Dec. 27, 1949 H. E. KNUPP 2,492,583

ICE TRAY CONSTRUCTION

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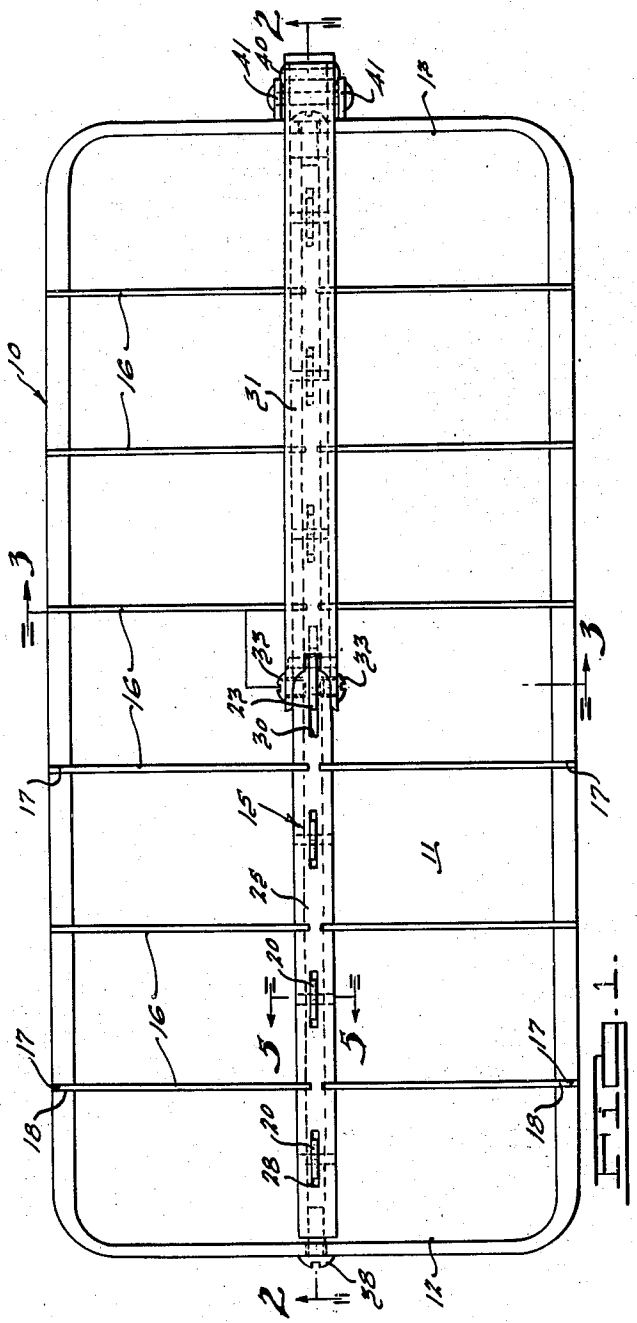


Fig. 1.

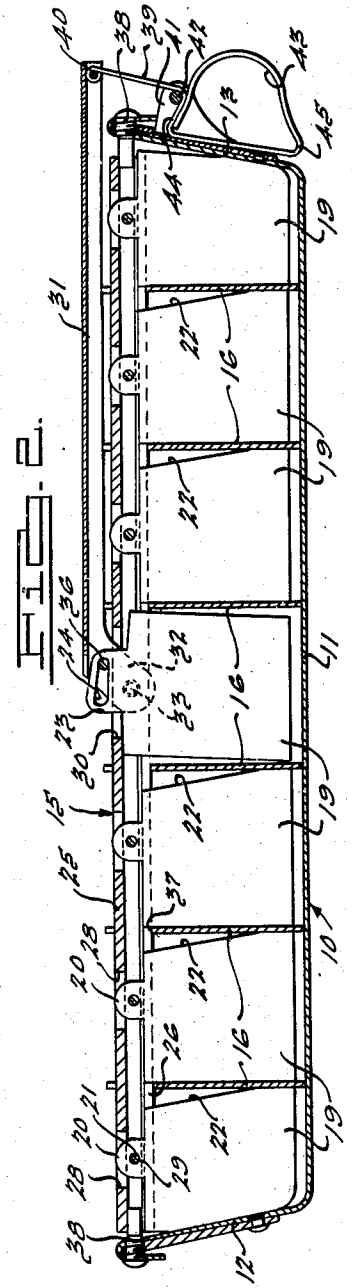


Fig. 2.

