April 13, 1954 A. J. GIORDANO 2,674,861

DEVICE FOR FRAGMENTING ICE

Filed July 26, 1950 3 Sheets-Sheet 1

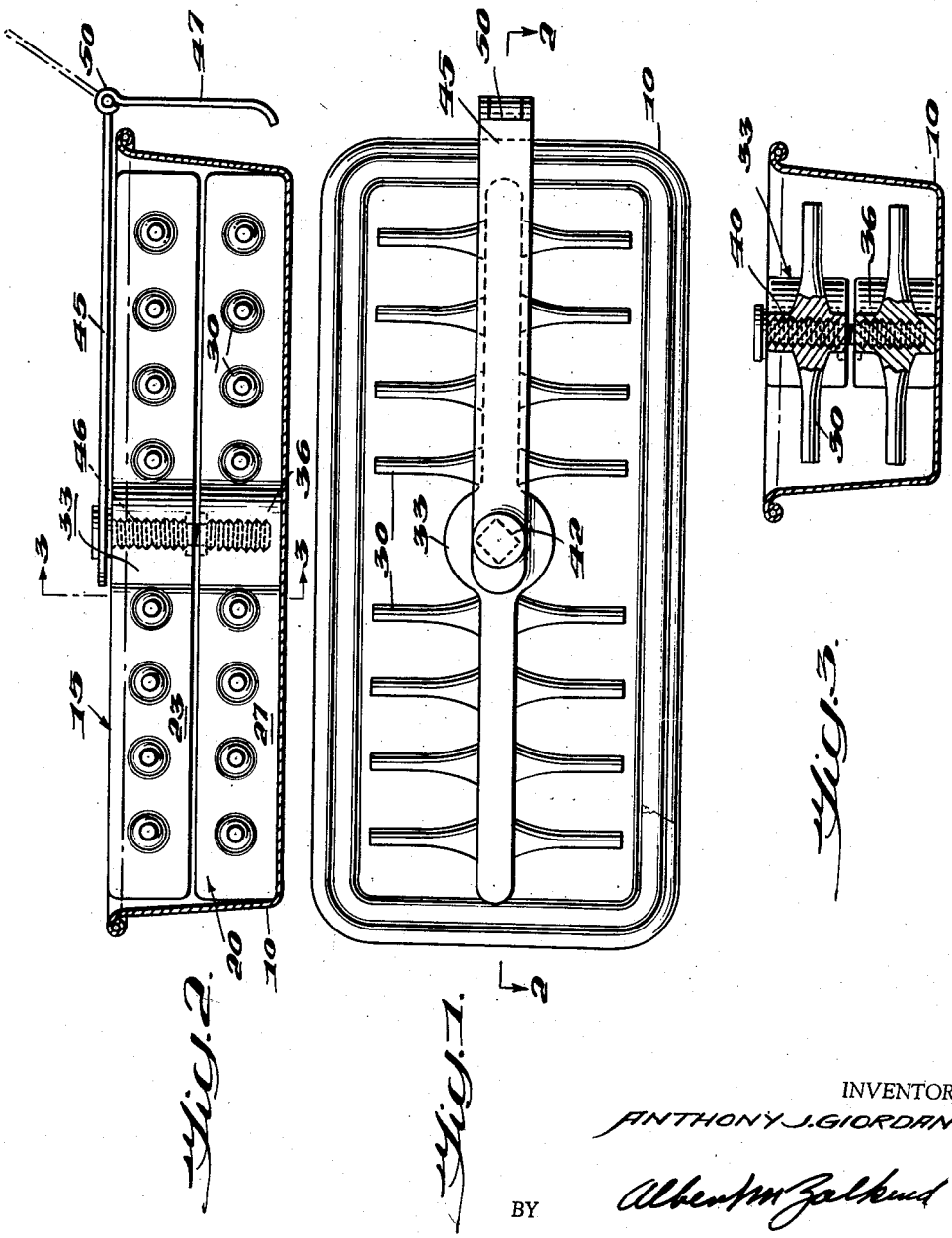


Fig. 2.

Fig. 1.

Fig. 3.

