Sept. 23, 1941. C. R. CARNEY 2,256,703

ICE TRAY GRID

Filed April 22, 1940 2 Sheets-Sheet 1

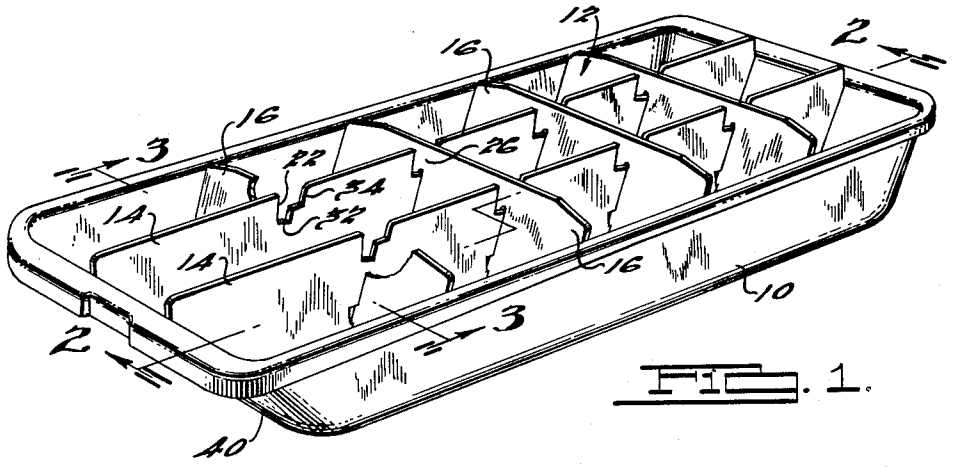


FIG. 1.

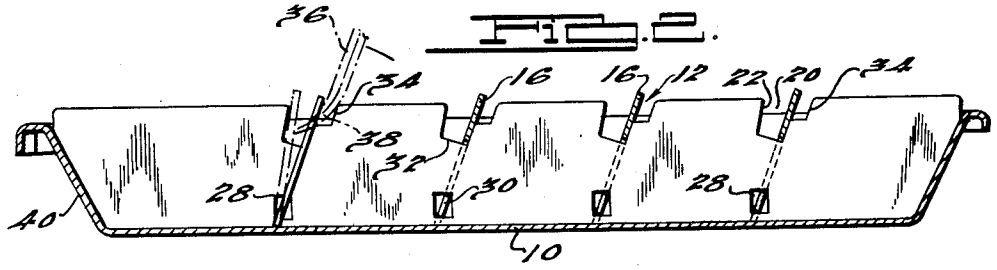


FIG. 2.

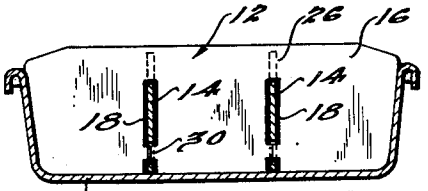


FIG. 3.

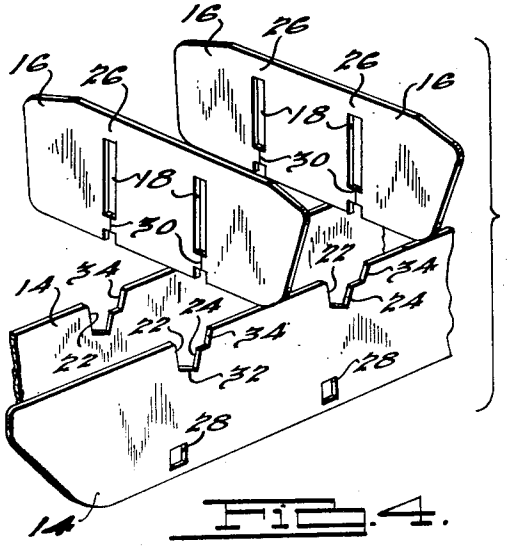


FIG. 4.

