

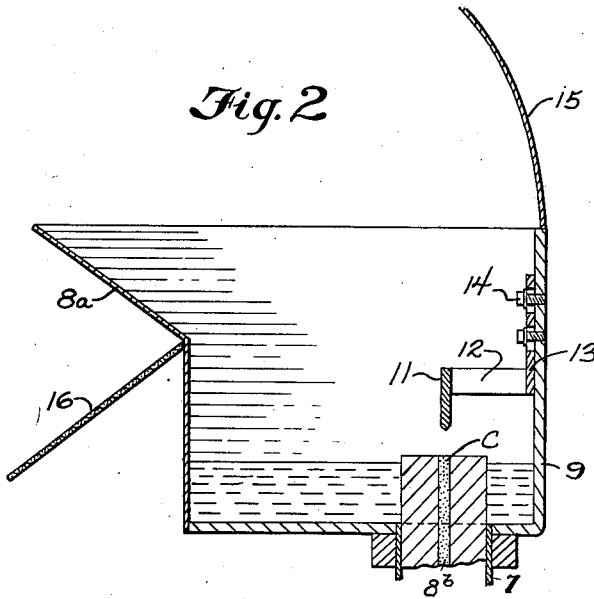
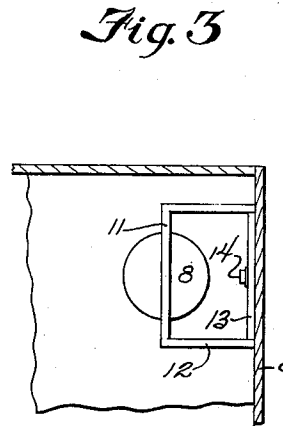
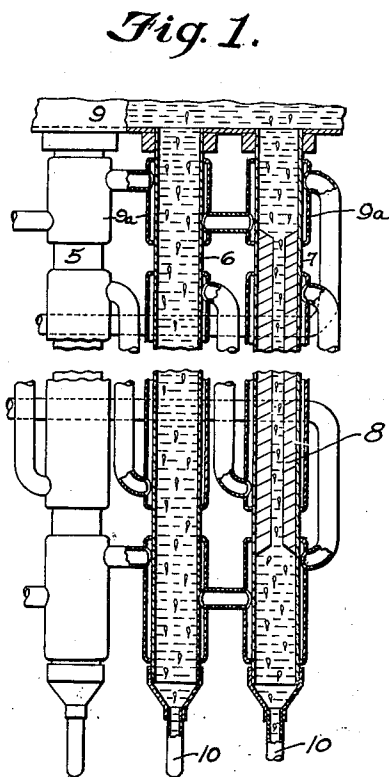
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METHOD OF AND MEANS FOR CRUSHING OR CRACKING ICE

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METHOD OF AND MEANS FOR CRUSHING
OR CRACKING ICE

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10 Claims. (Cl. 62-105)

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This invention relates to the art of automatically making and, if desired, continuously delivering ice in the broken or crushed form such as is ordinarily used in restaurants, soda fountains, bars and like places dispensing cold drinks. The invention is not limited to the field indicated but its principles may be employed in domestic ice making machines or refrigerators, the automatic icing of food stuffs in transit, or in any other field where it may be found applicable.

The present invention relates particularly to a modified form of ice crushing means and this application is a continuation-in-part of the inventions disclosed in applications Serial No. 95,112, Method of and Means for Freezing Ice in Small Masses, filed by us on May 24, 1949, now Patent No. 2,597,008, and Serial No. 142,392, Ice Making Machine and Method, filed by us on February 4, 1950, now Patent No. 2,595,588.

In each of the applications aforesaid the principle involved is the freezing of ice into relatively long columns in open ended tubes, thawing the ice enough to release the columns from the tubes and then introducing pressure beneath the columns of ice in such degree as to propel them from the tubes and against breaking elements of such form as to break the ice into a multiplicity of smaller pieces.

Application Serial No. 95,112, now Patent No. 2,597,008, discloses a breaker plate associated with each tube and lying at such an angle with respect to the axis of the tube that the upper ends of the columns of ice, impinging thereagainst, are successively snapped off by lateral deflection under the momentum of the ice column.

Application Serial No. 142,392, now Patent No. 2,595,588, also discloses the successive breaking off of the columns by lateral deflection and in addition discloses, among other improvements, a crushing device which may be employed as an alternative to the breaking element at the outlet end of one or more of the freezing tubes, the particular form of crushing device illustrated comprising a pair of crushing rollers.

The present application departs from the disclosure of the latter application in that the forcible movement of the ice columns out of the tubes is utilized to crush the ice by causing the columns to strike a stationary knife edge or the like positioned in the path thereof close to the outlet end of the tube. This provides a simple and effective crushing means for reducing the columns into crushed or cracked ice ready for use in glasses of cold drinks or any of the other purposes for which such ice is ordinarily employed. This

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application and its claims are intended to define a structure wherein the nature of the knife edge or equivalent abutment is such, that instead of snapping off the ice columns into a multiplicity of pieces of unimpaired diameter, there is a lateral separation or bursting asunder of the ice. To effect this result the knife edge is disposed across the diameter of the ice column and acts with equal force over the diameter of the exposed end of the column. Since the length of the columns and freezing tubes is very much greater than the distance from the tops of the tubes to the splitting or shattering knife edge, it follows that after the outer end of the tube has been split off and laterally discharged, additional fresh portions of the ice columns will be brought forcibly into engagement with the knife edges because air pressure is still being exerted beneath the lower ends of the ice columns through pipes

10.
In the accompanying drawing:

Fig. 1 is a face view of three of the freezing tubes with one of the tubes in elevation, with the water in one tube unfrozen and with the water in the last tube partially frozen;

Fig. 2 is a transverse sectional view through one of the tubes showing an ice column just starting to move out of the top thereof; and

Fig. 3 is a plan view of one of the splitting and cracking blades.

