Oct. 10, 1944. L. L. MALLARD 2,360,249

ICE CUBE TRAY

Filed May 4, 1939

Fig. 1.

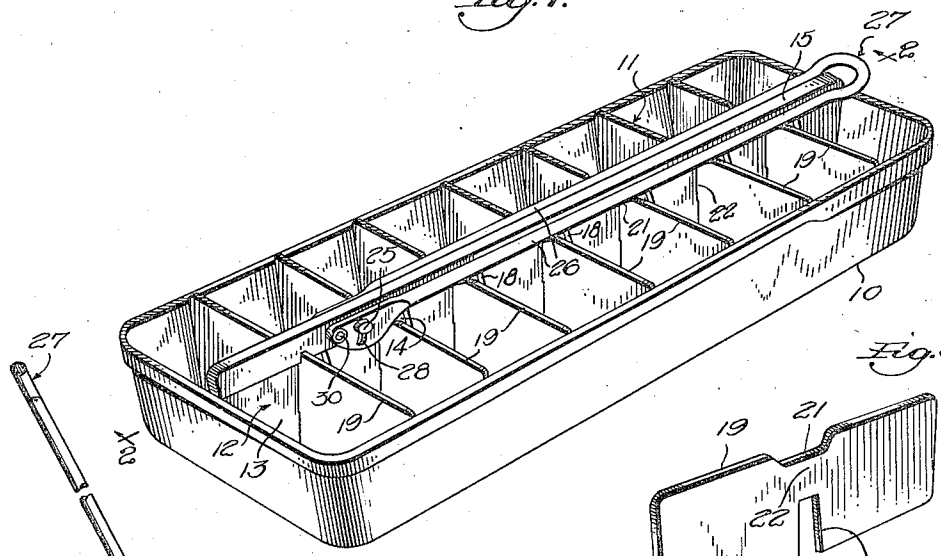


Fig. 5.

Fig. 2.

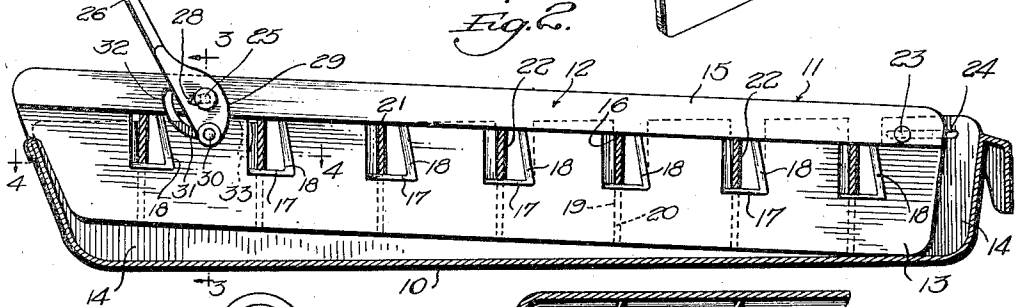
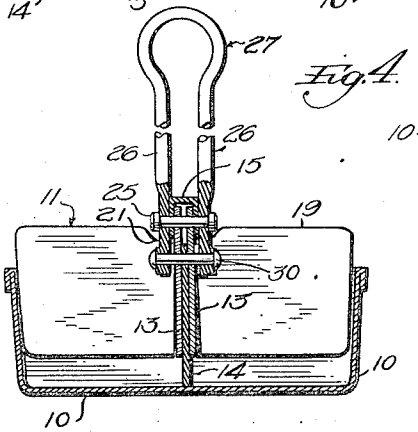


Fig. 4.



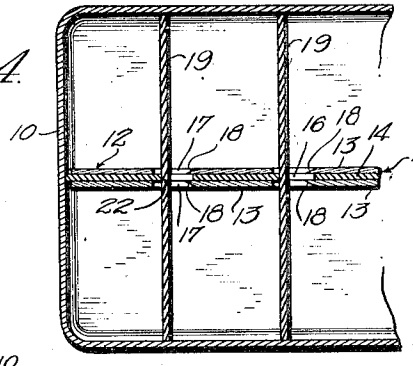


Fig. 3.

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ICE CUBE TRAY

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Application May 4, 1939, Serial No. 271,781

20 Claims. (Cl. 62—108.5)

This invention relates to ice cube trays for refrigerators.