INVENTOR
ANTHONY J. GIORDANO

BY Albert M. Zalkind

ATTORNEY

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Filed July 26, 1950 3 Sheets-Sheet 2

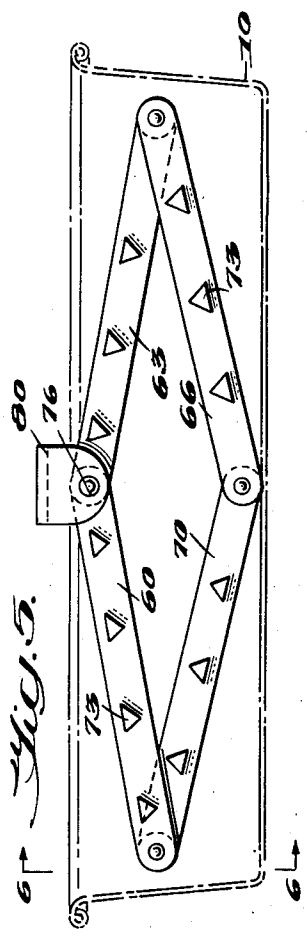


Fig. 3.

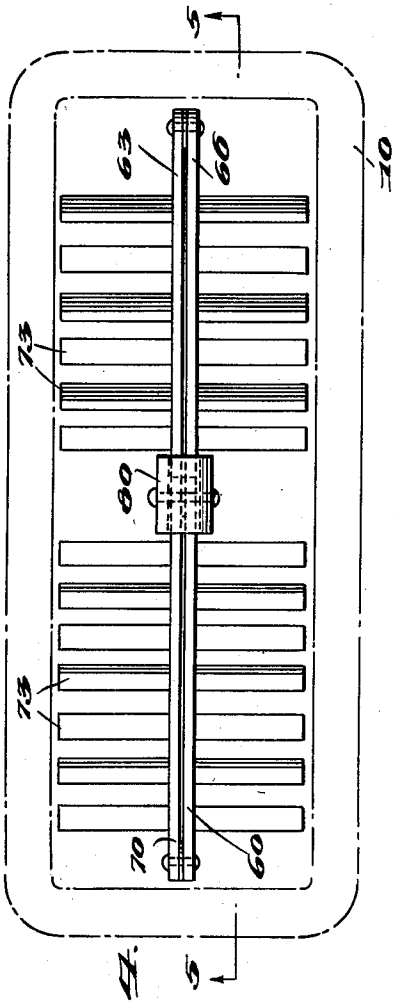


Fig. 4.

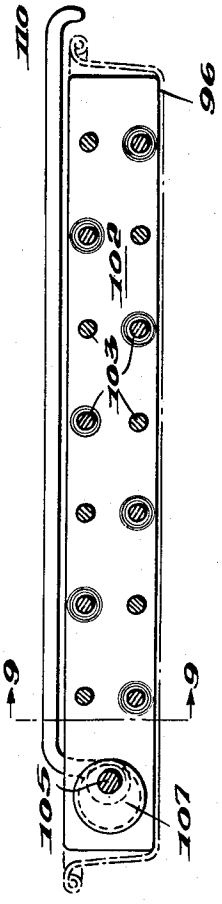


Fig. 8.

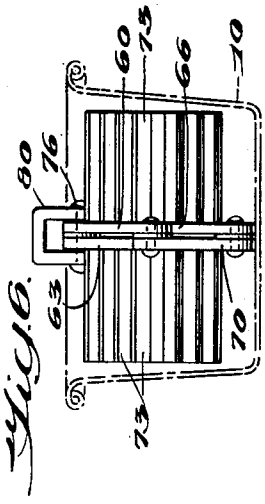


Fig. 6.

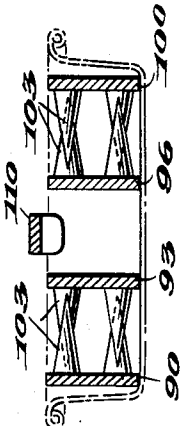


Fig. 9.

INVENTOR

ANTHONY J. GIORDANO,

BY Albert M. Galkin

ATTORNEY

April 13, 1954 A. J. GIORDANO 2,674,861

DEVICE FOR FRAGMENTING ICE

Filed July 26, 1950 3 Sheets-Sheet 3

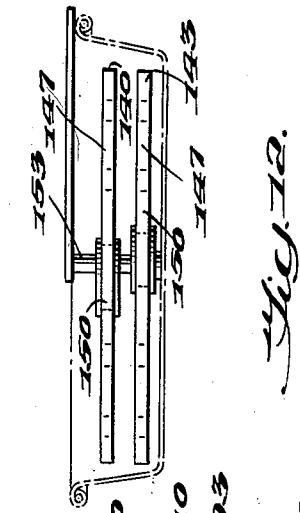


Fig. 12.