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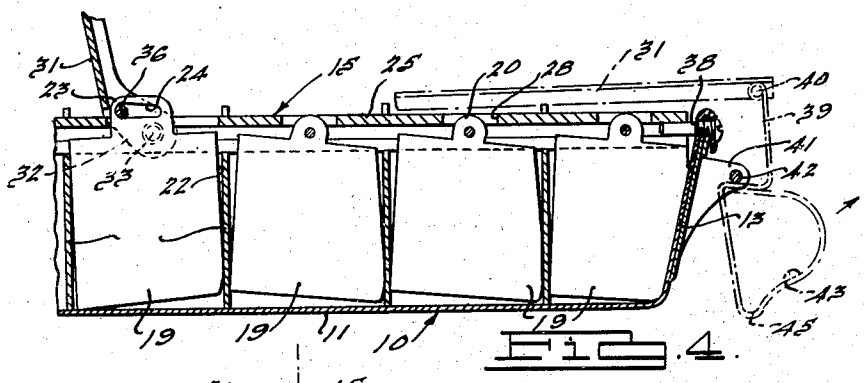


Fig. 4.

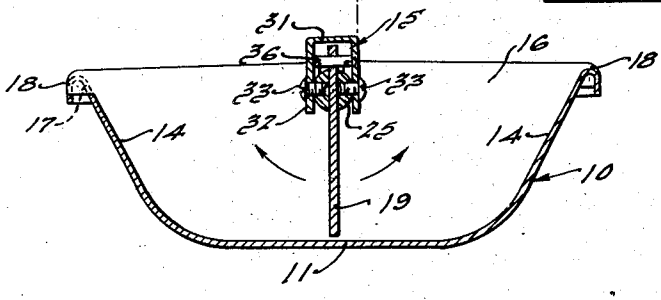


Fig. 3.

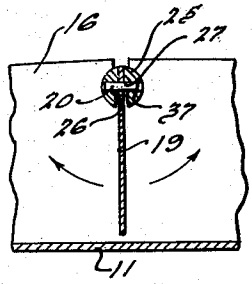


Fig. 5.

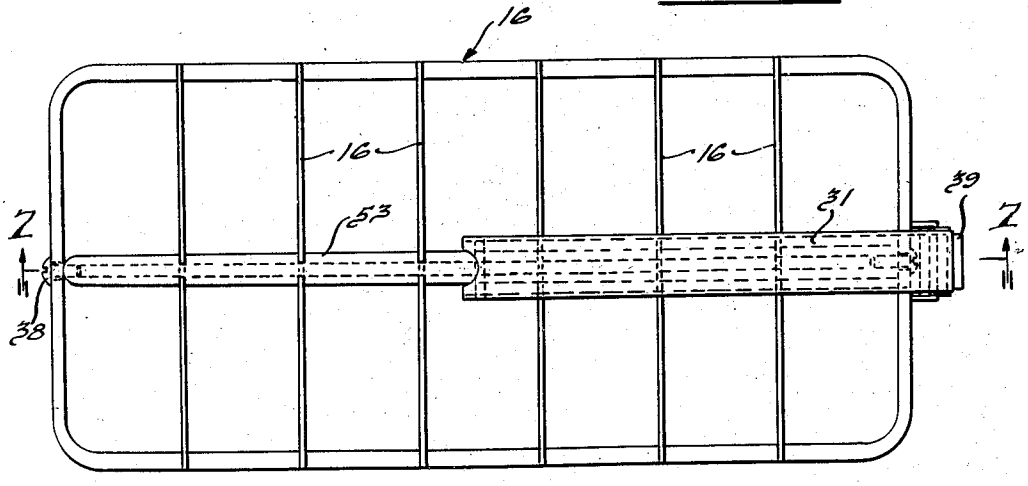


Fig. 6.

