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S. W. E. ANDERSSON

2,438,487

ARTICULATED ICE TRAY GRID

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Fig. 1.

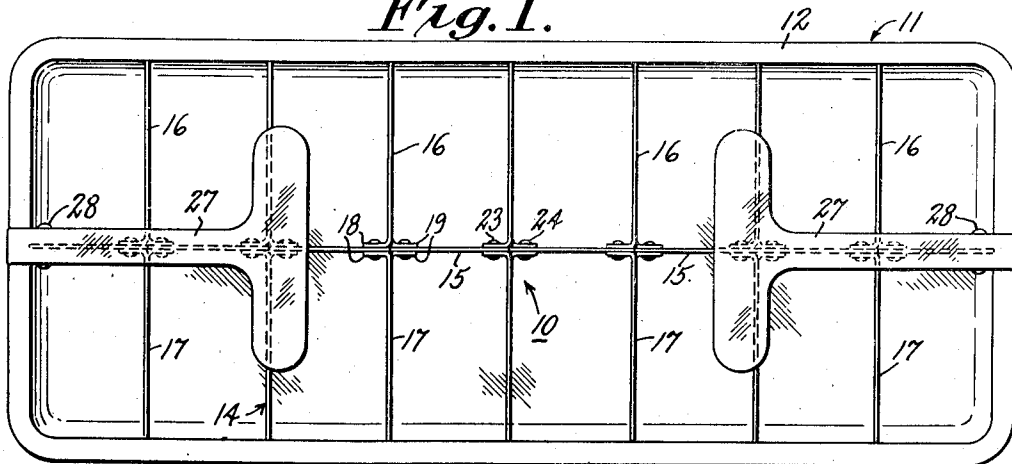


Fig. 2.

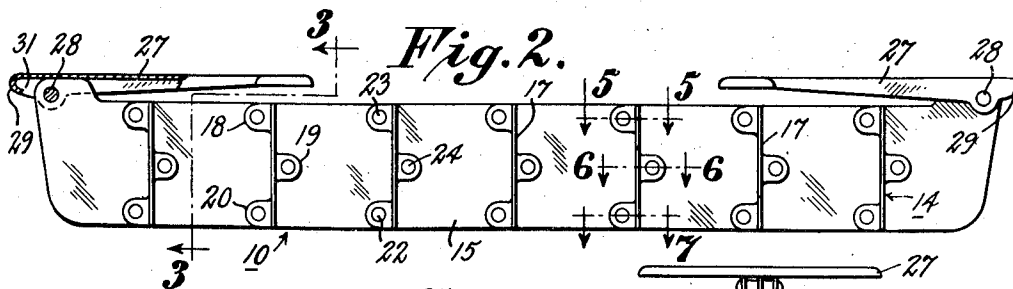


Fig. 4.



Fig. 3.

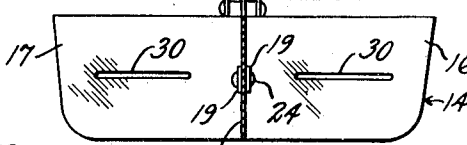


Fig. 5.

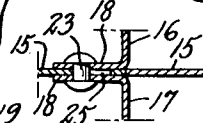


Fig. 6.

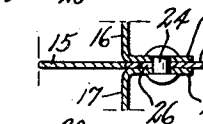


Fig. 7.

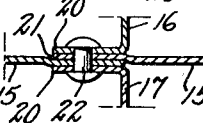


Fig. 9.

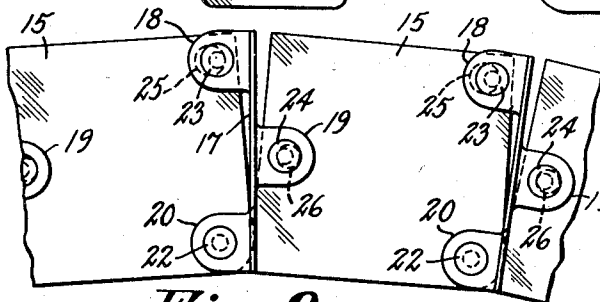
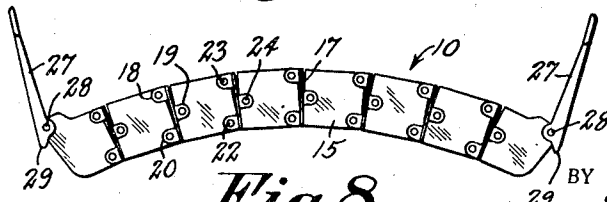


Fig. 8.