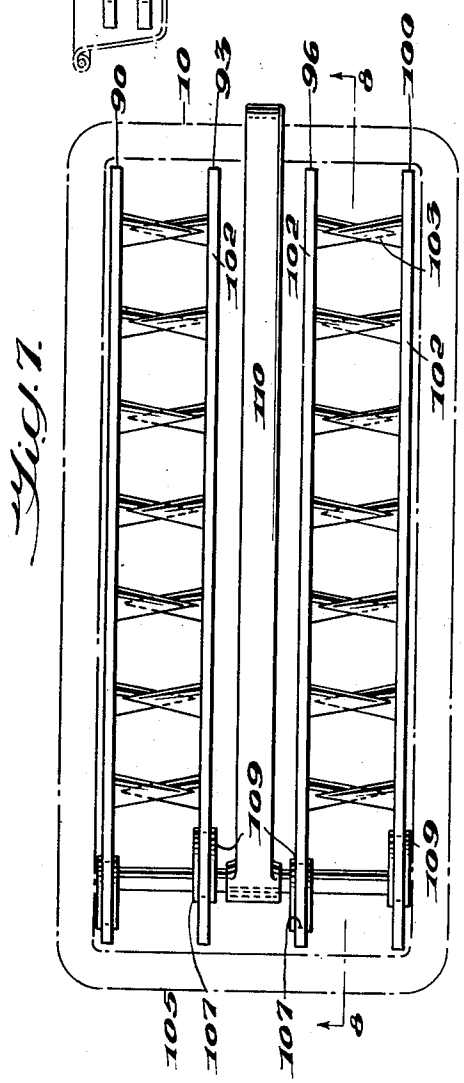


Fig. 7.

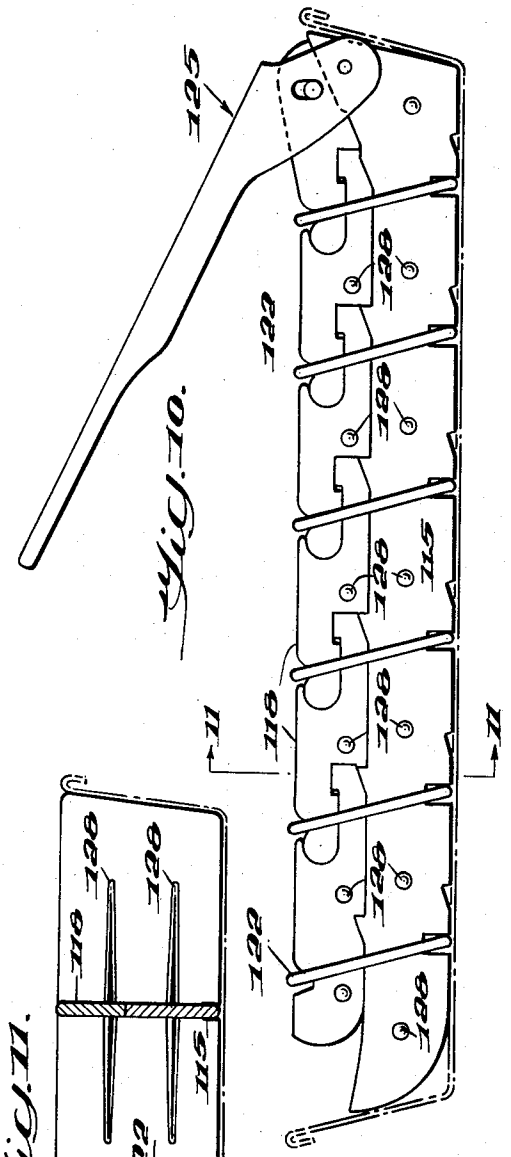


Fig. 10.

Fig. 11.

INVENTOR
ANTHONY J. GIORDANO,

BY Albert M. Zalkind

ATTORNEY

Patented Apr. 13, 1954

2,674,861

UNITED STATES PATENT OFFICE

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DEVICE FOR FRAGMENTING ICE

Anthony J. Giordano, Arlington, Va., assignor of twenty-five per cent to Albert M. Zalkind, Arlington, Va.