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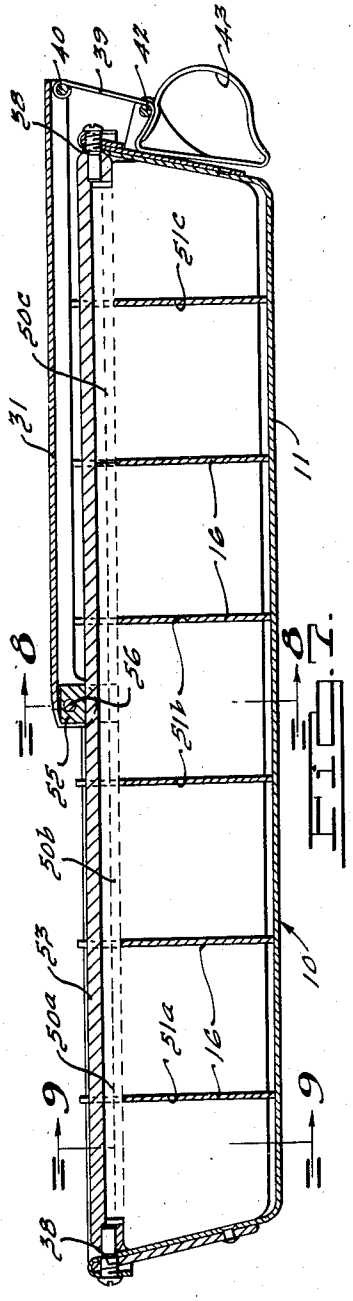


FIG. 7.

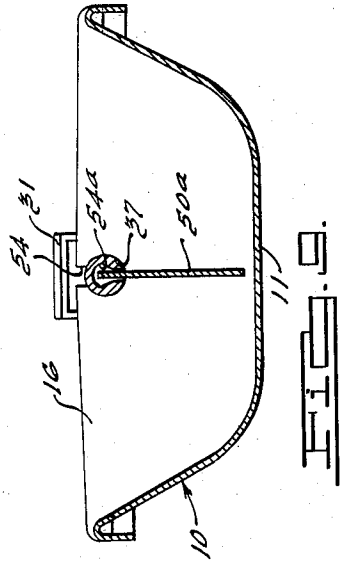


FIG. 9.

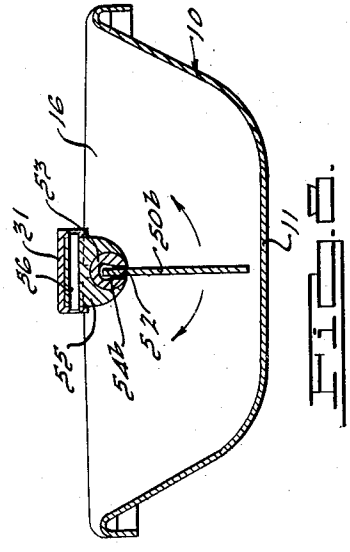


FIG. 11.