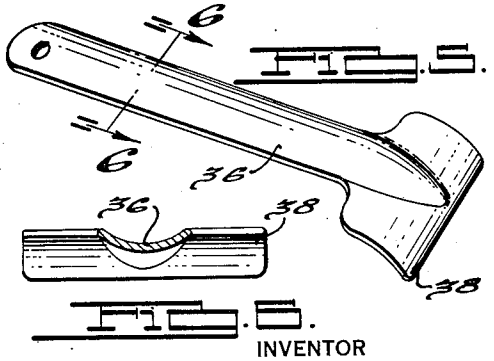


FIG. 5.

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ICE TRAY GRID

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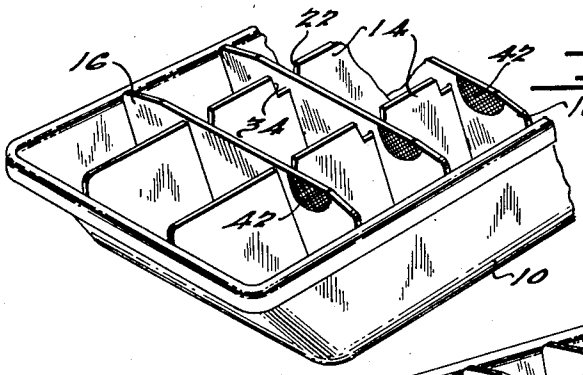


FIG. 7.

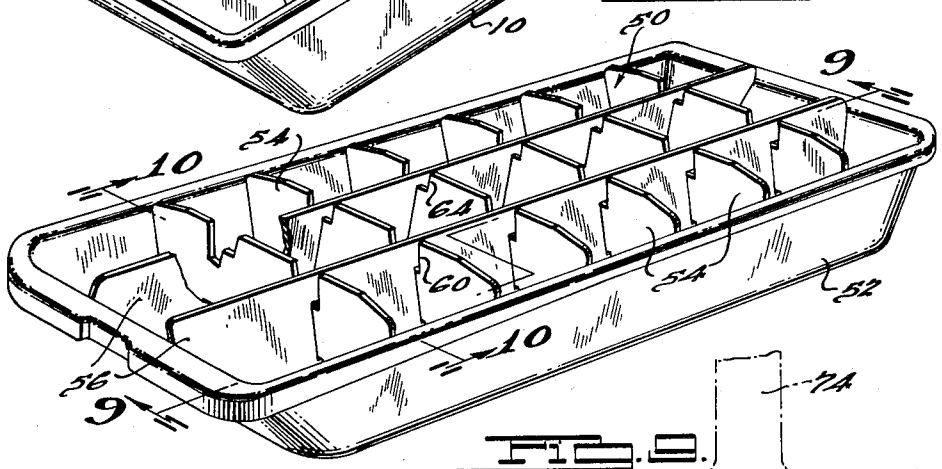


FIG. 8.

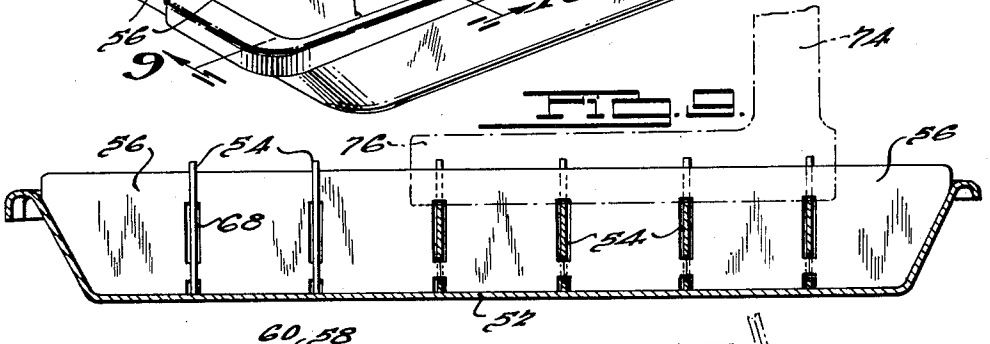


FIG. 9.