As is well known, it has been the practice for a number of years to furnish mechanical refrigerators with rubber or metal trays, the former being advantageous because of the relatively easy removal of the cubes and the latter being advantageous for the reason that they permit much more rapid freezing of the ice. In the metal trays, it is difficult to remove the cubes and it has been the practice to run water over the tray, and particularly the bottom thereof, to facilitate the removal of the cubes. A number of trays have been developed having mechanical means for loosening the cubes upon operation of a lever. Such trays for the most part have been unsatisfactory for one reason or another. For example, some such devices do not completely release the cubes from the grid structures, while in other devices substantial breakage of the cubes occurs.

Generally speaking, an important object of the present invention is to provide an ice cube tray having easily operated lever means associated therewith for releasing the cubes from the grid and tray and depositing the cubes loosely in the tray.

More specifically, an important object of the invention is to provide a grid structure operable by a single lever for effectively breaking the adhesion between the ice cubes and the grid structure and tray, particularly the bottom of the tray, thus permitting a single operation of the lever to deposit all of the ice cubes in the bottom of the tray.

A further object is to provide a grid unit comprising a pair of elements extending substantially throughout the length of the tray and forming the longitudinal unit of the grid structure, and to so form the longitudinal elements and to operate them in such a manner with respect to each other as to facilitate the loosening of the cubes from the grid structure and the tray.

A further object is to provide a mechanism of the character referred to wherein the operation of the lever effects bodily movement of the grid structure longitudinally of the tray to shear the cubes from the bottom of the tray and to simultaneously loosen the cubes from the grid structure.

A further object is to provide a grid structure of the character referred to wherein one of the elements forming the longitudinal grid unit is slidable with respect to the other longitudinal element and is so formed as to provide a shearing and camming action to positively loosen the cubes from the grid structure.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawing I have shown one embodiment of the invention. In this showing—

Figure 1 is a perspective view of the complete device showing the parts in normal position,

Figure 2 is a vertical longitudinal sectional view showing the parts in operative position,

Figure 3 is a transverse vertical sectional view on line 3—3 of Figure 2,

Figure 4 is a fragmentary horizontal sectional view on line 4—4 of Figure 2, and,

Figure 5 is a detail perspective view of one of the transverse grid elements.

Referring to Figure 1 the numeral 10 designates a conventional refrigerator ice cube tray in which is arranged a cube-forming grid structure indicated as a whole by the numeral 11. The grid structure comprises a longitudinal unit indicated as a whole by the numeral 12 and comprising a pair of spaced parallel elements 13 between which is arranged a center element 14, the elements 13 and 14 extending longitudinally of the tray preferably from end to end thereof. An inverted U-shaped bar 15 extends over and receives the upper edges of the elements 13 and 14 and preferably extends throughout the length of the tray, as shown in Figure 1. The element 14 is slidable between the elements 13 in a manner to be described.

Referring to Figures 2 and 3, it will be noted that the grid element 14 is provided with a series of openings 16 and that the elements 13 are similarly provided with openings 17, one side edge and the bottom edge of each of which is tapered as at 18 to provide a shearing and camming surface for a purpose to be described.

A plurality of transverse grid elements 19 form a part of the grid structure and each element 19 is shaped as shown in Figures 3 and 5. Referring to Figure 5 it will be noted that each transverse grid element is notched in its lower portion as at 20 and this notch is of a width to freely receive the three thicknesses represented by the lower portions of the elements 13 and 14. The top portion of each transverse grid element is provided with a relatively long notch 21 forming the center of the element 19 as a neck 22 which extends through corresponding openings 16 and 17. Each notch 21 is sufficiently deep to receive the bar 15 as will be apparent, and each

notch is elongated for another purpose to be described.

At one end of the grid structure a pin 23 extends through and is carried by the grid elements 13 and the depending portions of the bar 15 and this pin operates in an elongated slot 24 formed in the element 14 adjacent and substantially parallel to the upper edge thereof. The pin 23 therefore serves to guide the adjacent end of the element 14 with respect to the elements 13 and it also serves to connect the adjacent ends of the elements 13 to the bar 15 against movement with respect thereto.