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ICE TRAY CONSTRUCTION

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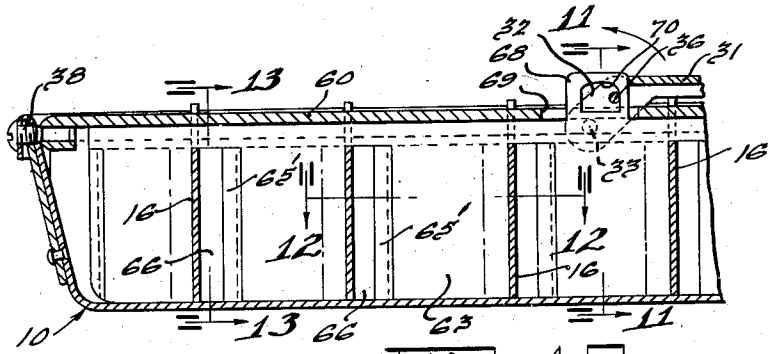


FIG. 10.

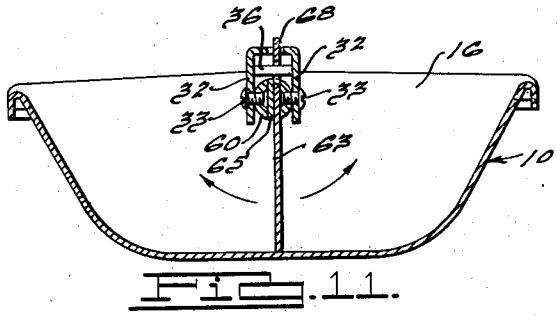


FIG. 11.

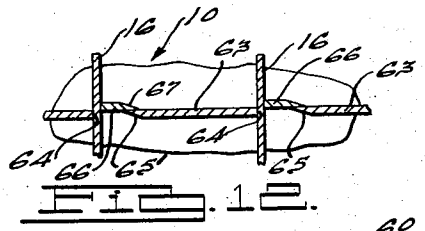


FIG. 12.

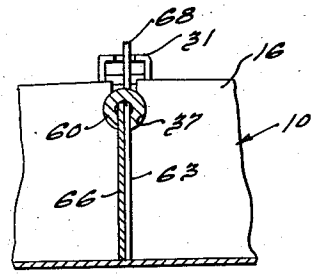


FIG. 13.

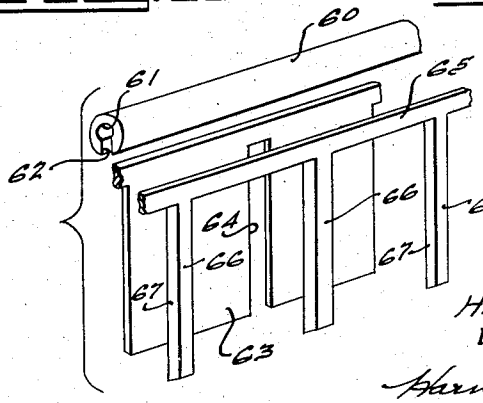


FIG. 14.

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Patented Dec. 27, 1949

2,492,583

UNITED STATES PATENT OFFICE

2,492,583

ICE TRAY CONSTRUCTION

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Application April 18, 1946, Serial No. 663,005

7 Claims. (Cl. 62—108.5)

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The present invention relates to improvements in trays, particularly of the type used in domestic refrigerators.

The primary object of the present invention relates to improvements in ice trays and grid assemblies whereby the individual ice cubes may be more readily removed from the trays than in prior constructions.

A further object of the invention is to provide improvements in ice tray and grid assemblies in which the ice cubes may be readily removed without removing the grid from the tray.

A further object of the invention is to provide improvements in ice tray and grid assemblies in which a selected number of individual ice cubes may be readily removed from the tray without the necessity of removing all of the cubes from the tray.

Another object of the invention is to provide improvements in ice tray and grid assemblies in which the ice cubes are readily separated from the grid partitions and moved to positions for selected removal from the trays.

