means. Removing the ice from said surfaces by thawing entails relatively great losses by melting, and removing it mechanically is also connected with undesired drawbacks. If rollers having spikes on their circumferential surface are used, the rollers being rolled along upon and over the ice and the spikes being driven into it, the consumption of power for driving the spikes into the ice is relatively great. If, as is the case with another method, a cooled drum rotates in a water bath, the layer of ice is separated from the drum by deforming this latter by means of a suitable device introduced into the drum. As, however, only thin-walled drums can be deformed in this manner, brine must be used as cooling agent. Thus, direct evaporation which generally requires high internal pressure cannot be made use of in connection with the employment of brine. The refrigerating machine must, thus, be operated with a relatively low evaporation temperature, in consequence of which the last-mentioned method is expensive.

The present invention obviates the drawbacks from which the above-mentioned known methods suffer. Its chief characteristic feature is this that the cold surface on which the thin layer of ice is to be formed is constituted by the surface of a flexible metallic pipe, more especially of a flexible high-pressure metallic pipe, as are on sale in commerce. These pipes are either dipped into a water-bath or the water to be transformed into ice is made to ripple over them and in either case a refrigerating agent is conducted through the pipe. Separating the ice from the flexible pipe is effected by bending this latter to and fro, the ice which is unable to take part in the bending falling off in the form of irregular pieces resembling pieces of broken glass.

In order to make my invention more clear I refer to the accompanying drawing which shows diagrammatically and by way of example a constructional form of an improved apparatus for carrying my improved method into practice, Figure 1 showing a vertical axial section, and Figure 2 a horizontal transverse section through the same.

On the drawing, 2 denotes the spirally wound flexible pipe, into the lower end of which (at 1, Fig. 1) the refrigerating agent is introduced. The upper end of the helical pipe is connected (at 3, Fig. 1) with a refrigerating machine (not shown). The water to be transformed into ice is conducted upon the top of the helical flexible pipe and ripples down over the cold surface thereof; it is circulated by means of a rotary pump 4 which sucks that water which has not yet been transformed into ice away at 8 from the bottom of the receptacle 7 in which the helical pipe is housed through a pipe 9 and drives it upwardly through a pipe 9*a*, which terminates at 5 over a centrally located small vessel 6 from which the water flows through radial pipes 6*a* into a perforated annular distribution pipe 6*b* located just over the helical pipe 2.

The flexible pipe can be deformed by means of a mechanism which is designed as follows:

Alternate windings of the helical flexible pipe are connected with a certain plurality of vertical stationary bars 10 firmly secured to the inner wall of the receptacle 19, and the other alternate windings of the flexible pipe (which are those located between the windings affixed to the bars 10) are connected with vertical and vertically movable bars 11, the upper ends of which are angularly bent off, these bent-off ends resting upon helical compression springs 12. The bars 11 serve for deforming the windings of the flexible pipe so as thereby to break the thin layer of ice formed upon them into pieces which fall down into the lower portion of the receptacle 19, as shown at 17 in Fig. 1. The pieces can be removed through a large bottom hole after a closing member 18 of that hole has been removed.

The bars 11 can be depressed, counter to the pressure of the springs 12, by rolls 14 attached to the ends of a rod 19 which is suspended from the lower end of the shaft of an electromotor 13 mounted upon the top of the receptacle 7. The rod 19 is hinged to the electromotor shaft and can assume an oblique position, as shown in Fig. 1. It assumes this position when one of the rolls arrives at a recess 16 in the receptacle top in which recess a contact 15 is located. When a roll enters into said recess, it operates the contact 15, that is to say, it switches the electromotor off. The electromotor works only intermittently, as a certain short period of time must

be left after every circulation of the rolls 14 so that another layer of ice can form upon the helical windings of the flexible pipe during that time.

When a roll 14 arrives over a bar 11, it compresses the appertaining spring 12 and depresses the respective bar 11 in order to break the layer of ice into pieces, as has already been mentioned. When the roll has left that bar this latter is lifted by its spring so that these parts reassume their former normal position. One revolution of the rolls 14 is sufficient to free all windings of the flexible pipe from the ice that has formed upon it. Then an interruption takes place and when the next layer of ice has formed, the motor is again started.

I claim:

1. A device for producing artificial ice in the form of pieces resembling broken glass, comprising, in combination, a helically wound flexible pipe, stationary bars located parallel to the axis of the helical pipe and being connected with alternate windings of the same, movable bars also arranged parallel to said axis and being connected with the other windings of the helical pipe, means for reciprocating said movable bars, means for conducting a refrigerating agent through the said pipe, and means for conducting water over it.

2. A device for producing artificial ice in the form of pieces resembling broken glass, comprising, in combination, a helically wound flexible pipe, stationary bars located parallel to the axis of the helical pipe and being connected with alternate windings of the same, movable bars also arranged parallel to said axis and being connected with the other windings of the helical pipe, compressive springs holding said movable bars, means for compressing said springs and depressing at the same time said movable bars, means for conducting a refrigerating agent through the said pipe, and means for conducting water over it.

3. A device for producing artificial ice in the form of pieces resembling broken glass, comprising, in combination, a helically wound flexible pipe, stationary bars located parallel to the axis of the helical pipe and being connected with alternate windings of the same, movable bars also arranged parallel to said axis and being connected with the other windings of the helical pipe, compressive springs holding said movable bars, circulating rolls so arranged as to be adapted to compress said springs successively and to depress simultaneously therewith the appertaining movable bars, means for causing the water to be transformed into ice to ripple over the helical pipe, and means for maintaining the latter at an appropriately low temperature.

4. A device for producing artificial ice in the form of pieces resembling broken glass, comprising, in combination, a helically wound flexible pipe, stationary bars located parallel to the axis of the helical pipe and being connected with alternate windings of the same, movable bars also arranged parallel to said axis and being connected with the other windings of the helical pipe, compressive springs holding said movable bars, circulating rolls so arranged as to be adapted to compress said springs successively and to depress simultaneously therewith the appertaining movable bars, means supporting said rolls, and means for driving them round, means for causing the water to be transformed into ice to ripple over the helical pipe, and means for maintaining the latter at an appropriately low temperature.

5. A device for producing artificial ice in the form of pieces resembling broken glass, comprising in combination a single flexible metallic pipe wound into helical shape, means for deforming said pipe axially in opposite directions, means for conducting a refrigerating agent through it, and means for conducting the water to be transformed into ice over it.

6. A device for producing artificial ice in the form of pieces resembling broken glass comprising in combination a casing, a single flexible metallic pipe arranged in a helical form within the casing, means for fixing portions of the pipe in the interior of the casing, means mounted in the casing for deforming said pipe axially in opposite directions at intervals, means for conducting a refrigerating agent through said pipe, means for conducting the water to be transformed into ice over said pipe, and means for facilitating the removal of the pieces of ice from the casing.

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