Near the opposite end of the grid structure a pivot pin 25 extends through the grid elements 13 and the depending portions of the bar 15, and this pivot pin, therefore, serves the function of connecting the adjacent ends of the elements 13 to the bar 15 to prevent relative movement between these elements in the same manner as the pin 23. However, the pin 25 does not engage the grid element 14 for a reason to be described. The pivot pin 25 extends outwardly beyond the opposite sides of the bar 15 for engagement with the arms 26 of an operating lever 27. The pin 25 extends through slots 28 formed in the enlarged ends 29 of the lever arms 26. The function of the slot 28 will be referred to later.

A pin 30 extends through the enlarged ends 29 of the lever arms 26 and is connected to the grid element 14, the pin 30 being freely movable through slots 31, formed in the grid elements 13, and through slots 32, formed in the depending portion of the bar 15. It will be apparent that the slots 31 and 32 permit the lever to pivot about the pin 25, and the pin 30 will transmit movement to the grid element 14, the point of connection of the pin 30 with the element 14 moving in an arc of a circle with the element 25 as its center. In this connection it will be noted that the slot 28 is arcuate and concentric with the pin 30. The reason for this formation of the slot 28 will be apparent from Figure 1. In the normal position of the parts the lever 27 lies in a horizontal position and the slot 28 permits the lever 27 to move freely until the pin 25 engages the lower end of the slot 28 as viewed in Figure 1, at which point the lever 27 will be in a position to be readily grasped by the hand of the operator. When the lever 27 is in the normal position referred to the pins 25 and 30 are approximately in the same horizontal plane, and the upper edge of the element 14 is notched as at 33 (Figure 2) to freely receive the pivot pin 25, thus permitting the upper edge of the grid element 14 to move upwardly to its desired limit of movement when the parts are in normal position.

The operation of the device is as follows:

The tray is filled with water in the usual manner and placed in the freezing compartment of the refrigerator with the parts arranged in the normal position shown in Figure 1. When it is desired to remove the cubes from the tray, the tray is removed from the refrigerator and placed on a suitable flat surface, whereupon the operator will lift the free end of the handle lever 27. As previously stated, the arcuate slots 28 will permit the handle 27 to move freely upwardly during its initial movement, thus permitting the handle to assume a position with its free end sufficiently above the grid structure to be grasped by the operator before the cube-releasing operation takes place.

The free movement of the handle lever 27 is arrested when the pin 25 engages the lower ends of the slots 28. The pin 25 thereupon becomes stationary with respect to the handle lever, and further upward movement of the free end of this lever will cause the pin 30 to partake of movement in an arcuate path about the axis of the pin 25. The point at which the pin 30 is connected to the grid element 14, therefore, will be caused to move in an arcuate path having components of movement relatively downwardly and horizontally toward the opposite end of the tray. Actually, the grid element 14 will remain stationary, since it contacts with the bottom of the tray, and upward movement will be transmitted to the grid elements 13 and the bar 15 adjacent the corresponding end of the tray, such units simultaneously moving away from the opposite end of the tray.

The operation referred to produces several results. In the first place, it provides upward movement of the adjacent end of the entire grid structure, except for the element 14, which remains stationary, while at the same time moving it horizontally, thus causing the transverse elements 19 to effectively break the adhesion between the ice cubes and the bottom of the ice tray. In the second place, the operation referred to moves the openings 16 and 17 (Figure 4) toward registration with each other, thus providing openings through the longitudinal grid unit which are wider than the respective transverse grid plates, thus freeing these plates for substantial movement relative to the longitudinal grid unit to permit them to assume whatever positions are necessary whereby the ice cubes may be more readily dropped when released.

It also will be apparent that the operation referred to causes the plates 13 and 14 to partake of movement having vertical and horizontal components with respect to the grid element 14. The ice which will have adhered to the portions of the element 14 exposed by the openings 17 thus will be sheared from the element 14 by the tapered faces 18, and these faces also exert forces against the ice cubes outwardly toward the sides of the tray to produce a camming action whereby the cubes are released both from the longitudinal and transverse grid elements. Upon the completion of the operation of the handle lever 27 it will occupy substantially the position shown in Figure 2 at which time every cube in the tray will be completely released from the tray and from the grid structure whereupon the grid structure may be completely lifted out of the tray by the handle lever 27.