Other objects of the invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings in which like numerals are used to designate like parts in the several views throughout:

Fig. 1 is a top plan view of an ice tray and grid assembly embodying features of the present invention;

Fig. 2 is a cross-sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken substantially along the line 3—3 of Fig. 1;

Fig. 4 is a partial view of Fig. 1 and of Fig. 2 and showing the parts in a different position;

Fig. 5 is a cross-sectional view taken substantially along the line 5—5 of Fig. 1;

Fig. 6 is a top plan view of a tray and grid assembly illustrating a modified form thereof;

Fig. 7 is a cross-sectional view taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a cross-sectional view taken substantially along the line 8—8 of Fig. 7;

Fig. 9 is a cross-sectional view taken substantially along the line 9—9 of Fig. 7;

Fig. 10 is a vertical cross-sectional view, similar to Fig. 2, showing a portion of another modified form of tray and grid assembly embodying features of the present invention;

Fig. 11 is a cross-sectional view taken substantially along the line 11—11 of Fig. 10;

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Fig. 12 is a cross-sectional view taken substantially along the line 12—12 of Fig. 10;

Fig. 13 is a cross-sectional view taken substantially along the line 13—13 of Fig. 10; and

Fig. 14 is a partial separated perspective view of the elements making up the central partition means in the embodiment shown in Figs. 10 to 13.

Referring to Figs. 1 through 5, one embodiment of the present invention is illustrated. The structure to which the present invention relates comprises a sheet metal tray generally indicated at 10 which is adapted to be inserted in the freezing compartment of a domestic refrigerator. The tray 10 is formed with a bottom 11, a rear wall 12, a front wall 13, and side walls 14. The side walls 14 preferably taper outwardly as best shown in Fig. 3 and join the bottom wall 11 through a curved corner. The upper edges of the front, rear and side walls are preferably turned outwardly and downwardly to form a rounded edge or rib around the tray.

A metal grid assembly generally indicated at 15 is disposed within the tray 10. Such grid assembly comprises a plurality of laterally disposed partition members 16 which, when in assembled relation, are disposed within the tray 10 at longitudinally spaced points. Each partition 16 has a contour complementary to that of the contour of the inside surface of the tray 10. Oppositely disposed slots 17 are formed in pairs through the side ribs of the tray at proper intervals therealong. Each partition 16 is formed with an outturned extension 18 of opposite ends thereof; and such extensions 18 are adapted to be received within the slots 17 to properly locate and position the partitions 16.

Each grid assembly 15 also includes a means which forms a longitudinal central partition, and in the present embodiment such partition means is formed of a plurality of separate wall members 19. Each partition member 19, with the exception of the central one, is formed with an upstanding projection 20 on the upper edge thereof which is formed with an opening 21 therethrough. Each partition member 19 is also formed with an upwardly tapering edge indicated at 22, the purpose of such tapering edge being to permit limited longitudinal movement of the partition member about its pivot within the space between adjacent members 16 to effect a separation of the ice cubes from the partition members and to facilitate removal of the ice cubes. The central partition 19 is formed slightly differently from the other members in that the upstanding projection 23 formed on the upper

edge thereof is provided with a longitudinal cam slot 24 therein.

The partition members 19 are mounted on a longitudinally extending rod or bar 25. The bar 25 is formed with a longitudinally extending slot 26 along the bottom edge thereof which joins a longitudinally extending axial bore 27 formed therein. The projections 20 extend upwardly through the slot 26 with the sides of the upper edges thereof facing and engaging the side edges of the slot 26. The projections 20 extend upwardly within longitudinal slots 28 formed in the bar 25. The partition members 19, with the exception of the central partition member, are pivotally connected to the rod 25 by means of pivot pins 29 passed through the openings 21 with the ends supported in transverse openings formed in the rod member 25, as best shown in Fig. 5.