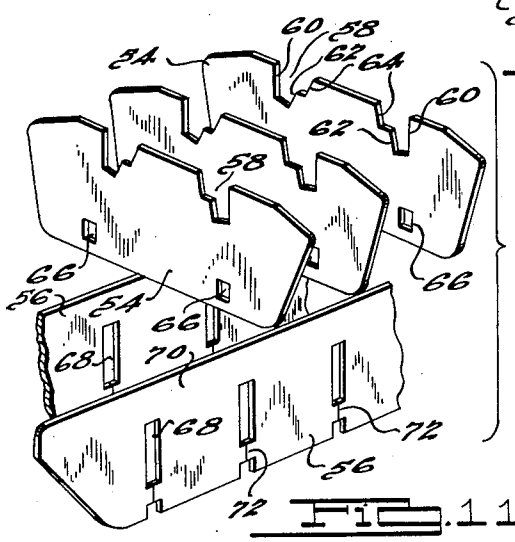


FIG. 11.

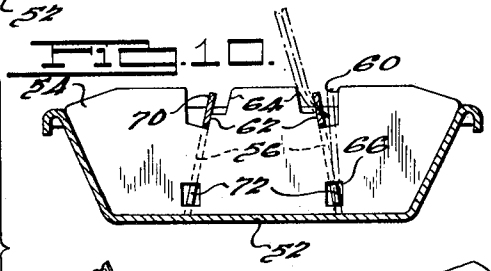


FIG. 10.

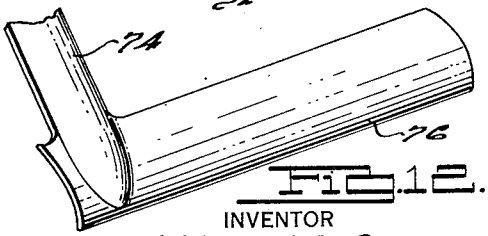


FIG. 12.

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UNITED STATES PATENT OFFICE

2,256,703

ICE TRAY GRID

Clifford R. Carney, Detroit, Mich.

Application April 22, 1940, Serial No. 330,814

3 Claims. (Cl. 62—108.5)

This invention relates to refrigeration devices and more particularly to freezing receptacles adapted to provide for the freezing of a relatively large volume of ice in a relatively small space thereby making it possible to reduce the size of refrigerator evaporator units without reducing the volumetric efficiency of the refrigerator insofar as the volume of ice which can be frozen is concerned.

More particularly the invention relates to a removable grid having a plurality of independently movable wall members which may be selectively actuated to effect the release of a desired number of blocks of ice from the grid and tray without disturbing the remaining blocks of ice.

Heretofore considerable difficulty has been experienced in effecting the release of the ice block partitioning mechanism or grid from the tray or pan, and also in effecting the removal of the individual ice blocks or cubes from the grid. I have found that these difficulties can be overcome by providing a partitioning structure or grid having a plurality of independently movable generally transversely or longitudinally extending angularly disposed members movably mounted on relatively fixed generally longitudinally or transversely extending grid members. The relatively fixed members are preferably provided with vertically spaced stop members to position the movable members at an angle to the vertical prior to the freezing of the ice cubes therein whereby a force may be applied to the movable members to selectively move them angularly relative to the relatively fixed members thereby producing a wedging or sliding force on the ice blocks or cubes to break the contact between the ice cubes and the grids and tray structure.

An object of this invention is to provide a freezing receptacle wherein a relatively large number of uniformly shaped ice blocks of a desirable size may be formed in a relatively small space thereby permitting a decrease in the cubic capacity of evaporator units required for producing a given quantity of ice blocks in refrigerator units.

A further object of the invention is to provide an ice tray grid structure having a plurality of generally transversely extending angularly movable grid members mounted on a plurality of generally longitudinally extending grid members.

Another object of the invention is to provide a plurality of relatively movable wall members mounted on a plurality of relatively fixed wall members wherein each relatively movable wall member may be selectively and independently operated relative to the relatively fixed wall members to release a desired quantity of ice from the grid and tray.

A further object of the invention is to provide an ice tray grid structure having a plurality of generally longitudinally extending members provided with vertically spaced stop members adapted to support a plurality of generally transversely extending grid members at an angle to the vertical.