The cubes thereupon may be placed in a suitable container for use, if desired, and the grid structure may be replaced in the tray in the position shown in Figure 2. The handle lever 27 then may be returned to its normal position shown in Figure 1, and the parts will be in the proper position for the freezing of the next batch of ice cubes.

From the foregoing it will be apparent that the present structure embodies a minimum number of parts which may be readily and cheaply manufactured, most of the elements being capable of economical manufacture by stamping. All of the transverse grid elements 19 may be duplicates of each other, while the two longitudinal elements 13 are likewise duplicates of each other. The relatively elongated notch 21 in the upper edge of each transverse grid element is provided to receive the lever arms 26 when the latter are

in the normal position shown in Figure 1. Of course, the transverse grid element 19 nearest the observer in Figure 1 need not have the elongated notch 21 since the upper edge of such grid element is not called upon to receive any portion of the handle lever regardless of the position of the latter. Accordingly such grid element 19 may be formed as shown in Figure 1, although it is preferably formed in the same shape as the remaining transverse grid elements to eliminate the expense incident to the making of a specially shaped end grid element.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A grid for forming ice cubes in a tray comprising a grid unit including a plurality of longitudinal elements substantially co-extensive in area arranged in relatively slidable face to face relation, and lever means operable while said unit is in contact with the bottom of the tray providing relative sliding movement of said elements, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

2. A grid for an ice cube tray comprising a grid unit including a plurality of longitudinal elements substantially co-extensive in area arranged in relatively slidable face to face relation, and means for effecting relative sliding movement of said elements, at least one of said elements having an opening therethrough at least one edge of which is tapered to effect a camming action against the adjacent ice upon relative sliding movement of said elements.

3. A grid for forming ice cubes in a tray comprising a grid unit including a plurality of longitudinal elements substantially co-extensive in area arranged in relatively slidable face to face relation, and lever means connected between said elements and operable for effecting relative sliding movement therebetween, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

4. A grid for an ice cube tray comprising a grid unit including a plurality of longitudinal elements substantially co-extensive in area arranged in relatively slidable face to face relation, and lever means connected between said elements and operable for effecting relative sliding movement therebetween, at least one of said elements having an opening therethrough at least one edge of which is tapered to effect a camming action against the adjacent ice upon relative sliding movement of said elements.

5. A grid for forming ice cubes in a tray comprising a longitudinal grid unit including a plurality of elements substantially co-extensive in area lying in face to face relatively slidable relationship, said elements being connected to each other to partake of predetermined relative sliding movement having a vertical component of movement whereby, upon relative movement of said elements, one of them will be caused to move upwardly while the other is fixed against downward movement by engagement with the tray, and means for effecting such relative movement of said elements, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

6. A grid for forming ice cubes in a tray comprising a longitudinal grid unit including a plurality of elements substantially co-extensive in area lying in face to face relatively slidable relationship, means connecting said elements adjacent one end thereof for predetermined relative sliding movement having a vertical component of movement whereby, upon relative sliding movement thereof, one of said elements will be moved upwardly, and an operating lever connected to said means to effect such relative sliding movement of said elements, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

7. A grid for an ice cube tray comprising a longitudinal grid unit including a plurality of elements substantially co-extensive in area lying in face to face relatively slidable relationship, means connecting said elements adjacent one end thereof for predetermined relative sliding movement having a vertical component of movement whereby, upon relative sliding movement thereof, one of said elements will be moved upwardly, and an operating handle connected to said means to effect such relative sliding movement of said elements, at least one of said elements having an opening therein at least one edge of which is tapered to effect a camming action against the adjacent ice when said elements partake of said relative sliding movement.

8. A grid for forming ice cubes in a tray comprising a longitudinal grid unit including a pair of spaced parallel elements substantially co-extensive in area and an inner element arranged therebetween and slidable with respect thereto, a plurality of transverse grid elements supported by said longitudinal grid unit, and lever means for effecting relative sliding movement of the elements of said longitudinal grid unit, said means being constructed and arranged to effect upward movement of said pair of elements, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

9. A grid for an ice cube tray comprising a longitudinal grid unit including a pair of spaced parallel elements substantially co-extensive in area and an inner element arranged therebetween and slidable with respect thereto, a plurality of transverse grid elements supported by said longitudinal grid unit, and means for effecting relative sliding movement of the elements of said longitudinal grid unit, said means being constructed and arranged to effect upward movement of said pair of elements, each of said pair of elements being provided with a plurality of openings therethrough at least one edge of which is tapered to effect a camming action against the adjacent ice when the elements of said longitudinal grid unit partake of said relative sliding movement.

