May 9, 1944. G. M. BLOMQVIST ET AL. 2,348,596

REFRIGERATION

Filed Nov. 2, 1937 2 Sheets-Sheet 1

Fig. 1.

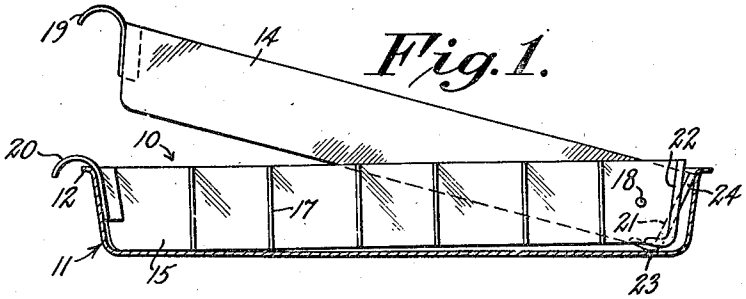


Fig. 2.

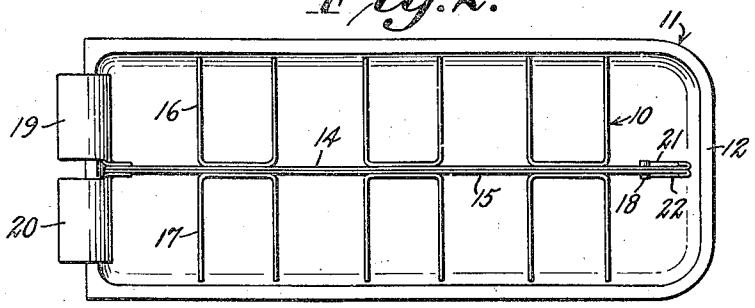


Fig. 3.

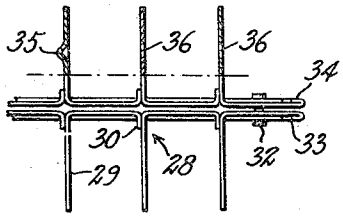


Fig. 4.

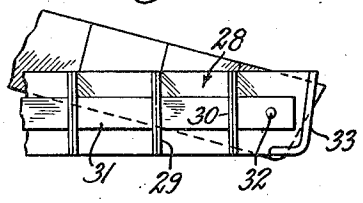
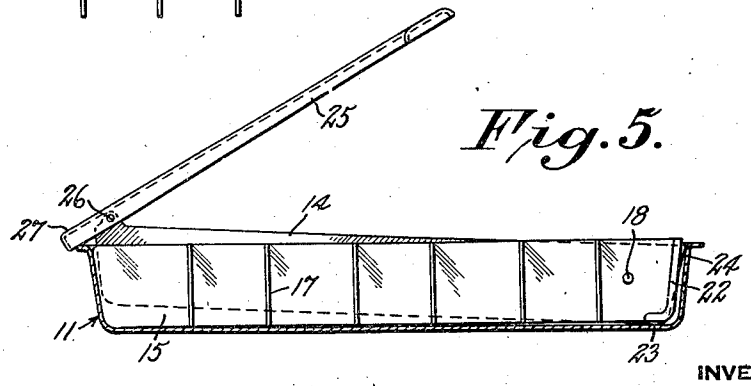


Fig. 5.



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Fig. 6.

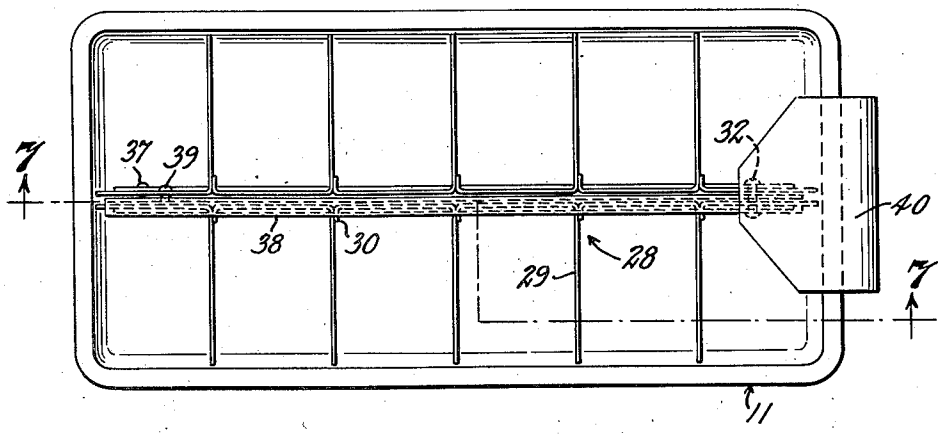


Fig. 7.