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16 Claims. (Cl. 62—108.5)

1

This invention relates to devices for fragmenting ice and more particularly to an ice tray having an actuatable grid comprising breaker elements for fragmenting a block of ice frozen in the tray.

It is an object of my invention to provide a combination ice tray and grid such that broken pieces of ice can be procured without the necessity of performing the conventional process of removing ice from a tray and subsequently pounding it into fragments with a mallet.

It is another object of my invention to provide a construction having high durability and affording easy operation.

It is a further object of my invention to provide a device essentially simple in nature and which can be readily mass produced.

In general, my invention comprises the provision of a plurality of groups of breaker elements within an ice tray adapted to be embedded in an ice block formed therein. These breaker elements may be in the form of spikes or bars or may even be perforations in plates. But whatever their form, the invention contemplates moving a group of breaker elements with respect to another group of breaker elements, by either moving one of such groups while the other group remains stationary, or simultaneously moving both groups.

Thus, since the groups are below the ice surface they exert rupturing forces on the ice block in at least one and preferably a variety of directions, to the end that the block will be well shattered or fragmentated. While it is preferable that simultaneous motion is provided for the groups of breaker elements, I have found that mere relative motion between two groups is sufficient. For example, where one group is held stationary and the other group is moved, the stationary group serves to take the reactive stress of the moving group so as to prevent motion of the ice block along therewith, while at the same time serving as points of fissure to aid in fragmenting the block.

Other objects and features of my invention will be apparent from the detailed description which now follows, taken in conjunction with the appended drawing in which,

Figure 1 is a plan view of one form of my device,

Figure 2 is a section through 2—2 of Figure 1,

Figure 3 is a section through 3—3 of Figure 2,

Figure 4 is a plan of another form of my device,

Figure 5 is a section through 5—5 of Figure 4,

Figure 6 is a section through 6—6 of Figure 5,

2

Figure 7 is a plan of a third form of my invention,

Figure 8 is a section 8—8 of Figure 7,

Figure 9 is a section through 9—9 of Figure 8,

Figure 10 is a longitudinal section through a fourth modification,

Figure 11 is a section 11—11 of Figure 10; and

Figure 12 is a sectional view illustrative of a fifth form of my invention.

Referring now to Figures 1–3, my device comprises a freezer tray 10 in which are a pair of grids 15 and 20. Each of the grids consists of a central panel 23 and 27 respectively from which protrude a plurality of breaker elements 30, the panels being spaced from each other as shown. It is contemplated that the panels and their respective breaker elements will be integrally cast so as to form a very strong and rigid structure. The breaker elements are elongated spike-like members of generally tapered form so as to be readily separable from ice fragments.

The panels are provided centrally with thickened portions or hubs 33 and 36 respectively, and intermediate the thickened portions or hubs is disposed a screw 40 having right-hand threaded engagement in the hub upper 33 and lefthand threaded engagement in the lower hub 36. The upper end of the screw 40 is squared at 42 for engagement with a similarly shaped cutout in the end of a lever 45. The construction is such that the lever is permanently attached to screw 40 which can be rotated by swinging the lever in a horizontal plane. A handle element 47 is pivotally secured to lever 45 at 50, whence it can be swung upwardly for affording a firm grasp to rotate the lever to the dotted position shown and also serves to increase the leverage effect. Normally handle 47 hangs downwardly and terminates short of the bottom of the tray.

It will be noted that the breaker elements 30 are all below the expected ice surface which is indicated by the dot-dash line in Figure 2 and Figure 3 and thus as an ice block is formed in the tray the breaker elements become embedded therein. Accordingly, if lever 45 be rotated in a horizontal plane, it will serve to force the grids 15 and 20 towards each other thereby rupturing the ice in many fragments. Owing to the use of the screw, an extremely heavy force may be exerted.

In the particular modification just described relative motion could be effected by providing separation movement of the grids, depending on the direction of rotation of lever 45. Such deviation would, of course, necessitate a slight initial

spacing between the base of panel 27 and the bottom of the tray so as to provide space for the grid 20 to move into. Such a space could easily be provided by resting the lower hub 36 on a soft rubber washer or other soft cushioning material which would yield as grid 20 was forced downwardly.