10. A grid unit for an ice cube tray comprising a longitudinal grid unit including a pair of spaced parallel elements substantially co-extensive in area and an inner element arranged therebetween in sliding relationship with the inner surfaces thereof, said elements being provided with corresponding sets of openings, a plurality of transverse grid elements each having its central portion extending through one of said sets of openings and supported by said pair of elements,

and means connecting said pair of elements and said inner element for relative sliding movement with respect to each other with such movement including a vertical component whereby, upon such relative sliding movement of the elements of said longitudinal unit, said pair of elements will be moved upwardly, said means including a lever for affecting said relative sliding movement.

11. A grid unit for an ice cube tray comprising a longitudinal grid unit including a pair of spaced parallel elements substantially co-extensive in area and an inner element arranged therebetween in sliding relationship with the inner surfaces thereof, said elements being provided with corresponding sets of openings, a plurality of transverse grid elements each having its central portion extending through one of said sets of openings and supported by said pair of elements, and means connecting said pair of elements and said inner element for relative sliding movement with respect to each other with such movement including a vertical component whereby, upon such relative sliding movement of the elements of said longitudinal unit, said pair of elements will be moved upwardly, said means including a lever for effecting said relative sliding movement, each opening in each element of said pair having at least one edge tapered to effect a camming action against the adjacent ice when the elements of said longitudinal grid unit partake of said relative sliding movement.

12. A grid for an ice cube tray comprising a longitudinal grid unit including a pair of spaced parallel elements substantially co-extensive in area and an inner element arranged therebebetween in slidable engagement therewith, said elements being provided with a plurality of sets of openings, a plurality of transverse grid elements each having its central portion projecting through one set of said openings and supported by said pair of elements, means connecting one end portion of said pair of elements to the adjacent end portion of said inner element for relative sliding movement substantially parallel to the upper edge of said longitudinal unit, and a lever having pivotal connection at spaced points with said inner element and said pair of elements adjacent the other end of said longitudinal grid unit.

13. A grid for an ice cube tray comprising a longitudinal grid unit including a pair of spaced parallel elements substantially co-extensive in area and an inner element arranged therebetween in slidable engagement therewith, said elements being provided with a plurality of sets of openings, a plurality of transverse grid elements each having its central portion projecting through one set of said openings and supported by said pair of elements, means connecting one end portion of said pair of elements to the adjacent end portion of said inner element for relative sliding movement substantially parallel to the upper edge of said longitudinal unit, and a lever having pivotal connection at spaced points with said inner element and said pair of elements adjacent the other end of said longitudinal grid unit, each opening in each element of said pair having at least one edge thereof tapered to effect a camming action against the adjacent ice upon relative sliding movement of the elements of said longitudinal grid structure incident to swinging movement of said lever.

14. A grid for an ice cube tray comprising a longitudinal grid unit formed of a pair of spaced parallel elements and an inner element arranged therebetween in slidable engagement therewith, said elements being provided with a plurality of sets of openings, a plurality of transverse grid elements each having its central portion projecting through one set of said openings and supported by said pair of elements, means connecting one end portion of said pair of elements to the adjacent end portion of said inner element for relative sliding movement substantially parallel to the upper edge of said longitudinal unit, and a lever having pivotal connection at spaced points with said inner element and said pair of elements adjacent the other end of said longitudinal grid unit, one of the pivotal connections of said lever being a lost motion connection whereby said lever is adapted to lie adjacent and parallel to the upper edge of said longitudinal grid unit and to be moved upwardly from such normal position before becoming effective for causing relative movement of the elements of said longitudinal grid unit.