A still further object is to provide a gravity actuated ice tray grid structure wherein a plurality of wall members are movable to one angularly related position by the force of gravity, and may be manually moved to another angularly related position relative to the horizontal to release the ice cubes from the grid and tray structure.

Another object of the invention is to provide an ice tray grid member having a plurality of generally oppositely directed members interconnected through vertically spaced stop members in such a manner that one set of members may move angularly relative to the other from an ice forming position of rest to another angular inclined position by the selective application of force to the movable members to independently move them from the position of rest to release ice.

A further object is to provide an ice tray grid which is so constructed as to permit the mechanical removal of the ice cubes from the grid by a separate application of power to each of a plurality of transverse sections of the grid.

Another object is to provide an ice tray grid which is so constructed as to permit selective manipulation of the transverse or longitudinal grid members to secure the progressive release of either all or a portion of the ice cubes contained therein without first partially melting said cubes.

A further object of the invention is to provide an ice tray grid from which separate ice cubes may be removed selectively either as separate cubes or in multiples of any desired number.

A still further object of the invention is to provide an ice tray grid from which the ice cubes may be released by a relative movement of the separate elements of the grid, and in which a portion of the grid is used as a fulcrum for the application of power to release the cubes from the grid and the tray.

Yet another object is to provide a grid structure having a plurality of longitudinally extending members and a plurality of generally transversely extending members hingedly interconnected in such a manner that means are provided between portions of the longitudinally and transversely extending members to permit the application of force to the hingedly con-

nected members to vary their angular relation relative to the other members to release the ice cubes from the grid and tray.

Other objects and advantages of this invention will be apparent from the following detailed description considered in connection with the accompanying drawings, submitted for purposes of illustration only, and not intended to define the scope of the invention, reference being had for that purpose to the subjoined claims.

In the drawings wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a view in perspective of an ice tray and grid embodying the present invention.

Fig. 2 is a longitudinal section taken substantially on the line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a transverse section taken substantially on the line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a view in perspective of the various parts of the grid shown in separated relationship.

Fig. 5 is a perspective view of one suitable type of wrench or manually operable means adapted for use with the tray and grid structure illustrated.

Fig. 6 is a sectional view taken substantially on the line 6—6 of Fig. 5 looking in the direction of the arrows.

Fig. 7 is a view similar to a portion of Fig. 1, showing a modified form of the invention.

Fig. 8 is a view in perspective of an ice tray and grid embodying a modified form of the present invention.

Fig. 9 is a longitudinal section taken substantially on the line 9—9 of Fig. 8 looking in the direction of the arrows.

Fig. 10 is a transverse section taken substantially on the line 10—10 of Fig. 8 looking in the direction of the arrows.

Fig. 11 is a view in perspective of the various parts of the grid shown in separated relationship; and

Fig. 12 is a perspective view of one suitable type of tool or manually operable means adapted for use with the grid structure disclosed in Figs. 8 to 11 inclusive.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

In the embodiment of the invention shown in Figs. 1 to 6, 10 represents an ice tray of any desired size and shape and 12 represents the grid member, which is constructed to provide a plurality of compartments in which a liquid body is confined within the tray 10 for freezing into cubes or any other desired shape. The grid 12 comprises a plurality of longitudinal partitions or separator members 14 and a plurality of transverse partitions or separator members 16. Each transverse partition 16 is preferably provided with a plurality of vertically disposed slots 18 corresponding in number with the number of longitudinal partitions 14. The slots 18 extend from a point preferably slightly above the central portion of the transverse partitions down almost but not quite to its lower edge as illustrated.

It will be observed that the upper edges of each of the longitudinally extending grid members 14 are formed with compound slots 20 defined by forward edge portions 22 of the longitudinal members 14 which act as stop members to engage the portions of the transverse members 16 above the vertical slots 18 to limit forward movement of the upper edges of the transverse grid members 16. Intermediate edge portions 24 of the longitudinal members 14 act as stop members to engage the portions 26 of the transverse members 16 above the vertical slots 18 to limit rearward or downward movement of the upper edges of the transverse grid members 16.