INVENTOR.

Soen W. E. Andersson

BY E. A. Fenander his ATTORNEY.

UNITED STATES PATENT OFFICE

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ARTICULATED ICE TRAY GRID

Sven W. E. Andersson, Evansville, Ind., assignor
to Servel, Inc., New York, N. Y., a corporation
of Delaware

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3 Claims. (Cl. 62—108.5)

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My invention relates to refrigeration, and more particularly to ice trays and grids for use in production of ice cubes in refrigerators.

It is an object of the invention to provide an improved distortable grid from which ice cubes are loosened in such a manner that splintering of the ice cubes is minimized. I accomplish this by providing stops to limit distortion or flexing of a grid with the stops being embodied in the grid in such a manner that individual bending or flexing of the grid partitions is promoted. By promoting the flexing or bending of the grid partitions, the peeling action of ice cubes is improved whereby the removal of the cubes or ice pieces from the grid is facilitated.

The invention, together with the above and other objects and advantages thereof, will be better understood from the following description taken in conjunction with the accompanying drawing forming a part of this specification, and of which:

Fig. 1 is a plan view of an ice tray within which is positioned a distortable grid embodying the invention;

Fig. 2 is a side elevation of the grid shown in Fig. 1 removed from the tray;

Fig. 3 is a transverse sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a side elevation of a center dividing member or partition of the grid structure shown in Figs. 1 and 2;

Figs. 5, 6 and 7 are fragmentary sectional views taken on lines 5—5, 6—6 and 7—7 respectively, of Fig. 2 to illustrate the grid more clearly;

Fig. 8 is a view similar to Fig. 2 with the grid distorted or bowed to illustrate the manner in which ice cubes are removed therefrom; and

Fig. 9 is an enlarged fragmentary view of the grid in Fig. 8 to illustrate more clearly the manner in which flexing of the grid partitions is promoted.

In Fig. 1 a grid structure 10 is positioned in a tray 11 having an outward extending flange 12 about the upper edges of the walls thereof. The grid structure 10 comprises a plurality of spaced transverse or cross partitions 14 which are substantially the same depth as the tray 11 and extend between the longitudinal side walls of the latter. Between the cross partitions members 14 are arranged a plurality of aligned center dividing members 15 which are the same in depth as the cross partitions 14. The center dividing members 15 together form a longitudinal partition extending from one end wall to the opposite end wall of tray 11.

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The cross partitions 14 are formed from separate dividing members 16 and 17 disposed at opposite sides of the longitudinal partition. Each of the dividing members 16 and 17 is formed with three tabs or ears 18, 19 and 20. The ears 18, 19 and 20 are at right angles to the portions of the dividing members 16 and 17 forming the cross partitions 14 and are disposed in planes parallel to the center dividing members 15 forming the longitudinal partition.

The center dividing members 15 are provided with ears 21 at a bottom corner, as shown most clearly in Fig. 4, each of which overlaps the bottom corner of an adjacent center dividing member 15. The center dividing member 15 at the left hand end of the grid structure is formed without an ear 21, as shown in Fig. 2. The ear 21 of each center dividing member 15 is directly hinged to the bottom corner of the adjacent center dividing member 15 which it overlaps, as by a rivet 22, for example. The rivets 22 pivotally connecting the center dividing members 15 also extend through openings in the bottom ears 20 of the dividing members 16 and 17, as shown most clearly in Fig. 7. Thus, the rivets 22 pivotally connect the center dividing members 15 and also serve as connectors or fasteners for the dividing members 16 and 17 which make up the cross partitions 14.