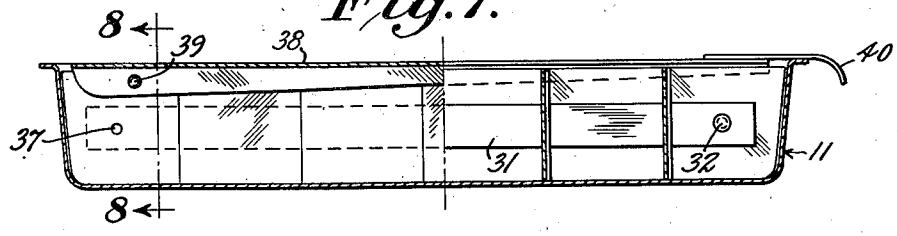


Fig. 8.

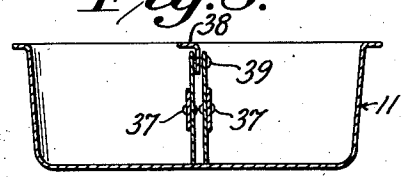


Fig. 9.

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UNITED STATES PATENT OFFICE

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REFRIGERATION

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Application November 2, 1937, Serial No. 172,340
In Germany November 10, 1936

19 Claims. (Cl. 62—108.5)

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

It is an object of this invention to provide an improved grid which can easily be ejected from a tray to break the ice bond between the tray and ice cubes frozen therein. This is accomplished by providing a grid having partitions to form ice cells and including two members forming a partition which are pivotally connected together to operate in a scissors-like manner. The two members pivotally connected together preferably form the longitudinal partition of the grid and serve as lever arms of mechanism to eject the grid from a tray.

A force multiplying device may be provided to raise one of the members of the longitudinal partition to remove the grid from a tray. The force multiplying device, such as a lever, may be arranged to cooperate between one of the members and a tray or between the pivotally connected members.

It is another object of this invention to provide a grid of this character which is flexible and from which a desired number of ice cubes can easily be removed by twisting or bending the grid after it has been removed from a tray.

The above and other objects and advantages of this invention will be better understood from the following description taken in conjunction with the accompanying drawings forming a part of this specification, and of which Fig. 1 is a vertical sectional view of a grid and tray embodying the invention; Fig. 2 is a plan view of the grid and tray shown in Fig. 1; Fig. 3 is a fragmentary horizontal sectional view of a grid illustrating a modification of the invention; Fig. 4 is a fragmentary view in elevation of the grid shown in Fig. 3; Fig. 5 is a sectional view similar to Fig. 1 and illustrates a further modification in which a grid is provided with a lever which cooperates with a tray; Fig. 6 is a plan view of a grid and tray illustrating a still further modification in which one part of the grid is provided with a force multiplying lever which cooperates with another part of the grid; Fig. 7 is a sectional view taken on line 7—7 of Fig. 6; Fig. 8 is a sectional view taken on line 8—8 of Fig. 7; and Fig. 9 is a sectional view similar to Fig. 7 with the lever in its raised position.

Referring to Fig. 2, a grid 10 is shown positioned in a shallow ice tray 11 having a resilient bottom and side walls. The tray is made of a suitable metal, such as aluminum or stainless steel, for example, and about the upper edges of the side walls is provided an outward extending flange 12.

The grid 10 comprises a pair of abutting walls or members 14 and 15 which form a longitudinal partition extending between the end walls of the tray 11. A plurality of U-shaped members 16 and 17 are secured to the walls 14 and 15, as by spot welding, for example, to provide transverse partitions which extend to the longitudinal side walls of the tray 11.