The lower portions of each longitudinal grid member 14 are preferably formed with apertures or notches 28 which may be rectangular or triangular in form, as illustrated in Figs. 2 and 4, to receive flange portions 30 formed in the transverse grid members 16 below the vertical slots 18 to hold the transverse members in assembled relation relative to the longitudinal grid members 14.

The apertures or notches 28 formed in the longitudinal members 14 are spaced longitudinally with reference to the edge portions 22 and 24 and the movement of each of the transverse grid members 16 is confined in such a manner that when the grid is positioned in a substantially horizontal position, each of the transverse members 16 will be urged by the force of gravity into engagement with its associated edge portion 24. Expressed in a different manner, the upper stop members defined by the edges 22 of the members 14 are spaced rearwardly of the lower stop members formed by the apertures 28. Particularly satisfactory results have been obtained when the angular relation of the transverse grid members 16 relative to the horizontal is approximately 70°. This angle is however merely approximate and may be varied without departing from the spirit of my invention. It is not necessary that the transverse members move through an extended angle, since movement of a few degrees only is sufficient to break the contact between the ice cubes and the grid and tray members. The edge portions 22 may therefore be moved closer to the edge portions 24 if desired. The surface 32 between the edge portions 22 and 24 may be arcuate in shape to correspond generally to the angular movement of the transverse grid members, or may be flat as desired.

Edge portions 34 formed in the upper edges of each of the longitudinal grid members 14 are provided to permit the insertion of a suitable implement or tool between the edge portions 34 of each of the longitudinal members 14 to engage the upper portion 26 of the transverse grid members 16 to move them forwardly toward a vertical position to break the contact between the ice cubes and the grid and tray members. One desirable form of such an implement is illustrated in Figs. 5 and 6 wherein a lever 36 is provided with a curved end portion 38 adapted to engage the upper portion of each of the transverse grid members 16 and the edge portions 34 of the longitudinal grid members 14 to move the transverse members 16 to an angularly inclined position to break the contact between the ice cubes and the tray and grid. It will be observed that the curved end portion 38 of the lever 36

is sufficiently broad to engage both of the longitudinal members 14. If more than two longitudinal members are employed the edge portion 38 should be sufficiently broad to span all of such members. It will be understood that any suitable instrument may be employed to actuate the transverse members 16, and the invention is not limited to the use of the implement shown in Figs. 5 and 6.

To further facilitate the loosening of the grid and the removal of the ice cubes, particularly the cubes associated with the first transverse member, the tray 10 may be provided with a sloping forward wall 40, although it should be understood that the effective operation of the grid is not dependent on a tray of this nature and trays of ordinary shape or construction may readily be used.

It will be understood that using the grid previously disclosed it is possible to remove any number of ice cubes in multiples of three either at one time or at different times during the use of the tray, and the removal of the cubes is greatly facilitated by the progressive movement of the transverse partitions of the grid, since the power applied need merely be directed to the cubes associated with a single transverse member at a time with the result that less resistance is offered to the removal of the cubes. The grid and lever described herein are also of such construction that the forces applied for releasing the cubes are directed against the various partitions of the grid and are not applied directly to the walls of the tray.

The mechanical interconnection of the longitudinal and transverse members forming the grid disclosed in Figs. 1 to 4 hereof is generally similar to that disclosed in my copending application Serial No. 293,261, now Patent No. 2,199,740, May 7, 1940, wherein a single longitudinally extending separator member is employed. If grids having single and double longitudinal separator members are used in pans of the same size, the number of transverse members required may be decreased where a plurality of longitudinal separator members are employed without a reduction in the number of ice blocks being formed. If a grid having a single longitudinal separator member and six transverse separator members is employed, fourteen ice blocks or cubes will be formed at one time. If a grid having two longitudinal separator members is employed in a pan of the same size, the number of transverse members may be reduced from six to four, and fifteen ice blocks or cubes will be formed. The cost of manufacturing the grid can thus be materially reduced because of the elimination of the steps of assembling two transverse members to the longitudinal members.