The openings in the parts secured together by the rivets 22 are substantially the same size as the rivets, as shown in Fig. 7. When the grid is distorted or bent, as shown in Figs. 8 and 9, the cross dividing members 16 and 17 and center dividing members 15 are angularly spread apart by the hinge connections formed by the rivets 22.

The top tabs or ears 18 are secured by rivets 23 to the upper corners of the center dividing members 15, and the intermediate ears 19 are secured by rivets 24 to intermediate regions of adjacent center dividing members. The rivets 23 and 24 extend through openings or slots 25 and 26, respectively, in the center members 15, the slots 25 and 26 in this embodiment being larger than the rivets 23 and 24 to permit considerable bowing or arching of the grid structure.

The center dividing members 15 at the ends of the grid structure are formed with raised portions to which are pivotally connected levers 27. In the illustrated embodiment the levers 27 are pivotally connected by pins 28 to the ends of the longitudinal partition. When the levers 27 are raised upwardly from the horizontal position shown in Figs. 1 and 2, the short arms 29 thereof press against the upper edges of the end walls

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of tray 11 to remove the grid structure from the tray.

After the grid structure has been removed from the tray, the levers 27 can be moved to the vertical position shown in Fig. 8. The short arms 29 of the levers are formed with catches 31, as shown in Fig. 2, which bear against the vertical edges of the end center members 15 when the levers are raised to the position shown in Fig. 8. After the levers 27 are raised so that the catches 31 contact the end center members 15, further movement of the levers in the same direction causes the transverse partitions 14 and center members 15 to bow or arch, as shown in Fig. 8.

In using the grid structure just described, the grid is positioned in a tray, as shown in Fig. 1, and the tray is filled with water. After the water has been frozen and ice cubes have been produced by placing the tray in a cooling unit of a refrigerator, the tray is taken out of the cooling unit and the grid structure removed from the tray in the manner described above.

To loosen the ice cubes from the grid structure the levers 27 are raised to the vertical position and outward force is applied to the levers to arch or bow the grid structure, as shown in Fig. 8. It is not easy to describe what actually takes place when the grid structure is operated. For purposes of description it is believed best to start with the movement of the partition members from the extreme end of the grid structure toward the center thereof, although the first break or fracture sometimes occurs in other places. When the first breaks or fractures occur at the extreme ends of the grid structure, the action of the grid is substantially as follows: With outward force applied to the levers 27, the force is transmitted directly to the end dividing members 15 whereby the latter are caused to move angularly with respect to the end cross partitions 14. This angular movement of the end dividing members 15 and end cross partitions 14 causes the ice cubes to peel from these parts. After the ice cubes are loosened from the end cross partitions 14 and the rivets 23 and 24 at the extreme end of the grid structure have reached the limit of their movement in the slots 25 and 26, respectively, the force effecting fracture of the end ice cubes from the outer surfaces of the end cross partitions is effectively transmitted across the broken ice bond to cause the ice cubes next to the end ice cubes to peel from the inner surfaces of the end cross partitions 14. The angular movement of the end cross partitions 14 with respect to the center members 15 adjacent to the end center members also causes peeling of the ice cubes from the center members. In this manner the force applied to the levers 27 is transmitted throughout the grid structure until all of the ice cubes are loosened.

It will be seen that the rivet and slot connections of the tabs or ears 18 and 19 and the center dividing members 15 act as stops to limit the extent of arching or bowing of the grid structures. In this way the force effecting fracture at one place is thereafter transmitted across such place of fracture to another place of fracture, as explained above in connection with the peeling of the end ice cubes from the outer surfaces of the end cross partitions 14 and the subsequent peeling of the ice cubes adjacent the end ice cubes from the opposite surfaces of the end cross partitions. Irrespective of where the first fracture or break occurs, whether at the extreme end or at an intermediate region of the grid structure, the stops

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embodied in the grid act to transmit force throughout the grid in the manner just described.