15. In combination with an ice cube tray, a grid structure for forming ice cubes in said tray, said structure comprising a unit made up of a plurality of adjacent contacting elements slidable with respect to each other and one of which normally contacts with the bottom of said tray, and means connecting the elements of said longitudinal unit for relative sliding movement including a vertical component of movement whereby engagement of said first named element with the bottom of said tray causes such relative sliding movement to result in upward movement of the other element of said longitudinal unit, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

16. In combination with an ice cube tray, a grid structure comprising a longitudinal unit formed of a pair of spaced parallel elements and an inner element arranged therebetween in slidable engagement therewith, said elements being provided with spaced sets of openings, a plurality of transverse grid elements each having its central portion projecting through one set of openings and supported by said pair of elements, and means connecting said pair of elements to said inner element for predetermined relative sliding movement including a vertical component of movement whereby, with said inner element engaging the bottom of said tray, said pair of elements will be caused to move upwardly, said means including an operating lever for effecting said predetermined relative sliding movement.

17. In combination with an ice cube tray, a grid structure comprising a longitudinal unit formed of a pair of spaced parallel elements and an inner element arranged therebetween in slidable engagement therewith, said elements being provided with spaced sets of openings, a plurality of transverse grid elements each having its central portion projecting through one set of openings and supported by said pair of elements, and means connecting said pair of elements to said inner element for predetermined relative sliding movement including a vertical component of movement whereby, with said inner element engaging the bottom of said tray, said pair of elements will be caused to move upwardly, said means including an operating lever for effecting said predetermined relative sliding movement, each opening in each element of said pair having at least one edge tapered to effect a camming action against the adjacent ice when

the elements of said longitudinal grid unit partake of said relative sliding movement.

18. In combination with an ice cube tray, a grid structure comprising a longitudinal grid unit formed of a pair of spaced parallel elements and an inner element arranged between and slidably engaging the adjacent faces of the elements of said pair and having its lower edge normally seating against the bottom of said tray, the elements of said longitudinal unit having spaced sets of openings, a plurality of transverse grid elements each having its central portion arranged in the openings of one set, a pin projecting through and carried by said pair of elements adjacent one end thereof, a slot formed in said inner element approximately parallel to the horizontal plane of the top of said tray and slidably receiving said pin, and a lever pivotally connected at spaced points to said inner element and said pair of elements adjacent the other end of said longitudinal unit whereby, upon operation of said lever, the point in said inner element to which said lever is connected will be caused to move in an arc of a circle concentric with the pivotal connection of said lever with said pair of elements and transmit relative sliding movement to said inner element and said pair of elements, such movement taking place with said inner element engaging the bottom of said tray whereby the ends of said pair of elements adjacent said lever are caused to move upwardly and longitudinally away from the opposite end of the tray.

19. In combination with an ice cube tray, a grid structure comprising a longitudinal grid unit formed of a pair of spaced parallel elements and an inner element arranged between and slidably engaging the adjacent faces of the elements of said pair and having its lower edge normally seating against the bottom of said tray, the elements of said longitudinal unit having spaced sets of openings, a plurality of transverse grid elements each having its central portion arranged in the openings of one set, a pin projecting through and carried by said pair of elements adjacent one end thereof, a slot formed in said inner element approximately parallel to the horizontal plane of the top of said tray and slidably receiving said pin, and a lever pivotally connected at spaced points to said inner element and said pair of elements adjacent the other end of said longitudinal unit whereby, upon operation of said lever, the point in said inner element to which said lever is connected will be caused to move in an arc of a circle concentric with the pivotal connection of said lever with said pair of elements and transmit relative sliding movement to said inner element and said pair of elements, such movement taking place with said inner element engaging the bottom of said tray whereby the ends of said pair of elements adjacent said lever are caused to move upwardly and longitudinally away from the opposite end of the tray, each opening in each element of said pair having at least one edge tapered to effect a camming action against the adjacent ice upon relative sliding movement of the elements of said longitudinal grid unit.

20. A grid for forming ice cubes in a tray comprising a longitudinal grid unit including a plurality of elements substantially co-extensive in area lying in face to face relatively slidable relationship, means connecting said elements at one end thereof for relative sliding movement, and lever means connecting said elements at the other end thereof to effect relative sliding movement of said elements, said elements being arranged in a manner whereby said sliding movement will effect the release of the cubes from each of said relatively slidable elements.

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