In the form of the invention shown in Figures 4 through 6, I provide a quadrilateral linkage of grids wherein the link elements 60, 63, 66, and 70 are pivotally joined, as by rivets, at their extremities, clearly illustrated in Figure 5. Each of the links carries a plurality of breaker elements 73, in this instance of triangular cross-section, and the upper joint, that is, the joint which pivots link 60 with link 63, has secured thereto by the rivet 76, a metal, U-shaped anvil member 80. Thus, if the top surface of the anvil be struck with a hammer, relative motion between the four links will occur and their integral breaker elements 73 will be actuated in directions determined by the linkage, to thereby crack up the ice block. It is noted that the arrangement is such that all the breaker elements are embedded in the ice block as heretofore described in connection with the previous form of the device.

The triangular cross-section of the breaker element 73 provides cutting edges in a variety of directions so that as the links receive the shock impact from the anvil 80 a large number of fissures are instantaneously formed in the ice to readily expedite the complete cracking up into a large number of fragments.

It should, of course, be noted that this form of the invention is not limited to percussive action but could easily be adapted for a mechanical action of the screw type as heretofore described in connection with Figures 1–3 for causing relative motion of the linkage system.

The modification shown in Figures 7 through 9 comprises a plurality of grids 90, 93, 96, and 100 disposed in parallel spaced relation and standing vertically in the tray. Each grid consists of a panel 102 carrying conically shaped breaker elements 103. The construction is such that the breaker elements of one panel are disposed in vertical alignment and staggered relation with the breaker elements of the adjoining panel as will be seen clearly from Figure 8, wherein the cross-hatching of the breaker elements indicates by similar slant the particular elements attached to respective panels. The panels are motivated by a cam shaft 105 carrying eccentrics 107 which engage in perforations in the respective panels 102. The eccentrics are formed with flanges 109 to maintain them secured to their respective panels, and it is contemplated that the flanges will be formed by swaging in assembling the device. The shaft 105 is preferably cast integrally with the eccentric portions 107. A lever 110 is keyed to shaft 105 for rotation thereof.

By referring to Figure 7 it will be noted that alternate eccentrics are disposed in opposite directions. Thus if lever 110 be raised, rotation of the eccentrics will compel motion of their respective panels 102 in such a direction that the alternately disposed panels will move in the same direction while the other two panels will move in the opposite direction. Simultaneously, a lifting effect will be experienced on grids 93 and 100.

In such manner the ice block will receive the thrusts of the breaker elements 105 in a variety of directions, and will consequently be well fragmented.

The form of the invention shown in Figures 10 and 11 contemplates the use of a conventional grid, now commercially obtainable, which consists of a lower panel 115 and a plurality of smaller panels 118 superposed edge to edge on the lower panel. A series of transverse panels 122 are secured to the longitudinal panels by a slotted arrangement as shown, while a link and lever arrangement generally designated at 125 is utilized to successively actuate the smaller panels and their respective transverse panels for releasing cubes frozen between the transverse panels. As heretofore indicated, the construction thus described is well known and accordingly no further detailed description of the elements or actuation is deemed necessary here. However, the embodiment is shown for the purpose of illustrating how my invention can be incorporated therein by providing a series of transverse breaker elements 128 secured in, and carried by, the various panels of the conventional grid. The combination, including my breaker elements, has been found to effectively fragmentate the ice cubes upon operation of the lever, and an advantage of this particular form of my invention resides in the fact that no high stresses are experienced owing to the successive operation provided for the panels 118 as the lever is pulled, whereas in the prior forms of my invention a group of ice breaker elements are simultaneously actuated, thereby occasioning, of course, fairly heavy stresses in the mechanism.

Another form of my invention is illustrated in Figure 12 showing a longitudinal view through a freezer tray wherein are utilized a pair of horizontal spaced plates 140 and 143 having a plurality of perforations 147 therein, which perforations may be aligned or staggered with respect to each other as between the plates. The plates are motivated by a cam arrangement similar to the form of the invention shown in Figures 7 through 9 wherein a pair of eccentrics 150 are secured to a shaft 153 so that rotation of the shaft will cause relative motion of the plates. Any suitable means of rotating the shaft may be utilized; for example, a lever similar to the lever 45 of Figures 1 through 3 engaging the squared end of shaft 153. In the form of the invention just described the ice block freezes in and around the plates 140 and 143 and thus relative motion of the plates in their respective horizontal planes serves to provide a large number of severed fragments. If desired, the edges of the perforations may be beveled to form cutting edges and, further, a plurality of spike-like breaker elements similar to those heretofore described; for example, as shown in Figure 7, may be secured to the plates and extend therefrom in vertical directions.