The central partition member 19 is also positioned within the slot 26 and the projection 23 thereof extends upwardly through a slot 30 formed in the rod 25, with the cam slot 24 extending above the rod 25. An operating handle 31, which may be formed of a sheet metal stamping generally U-shaped in cross section, is positioned above the rod member 25 and extends from the center thereof toward and beyond the front edge 13 of the tray. The lever 31 has depending side portions 32 which are pivotally connected to the rod 25 by means of pivot screws 33, as best shown in Fig. 3. The central partition member 19 is connected to the operating lever 31 by means of a transverse pin 36 which is fixed to the opposite depending walls 32 of the operating lever and which passes through the cam slot 24. The shape of the depending arms 32 and the location of the pin 36 is such that when the parts are in the position shown in Fig. 2, the pin 36 is located upwardly and to one side of a vertical plane through pivots 33 and engages in one end of the slot 24.

The transverse partition members 16 are formed with central openings 37 therethrough and in communication with the top edge through an open slot so that the partition members may be passed over the round rod member 25. The parts are so assembled that the partitions 16 are disposed between adjacent central partition member 19. It will be appreciated that the rod member 25 may pivot within the openings 37 in either direction laterally as indicated by the arrows in Figs. 3 and 5. With the grid 15 in its assembled relation, it is positioned within the tray 11 by means of pivot screws 38 which are threaded through openings in the front and rear walls of the tray 11 with the ends of the pins 38 projecting within the open ends of bore 27.

The lever 31 extends forwardly of the front edge 13 and has a spring clamp 39 pivotally connected to the end thereof by means of a pivot pin 40. The clamp 39 serves several purposes. One, to locate the lever 31 in the position shown in Fig. 2; and two to free the tray 10 from the bottom wall of the freezing compartment when it is desired to remove the tray from the refrigerator.

In order to serve the first function, a pair of spaced brackets 41 are fixed to the front wall 13 and are provided with a transverse pin 42 therebetween. The clamp 39 is formed with a closed loop 43 having a cam edge 44 which bears against and springs under the pin 42 when the parts are in the locked position shown in Fig. 2. The pin 42 is located to one side of the vertical through pin 40 and the length of the clamp 39 is such that the corner indicated at 45 follows a downward arc as the clamp is moved to its released position shown in broken lines in Fig. 4. When the loop 43 is thus pulled outwardly, the edge 45 strikes against the bottom of the freezing compartment and raises the bottom of the tray 10 from engagement with the refrigerator wall so that the tray is loosened therefrom and can be easily removed.

In the use of the device above-described, assuming that the tray is full of frozen ice cubes with the tray removed from the refrigerator, the clamp 39 is released and the lever 31 moved past a vertical position about pivots 33, to the position shown in Fig. 4. As the lever is thus moved, the pin 36 moves along the cam slot 24 until it engages the opposite end of the slot. The first action is to move the central partition members longitudinally to break it free of engagement with the ice cubes and as the end edges move, they engage the facing surfaces of adjacent partition members 16. Further movement of the arm 31 in the same direction will effect a slight longitudinal movement of the rod 25, the effect of which is to cause the other partition members 19 to pivot about their pivots 29 so that they are shifted from the position shown in Fig. 2 to that shown in Fig. 4. This breaks those partition members free of engagement with their ice cubes. With the lever 31 in the raised position, the rod 25 may then be pivoted about pivots 38 to swing the partition members 19 laterally in either direction. As these partition members are thus swung in either direction, the ice cubes on that side of the direction in which the partitions are being swung will be forced out and upwardly of the ice compartments to positions above the edges of the tray. They are then free from the walls and may be selectively picked off. If it is desired to remove the entire contents of the tray, the partitions are then swung in the opposite direction to raise the ice cubes on the opposite side. If it is only desired to remove a few of the cubes, the partitions 19 may be moved to their original position in which event the cubes not removed will drop back to their original positions.