The longitudinal walls 14 and 15 are pivotally connected together at one end at 18, as by a pin or rivet, and the opposite ends are each provided with separate handles 19 and 20. The pivotally connected ends of the walls 14 and 15 are provided with reinforcing members 21 and 22 to increase the bearing surface of the portions of the grid which contact the tray 11 when the grid is removed from the tray.

In using the grid just described, the grid is positioned in the tray and the latter is filled with water. After the water has been frozen and ice cubes have been produced by placing the tray in a cooling element of a refrigerator, the tray is removed from the cooling element.

In order to remove ice cubes from the tray 11, one of the longitudinal walls 14 or 15 is raised by means of its associated handle 19 or 20. If the longitudinal wall 14 is raised, for example, it turns about the pivotal connection 18 with the extreme right-hand end bearing against the bottom of the tray at 23. The pivotal connection 18 is raised upward whereby the longitudinal wall 15 is raised and the ice bond is readily broken between the tray and ice cubes. In operating the grid, therefore, walls 14 and 15 are angularly moved with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection 18.

The grid 10 may be arranged to distort an end wall of the tray when one of the members 14 or 15 is raised. As shown in Fig. 1, when the longitudinal wall 14 is raised, the right-hand edge 24 bears against the end wall of the tray. The force exerted by the wall 14 against the end wall causes deformation of the latter and assists in breaking the ice bond between the tray and ice cubes.

A force multiplying device may be employed to raise one of the longitudinal walls 14 or 15. As shown in Fig. 5, such a device may consist of a lever 25 which is pivoted at 26 to the longitudinal wall 14. The lever 25 normally is disposed in a horizontal plane with the outer end 27 projecting beyond an end wall of the tray 11.

By providing the lever 25 which cooperates with the tray 11, the force employed in raising the lever is multiplied to effect raising of the longitudinal wall 14.

The advantage of a grid of this character is that parts of the grid form a mechanism for removing the grid from a tray. Since the pivotal connection 18 is at one end of the grid, a greater part of the longitudinal wall 14 is available as a lever arm when it is raised. The force developed or used to raise the longitudinal wall 14 is multiplied or increased to effect raising of the longitudinal wall 15 because of the scissors-like connection of the longitudinal walls. Since the initial force exerted to remove the grid is multiplied through parts of the grid structure, considerably less force is required to remove a grid of this character than in the usual type of grid in which no force multiplication takes place.

In Figs. 3 and 4 is shown a modification of the embodiment just described in which the abutting longitudinal walls of the grid are flexible. The flexible grid shown includes a plurality of L-shaped members 28 arranged to form abutting longitudinal walls and a plurality of spaced transverse partitions or dividing members 29. The sides of the L-shaped members 28 forming portions of the longitudinal walls are provided with outward turned ends 30. In the sides 29 and ends 30 of the L-shaped members 28 are provided vertical slots through which extend flexible metal strips 31 which are about one-third the height of the partitions. The strips 31 are located close to the longitudinal walls of the grid and may be secured at their ends, as by welding, to the end L-shaped members 28. The longitudinal walls are pivotally connected together at one end at 32, and the other ends may be provided with handles or a force multiplying lever, as shown in Fig. 1 or 5. As in the embodiment of Fig. 1, the end L-shaped members 28 adjacent the pivotal connection 32 are provided with reenforcing members 33 and 34.

The flexible grid of Figs. 3 and 4 is removed from a tray in the same manner as described above in connection with the grids of Figs. 1 and 5. After the grid has been removed from a tray with the ice cubes clinging thereto, one part of the grid may be turned 180° with respect to the other part of the grid. The ice cubes are readily released by flexing of the grid. In many instances it is only desired to remove a few ice cubes. With the flexible grid of Figs. 3 and 4, one part of the grid can be flexed sufficiently to remove the desired number of ice cubes, and thereafter the grid may be replaced in the tray with the remaining ice cubes adhering thereto.