An important feature of the grid structure described above is the location of the tabs or ears 18 and 19. By locating the ears 18 and 19 at different elevations, individual bending or flexing of the cross partitions 14 is promoted. Referring to Fig. 9, for example, force is transmitted to an intermediate region of dividing member 17 by the ear 19 and to an upper region of the dividing member by the ear 18. Since the ears 18 and 19 transmit forces across places of fracture at regions removed from each other, flexing of the dividing member 17 is effected. Stated another way, when the grid structure is bowed or distorted, force is transmitted longitudinally of the grid from one center dividing member 15 to an adjacent dividing member 15 through a path including a vertically extending portion provided by the cross dividing members 16 and 17. The intermediate ears 19 exert a pull in one direction at a center region of the cross dividing members 16 and 17 which is resisted by pulls in the opposite direction at the upper and lower regions of the dividing members 16 and 17 by the top and bottom ears 18 and 20.

While this flexing of the dividing members 16 and 17 making up the cross partitions 14 is slight, nevertheless this action has been found very desirable because the peeling of the ice cubes from the dividing members is improved and the loosening of the ice cubes is facilitated.

If desired, the slots 25 and 26 in the center dividing members 15 may be made the same size or substantially the same size as the rivets 23 and 24. In such case very little bowing of the grid structure takes place when it is distorted. However, the flexing action of the cross partitions is effective to loosen the ice cubes from the grid structure. With very little bowing of the grid structure the ice pieces do not readily fall out and the ice pieces would have to be picked out. By embodying the stops in the grid structure so that the latter opens up to some extent, as in the embodiment illustrated and described, the ice pieces readily fall out with bowing or bending of the grid. When the ice cubes are of sufficient depth so that the slots 25 and 26 are full of ice, force is immediately transmitted throughout the grid when the levers 27 are forced away from each other to cause bending or flexing of the individual cross partitions to effect loosening of the ice cubes from the dividing members. After the ice in the slots 25 and 26 is crushed and the rivets 23 and 24 have reached the limit of their movement in the slots, flexing or bending of the individual cross partitions is effected to insure complete loosening of the ice cubes from the dividing members.

The end cross partitions 14 may be provided with slots 30, as shown in Fig. 3, to facilitate further the loosening of the extreme end ice cubes. With this arrangement small ice rivets are formed at the narrow slots 30. When the grid structure is bowed the likelihood of the end ice cubes loosening first from the end center dividing members 15 is improved by the relative movement of these dividing members and the end ice cubes. With flexing and bending of the end cross partitions 14, the ice rivets in the slots 30 are subsequently broken whereby the end ice cubes are loosened from the outer surfaces of the end cross partitions. With the provision of the slots 30, therefore, the likelihood of the end

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ice cubes first breaking loose from the end center dividing members is increased.

Although a single embodiment of the invention has been shown and described, such variations and modifications are contemplated which fall within the true spirit and scope of the invention, as pointed out in the following claims.

What is claimed is:

1. A grid including a cross partition and center dividing members at opposite sides of said cross partition and at right angles to the latter, said dividing members being movable in opposite directions from said cross partition, means at one elevation to limit separating movement of one of said dividing members from said cross partition, and means at another elevation to limit separating movement of said other dividing member from said cross partition.

2. A bendable grid including a plurality of spaced cross partitions of single wall thickness and a longitudinal partition formed by a plurality of substantially aligned center walls disposed between said cross partitions, means for pivotally connecting the adjacent center walls of the longitudinal partition, the grid being bendable along the longitudinal partition whereby flaring apart of said cross partitions is effected, and spaced connections between each cross partition and the two adjacent center walls so arranged that, when bending force is applied to said grid, force is transmitted from one center wall to a first region of the cross partition and force is also transmitted from the other center wall to a second region of the cross partition removed from the first region to cause warping of said cross partition.

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3. A distortable grid for refrigerators to which ice may freeze comprising a plurality of articulated wall members including partitions of single wall thickness, said wall members being relatively movable with respect to each other, and structure embodied in said grid for applying force couples to said partitions when a distorting force is applied to said grid whereby to cause individual warping of such partitions.

SVEN W. E. ANDERSSON.

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