Referring to the drawing 5, 6 and 7 designate three of the tubes of a multiple tube freezing machine. In tube 6 the water is not yet frozen. In tube 7 it is shown partly frozen into an ice column 8 but the central core has not yet been frozen and air bubbles are shown as circulating therethrough to cause the ice to freeze into clear and cloudless ice. The upper ends of the tubes are open and enter into the bottom of a water pan 9 from which they are filled at the proper time. The tubes are surrounded by jackets 9a through which a refrigerant and a thawing medium are alternately passed, to alternately freeze and then release the ice columns. Air under pressure introduced through pipes 10 into the lower ends of the tubes acts to eject the columns forcibly and speedily from the tubes.

All of the foregoing is disclosed in our application Serial No. 142,392 aforesaid. According to this invention we utilize the momentum of the ejected columns to crush or crack the ice by disposing across the line of travel of the ice columns through the tubes and, preferably centrally across the tubes and very close to the outlet ends thereof, sharp knife like blades 11. These blades

are supported by spaced arms 12 from plates 13. These plates may be adjustably mounted upon the wall of pan 9 by slot and bolt mountings 14. Such crushers may be employed with all of the tubes in a machine or with any one or more of them as may be desired.

While the knife like blades 11, disposed substantially centrally across the tubes act with a more or less splitting action to shatter and reduce the ice columns the invention contemplates the use of an abutment of any shape disposed across and relatively close to the ends of the tubes and shaped to shatter the ejected ice into pieces materially smaller in their transverse dimensions than the columns of ice from which they are formed. This yields ice of smaller dimensions than the snap off action of the deflector plates of our application Serial No. 95,112, for example.

A deflector 15 is placed over the pan to deflect flying ice over lip 8a, it being then directed by a screen or other suitable guide 16 into a bin (not shown).

It is to be understood that the invention is not limited to the precise construction set forth herein but that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described our invention what we claim is:

1. The herein described method of manufacturing crushed or cracked ice which consists of freezing water in elongated tubes to form elongated columns of ice, forcibly ejecting said columns from the tubes and splitting the columns of ice under the momentum of said columns and successively throughout the movement of ejection of said columns.

2. In an ice machine of the character in which columns of ice are frozen in elongated tubes and then forcibly ejected therefrom, a stationary head on crushing or cracking member disposed in the path of movement of an ejected ice column in close proximity to the outlet end of the tube, said member forming an abutment lying across the end of the ice column and being shaped to break up said column into a multiplicity of smaller pieces in the form of crushed or cracked ice of smaller diameter than said column by successively shattering the end portion of the column across its diameter as it moves by its own momentum into engagement with said member.

3. The herein described method of manufacturing ice in small pieces which consists of freezing water in elongated tubes to form elongated columns of ice, forcibly ejecting said columns from the tubes and splitting the columns of ice asunder under the momentum of said columns.

4. In an ice machine of the character in which columns of ice are frozen in elongated tubes and then forcibly ejected therefrom, a splitting member disposed in the path of movement of an ejected ice column shaped to split said column into a multiplicity of smaller pieces by successively splitting asunder the end portions of the column into pieces smaller than the diameter of the column as it moves by its own momentum into engagement with the splitting member and means

imposing an ejecting force upon the lower end of the ice columns of such duration and intensity as to effect such splitting under the bodily movement of the ice column against the said member.

5. A structure as recited in claim 4 wherein the splitting member comprises a knife like blade disposed transversely across the line of travel of the ice column.

6. A structure as recited in claim 4 wherein the splitting member comprises a knife like blade disposed transversely across the line of travel of the ice column and substantially centrally across the tube from which the column moves.

7. A device of the character described comprising a water pan, an open ended refrigerating tube opening therein, a knife like blade within said pan and extending laterally across said tube means for supporting said blade and means for introducing ejecting pressure into the lower end of the tube.

8. A device of the character described comprising a water pan, an open ended refrigerating tube opening therein, a knife like blade within said pan and extending laterally across said tube means for supporting said blade from the wall of the pan and means for introducing ejecting pressure into the lower end of the tube.

9. A device of the character described comprising a water pan, an open ended refrigerating tube opening therein, a knife like blade within said pan and extending laterally across said tube means for adjustably supporting said blade from the wall of the pan and means for introducing ejecting pressure into the lower end of the tube.

10. In an ice machine of the character described in which columns of ice are frozen in elongated tubes and then forcibly ejected therefrom, a stationary abutment disposed in the path of movement of an ejected ice column, said abutment lying in close proximity to the outlet end of the tube and engaging the ice column entirely across its end portion and being so shaped as to successively shatter the end portions of the ice column into masses of relatively finely cracked ice of smaller transverse dimensions than the columns of ice from which they are formed and under the momentum of the ice column out of its tube and means for introducing a pressure fluid beneath the ice column of such intensity and through such period of time as to forcibly eject substantially the entire column of ice.

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