Referring to Figs. 6 through 9, a modified form of the invention is illustrated. The ice tray 10 and the longitudinal partitions 16 are the same as those discussed above in connection with the embodiment shown in Fig. 1 through 5. The partitioning means comprises a plurality of sections 50*a*, 50*b*, and 50*c*. Each of such sections 50*a*, 50*b*, and 50*c* is formed with slots 51*a*, 51*b*, and 51*c*, respectively. These slots are such a width as to receive the partition members 16 therein. The slots are of a depth substantially equal to the depth of the partition members 16 up to the bottom of openings 37 therein. The upper continuous edges of sections 50*a*, 50*b*, and 50*c* are received within a slot 52 formed in a longitudinally extending pivot rod 53. The rod 53 is generally the same as the rod 25 in the embodiment above-described and is similarly connected to the tray 10 for pivotal movement with respect thereto. Openings or bores of different widths as indicated at 54*a* and 54*b* are formed in the member 53 throughout the length thereof. The widths are slightly different for each of the sections 50*a*, 50*b*, and 50*c*. The purpose of this construction is that when the rod 53 is pivoted to eject the ice cubes, the sections 50*a*, 50*b*, and 50*c* will act in succession so that the force is only being applied to loosen a few of the ice cubes at one time.

In order to so pivot the central partitions, the

handle 31 is connected to a lug 55 which is fixed to the rod 53 centrally thereof by moving the handle 31 to its vertical position about pivot 56. The handle may then be swung to either side which causes the rod 53 to pivot. As the rod 53 pivots, the sides of the slots 54*a*, 54*b*, and 54*c* engage the upper edges of their respective sections to cause such sections to pivot about the edges of openings 37. The ejecting action on the ice cubes is the same as that described above.

The manner in which the grid elements may be assembled is as follows. The sections 50*a*, 50*b*, and 50*c* are first positioned within the slot 52. The partitions 16 are then positioned around 180° from the position shown in Figs. 8 and 9 and may be slid over the rod 53 through openings 37. When they reach a position adjacent the proper slot 51*a*, 51*b*, or 51*c*, they are then swung around 180° and it will be appreciated that when in such position they pass through the slots 51*a*, 51*b*, or 51*c* to the position of assembly shown in Figs. 8 and 9. A slot 54 formed through the upper edge of each partition 16 and communicating with the opening 37 permits the longitudinal movement of the partition past the partitions 50*a*, 50*b*, and 50*c* as it is being moved to its proper position while inverted.

Referring to Figs. 10 to 14, another embodiment of the invention is illustrated. In this embodiment, the tray 10 and the partitions 16 are of the same construction as in the embodiments described above. The central partition member is differently constructed and is constructed to permit slight longitudinal movement, as well as lateral pivotal movement. The central partitioning and pivoting means comprises a longitudinally extending rod 60 which is generally the same as rod 25 in the manner in which it functions and is pivotally connected to the tray 10. The rod 60 has a central axial opening 61 therethrough with a longitudinal slot 62 formed through the bottom edge thereof which communicates with the opening 61. The central partition is formed of a unitary sheet metal member 63 which is provided with slots 64 therein and one edge of each slot is knife-edged as indicated at 65′ in Fig. 12. The opposite edge of the slot 64 abuts against one face of its adjacent transverse partition member 16 when in assembled position. The partitioning members 16 are adapted to be positioned on the rod 60 between the slots 64 as described above.

Another frame member having a longitudinally extending upper bar 65 is adapted to be stationarily positioned within the slot 62. The member 65 has depending legs 66 which are formed with knife edges 67 along one edge thereof, and when in assembled relation the adjacent faces of members 66 bear against the adjacent faces of members 63. The knife edges 65′ and 67 are oppositely disposed, as shown in Fig. 12, and a slight longitudinal movement is imparted to the central partition 63. The members 65 and 66 remain stationary so that there is a relative movement between the knife edges 65′ and 67 which serves to loosen the ice cubes from the partitioning members.