It will be appreciated that many variations of my invention are possible; for example, spikes may be provided in various lengths and shapes and different forms of mechanisms may be devised for moving groups of spikes in predetermined directions. Further, a single moving grid such as shown in Figures 1, 5, 7 or 12 could be utilized. In such case the equivalent of another grid, to take the reactive stress, could be effected by securing suitable breaker elements, similar to the spikes described herein, to the walls of the tray.

Accordingly, I do not seek to be limited to the

specific illustrations herein described except as set forth in the appended claims.

I claim:

1. A device for fragmenting ice comprising a freezer tray, a pair of grids comprising breaker elements disposed in said tray below the expected ice surface, a screw engaging said grids and being rotatable for effecting relative motion of said grids.

2. A device for fragmenting ice comprising a freezer tray, a pair of grids disposed within said tray below the expected ice surface, and means for effecting relative motion of said grids with respect to each other comprising a screw element intermediate said grids, and a lever for turning said screw element.

3. A device as set forth in claim 2 wherein said lever is fastened at one end to said screw element and extends outwardly therefrom beyond an edge of said tray, including a handle element pivotally secured to the outer end of said lever.

4. A device for fragmenting ice, comprising a plurality of grids pivotally joined to each other, each of said grids carrying a plurality of breaker elements extending transversely of the plane of pivotal motion of said grids and means for moving said grids with respect to each other.

5. A device for fragmenting ice comprising a plurality of grids, each of said grids comprising a plurality of breaker elements and means for moving said grids with respect to each other when said breaker elements are substantially embedded in ice, wherein said means comprises a cam shaft passing through said grids and having eccentric elements engaging respective grids whereby rotation of said shaft is effective to move said grids in directions determined by the disposition of said eccentric portions.

6. A device for fragmenting ice comprising a plurality of grids disposed in spaced relation and comprising spikes extending into the space between respective grids, and means for moving said grids with respect to each other.

7. A device for fragmenting ice comprising a freezer tray, a plurality of breaker elements in said tray, means for holding said elements in position completely below the edge of said tray, said means comprising a system of links joined together and movably related to each other, including means for applying force to said link system for actuation thereof to simultaneously move said elements in respective directions having opposed components so as to exert tensile forces within an ice block in said tray for fragmenting said block.

8. A device for fragmenting ice including an ice tray comprising a plurality of links forming a linkage system, each of said links carrying a plurality of breaker elements disposed so as to be embedded completely in an ice block substantially below the top of said tray and means for applying a motivating force to said linkage system for effecting relative motion of said breaker elements with respect to each other.

9. A device for fragmenting ice, comprising a freezer tray, a plurality of groups of transversely extending rod-like elements disposed in said tray below the top edge thereof so as to be completely embedded in ice and means for moving said elements with respect to each other for fragmenting said ice.

10. A device for fragmenting ice, comprising a freezer tray, a pair of grids in said tray, each grid carrying a set of breaker elements, means interconnecting said grids so as to move them with respect to each other wherein the sets of breaker elements are relatively movable with respect to each other to fragment ice in said tray.

11. A device for fragmenting ice comprising a freezer tray, a pair of superposed grids in said tray, each of said grids comprising respective sets of breaker elements extending substantially into the ice-freezing space of said tray, and means for forcing said grids to move with respect to each other so as to provide motion of the respective breaker element sets with respect to each other for fragmenting ice in said tray.

12. A device for fragmenting ice comprising a plurality of breaker elements and means for holding said elements in the freezing space of an ice tray, wherein said elements are arranged in a plurality of horizontal planes, including means for moving said elements with respect to each other for fragmenting ice.

13. A device for fragmenting ice comprising a plurality of rod-like breaker elements, means for supporting said elements in the ice-freezing space of an ice tray, wherein said elements extend substantially into the ice-freezing space and means for moving said elements with respect to each other for fragmenting said ice.

14. A device as set forth in claim 13, wherein said elements are disposed in different planes.

15. A device as set forth in claim 13, wherein said means for supporting said rod-like elements comprises a series of plates disposed so as to extend substantially across one dimension of an ice tray, said rod-like elements being secured to respective plates and extending from the sides thereof, the means for moving said elements comprising links engageable with respective plates and manually movable so as to engage said plates successively whereby respective elements are motivated successively.

16. A device as set forth in claim 15, wherein said links carry additional rod-like elements.

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