In order to prevent inadvertent loosening of ice cubes from the grid, each transverse partition may be provided with a projection 35 which is punched out of a side wall 29, as shown in Fig. 3. Openings 36 may be formed in the side walls 29, as also shown in Fig. 3, whereby adjacent ice cubes are partly frozen together. The openings 36 preferably are of such size that the ice cubes will normally cling to the grid and at the same time will readily break away from the partitions when the longitudinal walls are flexed or twisted.

In Figs. 6 to 9 inclusive is illustrated a further modification in which a force multiplying device cooperates between the two parts of the grid. The grid in this modification is similar to that shown in Figs. 3 and 4. The right-hand ends of the strips 31 are secured to the end L-shaped members 28 at the pivotal connection 32 and the left-hand ends are secured at 37 to the other end L-shaped members 28, as by spot welding, for example.

The grid of Figs. 6 to 9 inclusive further includes a lever 38 which is substantially the length of the grid and is pivotally connected at 39 to an end of one of the longitudinal walls. The lever 38 is normally disposed horizontally above the grid and is provided with a handle portion 40 which extends over an end wall of the tray. The lever 38 is L-shaped in cross-section, as shown in Fig. 8, and in its horizontal position the horizontal arm thereof is spaced from the longitudinal wall to which it is not connected.

When the lever 38 is first raised by the handle 40, the portion of the horizontal arm at the end adjacent the pivotal connection 39 bears against one of the longitudinal walls of the grid. With continued upward movement of lever 38, the longitudinal wall to which it is connected is raised. This raises the pivotal connection 32 which operatively connects the two parts of the grid, whereby the other longitudinal wall is also raised and the ice bond is broken between the tray and ice cubes frozen therein.

In addition to the reenforcing members 21 and 22 in Fig. 1 and reenforcing members 33 and 34 in Fig. 4, the tray 11 may also be provided with reenforcing members at the regions against which the longitudinal walls bear when the grid is removed from the tray. Instead of providing reenforcing members, the tray may be hardened at the regions subjected to wear.

Although several embodiments of the invention have been shown and described, it will be apparent that various modifications and changes may be made without departing from the spirit and scope of the invention, and that certain features may be employed independently of others, as pointed out in the following claims.

What is claimed is:

1. A grid for refrigerators having partitions to form ice cells and comprising a double walled partition including two members in side by side relation and closely adjacent to each other, and means pivotally connecting said members intermediate the ends thereof so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection.

2. For use in a shallow ice tray of ice freezing apparatus, a grid including a longitudinal partition and spaced transverse partitions, said longitudinal partition comprising two members pivotally connected together at one end of the partition so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection.

3. A grid for refrigerators including a longitudinal partition comprising two members in side by side relation throughout their length, transverse partitions carried by said longitudinal partition, and means pivotally connecting said members together at a region intermediate the ends of said partition and between the upper and lower edges thereof so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about the pivotal connection.

4. A grid for use in a shallow ice tray and including transverse partitions and a double walled longitudinal partition, and means operatively connecting the walls of said longitudinal

partition whereby, when said grid is fitted into a tray, lifting force applied to one wall is transmitted by said wall to said means and thence to the other of said walls to effect lifting of the other wall and relative movement between said walls.

5. A flexible grid for refrigerators having partitions to form ice cells and comprising a double walled partition including two flexible members in side by side relation and closely adjacent to each other, and means to pivotally connect said members intermediate the ends thereof so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection.

6. For use in a shallow tray of ice freezing apparatus, a grid including spaced transverse partitions and a double walled longitudinal partition, the walls of said longitudinal partition being flexible and pivotally connected together adjacent one end of said longitudinal partition so that said walls are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection.

7. A grid as set forth in claim 6, in which at least one of said transverse partitions is provided with a projection to prevent inadvertent loosening of ice clinging thereto before the walls of said longitudinal partition are angularly moved with respect to each other.

8. A grid as set forth in claim 6, in which at least one of said transverse partitions has an opening therein to permit an ice bond to be formed between adjacent ice blocks on opposite sides thereof.