This longitudinal movement of the partitioning member 63 is effected through a cam and pin connection between the arm 31 and the partition 63. The partition 63 is formed with an upstanding projection 68 which extends through an enlarged longitudinal slot 69 formed in the rod member 60 centrally thereof. A projection 68 has a cam slot 70 formed therein within which a transverse

pin 36 of the arm 31 passes. The depending arms 32 of the lever 31 are pivotally connected to the member 60 by means of pivot screws 33. The rod 60 does not move longitudinally but as the arm 31 is raised, the pin 36 will effect longitudinal movement of the partition 63 toward the left, viewing Figs. 10 and 12. This will loosen the ice cubes and with the lever in its upper position the rod 60 may then be pivoted to effect a lateral movement of the partition 63 so as to eject the ice cubes in the same manner described above in connection with other embodiments.

Formal changes may be made in the specific embodiments described without departing from the spirit and substance of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. In combination, an ice tray, a grid assembly positioned therein to form ice cube compartments, said grid assembly comprising transverse partitions and a central longitudinal partition, and means mounting said longitudinal partition on said tray for movement longitudinally and laterally in either direction.

2. In combination, an ice tray, a grid assembly positioned thereinto form ice cube compartments, said grid assembly comprising a plurality of transverse partitions and a plurality of sections forming a central longitudinal partition disposed between adjacent pairs of said transverse partitions, a pivot rod pivotally connected to said tray longitudinally thereof, means connecting said sections to said rod for lateral movement in either direction from their central position upon pivoting of said rod, the connection between the pivot rod and the sections being so constructed that said sections are moved laterally in succession upon movement of said rod, and means for pivoting said rod.

3. In combination, an ice tray, a grid assembly positioned therein to form ice cube compartments, said grid assembly comprising a plurality of transverse partitions and a central longitudinal partition disposed between adjacent transverse partitions, a pivot rod extending longitudinally between the ends of said tray and pivotally connected thereto, and means connecting said longitudinal partition to said rod for longitudinal movement with respect thereto and for lateral pivotal movement therewith in either direction from its central position.

4. In combination, an ice tray, a grid assembly positioned therein to form ice cube compartments, said grid assembly comprising a plurality of transverse partitions and a central longitudinal partition disposed between adjacent transverse partitions, a pivot rod extending longitudinally between the ends of said tray and pivotally connected thereto, means connecting said longitudinal partition to said rod for lateral pivotal movement therewith in either direction from their central position, and a lever overlying said rod and pivotally connected to said rod for movement from a horizontal position to a substantially vertical position.

5. In combination, an ice tray, a grid assembly positioned therein to form ice cube compartments, said grid assembly comprising a plurality of transverse partitions and a central longitudinal partition disposed between adjacent transverse partitions, a pivot rod extending longitudinally between the ends of said tray and pivotally connected thereto, and means connecting said longitudinal partition to said rod for

lateral pivotal movement therewith in either direction from its central position, a lever overlying said rod and pivotally connected to said rod for movement from a horizontal position to a substantially vertical position, and means on the lever to raise the tray from the tray support.

6. In combination, an ice tray, a grid assembly positioned therein to form ice cube compartments, said grid assembly comprising a plurality of transverse partitions and a central longitudinal partition disposed between adjacent transverse partitions, a pivot rod extending longitudinally between the ends of said tray and pivotally connected thereto, means forming a slot in said rod along the under side thereof, and said longitudinal partition having the upper edge thereof disposed in said slot for lateral pivotal movement therewith in either direction from its central position.

7. In combination, an ice tray, a grid assembly positioned therein to form ice cube compartments, said grid assembly comprising a plurality of transverse partitions and a central longitudinal partition disposed between adjacent transverse partitions, a pivot rod extending longitudinally between the ends of said tray and pivotally connected thereto, means forming a slot in said rod along the under side thereof, said longitudinal partition having the upper edge thereof disposed in said slot and connected thereto for longitudinal movement with respect to said rod and for lateral pivotal movement therewith in either direction, and a stationary frame member having the upper portion also mounted within said slot and having depending portions cooperating with said longitudinal partition to free ice cubes upon longitudinal movement of said longitudinal portion, and means to effect said longitudinal partition.

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The following references are of record in the file of this patent:

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