The force required to actuate the transverse members to release the ice blocks varies dependent on the length of the lever arm through which the force must be applied to move the transverse members. In a grid structure having a single longitudinal separator member the length of this lever arm is the distance between the end of the transverse member and the longitudinal member. In a grid having a plurality of longitudinal members the length of this lever arm is the distance between the longitudinally extending separator members, or the distance from the end of the transverse member to the adjacent longitudinally extending separator member. Where a plurality of longitudinal separator members is employed a shorter lever arm results and less force is required to actuate the transverse members where a plurality of longitudinal separator members is employed than is required to actuate the transverse members where a single longitudinal member is employed.

In the embodiment of Fig. 7 where two longitudinal members 14 are employed, each transverse member 16 may be formed with a knurled section 42 against which the operator may place a thumb or finger to exert a force on the transverse member to move it angularly to release ice from the grid and tray. When the transverse members are actuated in this manner it is unnecessary to employ the lever 36 to exert a force on the transverse members to release the ice since with this construction relatively little force is required to move the transverse members to release the ice blocks. The knurled section 42 may be positioned at any desired point along the upper edge of the transverse members 16, or the operator may selectively grasp the transverse members 16 at any desired point to actuate them to release ice.

The embodiment of Figs. 8 to 12 is similar in certain respects to the embodiments of Figs. 1 to 7 inclusive in that a plurality of longitudinally and transversely extending members is interconnected to provide a grid structure for use in an ice tray pan.

Means are provided whereby the longitudinally and transversely extending members may be selectively moved relative to each other to effect the release of the ice blocks from the grid and tray structure. A grid structure designated as a whole by the reference character 50 is adapted for use with a pan 52 to divide the space within the pan into a plurality of relatively small sections to form ice blocks therein.

In this embodiment of the invention a plurality of substantially vertically disposed transverse members 54 extends across the pan 52 to divide the space within the pan into a plurality of transversely extending rows. A plurality of preferably angularly disposed longitudinally extending separator members 56 is interconnected with the transverse members 54 to divide the transversely extending rows formed by the transverse members 54 into a plurality of relatively small compartments to form ice blocks of a suitable size for domestic or other use.

The transverse members 54 are each provided with spaced compound slots 58 adjacent their upper edges. Each compound slot is defined by outer edge portions 60, intermediate edge portions 62 and inner edge portions 64. Suitable apertures or cutout portions 66 are positioned adjacent the lower edge of each transverse member 54 and are so spaced with relation to the edge portions 60 and 62 as to confine the longitudinal separator members 56 to angular movement between the edge portions 60 and 62.

Each of the longitudinally extending separator members 56 is preferably vertically slotted as indicated at 68 to provide a segment of metal 70 above the slots 68 for reception within the space between the edge portions 60 and 62 of the compound slots 58 formed adjacent the upper edge of each transverse member 54. Each longitudinal member 56 is also provided with a segment of metal 72 adapted to lie within the apertures or cutout portions 66 of the transverse members.

In the operation of this embodiment of the invention the longitudinal members 56 normally lie adjacent the edge portions 62 of the compound slots 58 formed in the transverse members

54 and may be moved angularly toward the outer edge of the pan 52 to effect a wedging action on the ice blocks to release the ice from the grid and tray structure. Any suitable means such for example as a lever 74 having a blade 76 may be employed to actuate the longitudinal members 56 to release the ice. The blade 76 of the lever 74 may be positioned in the space between the edge portions or abutments 64 and the segment of metal 70 of each longitudinal member 56 to fulcrum against the edge portion 64 to move the longitudinal member 56 angularly relative to the transverse members 54 to release ice.

After the longitudinal members 56 have been actuated to release the ice blocks formed adjacent the outer edges of the pan, the ice blocks positioned between the longitudinal separator members 56 may be readily released since these blocks will then only contact the bottom of the pan 52 whereupon they may be readily released. If desired, the lower apertures 66 formed in the transverse members 54 may be so proportioned and positioned relative to the edge portions 60 and 62 of the compound slots 58 formed adjacent the upper edge portions of the transverse members 54 that the final angular movement of the longitudinal members 56 will produce a wedging action between the lower edge of the longitudinal members 56 and the ice blocks formed between the longitudinal members 56 to release them from the bottom of the pan 52.