9. A grid for refrigerators having partitions to form ice cells and comprising a double walled partition including two members in side by side relation and closely adjacent to each other, means to pivotally connect said members intermediate the ends thereof so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection, and means to move one of said members relative to the other.

10. A grid for use in a shallow ice tray and including transverse partitions and a longitudinal partition, said longitudinal partition comprising two members pivotally connected together adjacent one end of said longitudinal partition so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection, and a lever pivotally connected to one of said members at the opposite end of said longitudinal partition and operative to move one of said members relative to the other.

11. In ice freezing apparatus, the combination of a tray, a grid removably fitting in said tray and including spaced transverse partitions and a longitudinal partition, said longitudinal partition comprising two members pivotally connected together so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection, and a force multiplying device to effect movement of one of said members relative to the other.

12. For use in a shallow ice tray of ice freezing apparatus, a grid including transverse partitions and a double walled longitudinal partition, and means so pivotally connecting the walls of said longitudinal partition that, when said grid is fitted in the tray, lifting of only one wall adjacent one end produces leverage effect to cause lifting of the other wall.

13. For use in a shallow ice tray of ice freezing apparatus, a grid including transverse partitions and a double-walled longitudinal partition, means operatively connecting said walls adjacent one end of said longitudinal partition so that said walls are angularly movable relative to each other into overlapping relation in a scissors-like manner, and means to so lift one of said walls at the other end that, when said grid is fitted in the tray, a greater part of said lifted wall is effective as a lever arm of force multiplying mechanism embodied in said grid to produce leverage effect to cause lifting of the other wall.

14. In ice freezing apparatus, the combination of a shallow ice tray, a grid removably fitting in said tray and including spaced transverse partitions and a double walled longitudinal partition, said longitudinal partition comprising two members pivotally connected together so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivotal connection, and means cooperating with said tray and one of said members to effect relative movement of said members.

15. A grid adapted to fit in a shallow tray for producing ice pieces and comprising wall structure including a double walled partition comprising two members in side by side relation, said members having openings intermediate the ends thereof, said openings being disposed between the upper and lower edges of said members and at a distance from but nearer one end of said partition than the opposite end, means including a pin extending through said openings for pivotally connecting said members, and a handle connected to an opposite end of one of said members for raising said one member with respect to the other of said members.

16. In ice freezing apparatus, the combination of a tray, a grid removably fitting in said tray and including vertical partitions to form ice cells, one of said partitions comprising two walls or members arranged in side by side relation, structure providing an operative connection between said walls, said structure being so arranged as to maintain said walls in said relation and being so located that when a lifting force is exerted on one of said walls when the grid is fitted in said tray, said lifting force is transmitted to said other wall to effect lifting of such other wall and relative movement between said walls.

17. In ice freezing apparatus, the combination of a shallow tray, a grid removably fitting into said tray and including transverse partitions and a double-walled longitudinal partition, structure providing an operative connection between the walls of said longitudinal partition, said structure being so arranged as to maintain said walls in said relation and being so located that when lifting force is exerted on one of said walls when the grid is fitted in said tray, said lifting force is transmitted to said other wall to effect lifting of such other wall and relative movement between said walls, and a member connected to said one wall and arranged to cooperate with said tray to produce said lifting force.

18. In ice freezing apparatus, the combination

of a shallow tray, a grid removably fitting into said tray and including a plurality of spaced transverse partitions and a double-walled longitudinal partition, structure providing an operative connection between the walls of said longitudinal partition, said structure being so arranged as to maintain said walls in said relation and being so located that when a lifting force is exerted on one of said walls when the grid is fitted in said tray, said lifting force is transmitted to said other wall to effect lifting of such other wall and relative movement between said walls, and a member connected to said one wall arranged to cooperate with said other wall to produce said lifting force.

19. In ice freezing apparatus, the combination of a tray, a grid removably fitting in said tray and including a longitudinal partition and spaced transverse partitions carried thereby, said longitudinal partition comprising two members pivotally connected together so that said members are angularly movable with respect to each other into overlapping relation in a scissors-like manner about an axis coinciding with the pivoted connection, and a force multiplying device to effect movement of one of said members relative to the other.

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