Using the form of the grid constructions shown, it will be apparent that the operation of the grid for removing frozen cubes or other shaped frozen objects therefrom requires the freeing of only the desired number of such cubes or objects from the grid and the tray. During this operation, the grid and its contents may be securely frozen to the tray except for those particular portions where the transverse members have been moved for the express purpose of freeing the adjacent cubes or objects therefrom. This makes it possible for the housewife or other user to operate the grid readily with one hand while holding the tray and the grid with the remaining frozen cubes or other objects with the other hand. This is a desirable feature of the present grid construction for as it will be seen, there is no necessity for freeing the grid and its contents at one time from the tray and thereafter requiring a separate manipulation by the user to free the grid from the ice blocks.

Features disclosed but not claimed herein are being claimed in my copending application Serial No. 377,099, filed February 3, 1941.

I claim:

1. A grid for an ice tray comprising a plurality of generally vertically disposed transversely extending separator members each having a plurality of compound slots, each of said slots including three spaced edge portions formed adjacent its upper edge, and a plurality of apertures defined by paired relatively closely spaced edge portions formed adjacent the lower edge of each of said members, a plurality of generally longitudinally extending separator members hingedly mounted in said slots and apertures formed in the transversely extending members, each of the lower apertures of each transversely extending separator member being longitudinally spaced relative to one of said compound slots and cooperating therewith to confine one of the longitudinal members to limited angular movement from a position of rest at a substantially predetermined angle with respect to the bottom of the grid, one edge portion of each of the compound slots of each transversely extending separator member forming an abutment spaced from the associated longitudinal member when in the position of rest to provide a space therebetween for the reception of a detached lever whereby force may be selectively exerted against each of the longitudinal members to selectively move said members angularly to release ice.

2. An ice tray grid comprising a plurality of partition elements extending transversely of the grid from one side to the other and having a plurality of sets of slots extending inwardly from the upper edge of each of the partition elements and a plurality of sets of slots extending inwardly from the lower edge of each of the partition elements, a plurality of longitudinally extending partition members extending from one end of the grid to the other and each having a portion extending through one of the upper slots and a second portion extending through a lower slot of each of the transverse partition elements, the upper and lower slots of each set being staggered with respect to the slots of the other set and the walls of the sets of slots cooperating to normally hold each of the longitudinal partition members in a position of rest at a substantially predetermined angle with respect to the bottom of the grid, each slot of each of the upper sets being shaped to provide a pair of confronting wall portions spaced to permit each of the associated longitudinal partition members to swing through a predetermined arc, and third wall portions of each of the transverse partition elements cooperating with each of said longitudinal partition members to provide slots for receiving the end of a lever and to form fulcrums around which such lever may pivot to move said longitudinal partition members from their original position of rest.

3. A grid for an ice tray comprising a plurality of transversely extending separator members adapted to be positioned in a substantially vertical position and each having a plurality of spaced cutout portions adjacent its upper and lower edges, a plurality of independently movable longitudinal separator members mounted on the transverse separator members and having portions projecting into the upper and lower cutout portions of each of the transverse separator members, the lower cutout portions of each of the transverse separator members being defined by relatively closely spaced wall portions and the upper cutout portions each being defined by two relatively widely spaced confronting wall portions, the upper cutout portions being so related to the lower cutout portions that the longitudinal members may each be moved angularly from a substantially predetermined angular position relative to the bottom of the grid, a plurality of abutments formed in each of the transverse separator members below the upper edge thereof and disposed one adjacent each longitudinal separator member to provide a space between the abutment and the longitudinal member above the normal ice freezing level, whereby a detached manually operable tool may be selectively inserted between abutments and a portion of each longitudinal member to exert a force on each longitudinal member to move it angularly relative to the transverse separator members to release ice.

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