

April 16, 1940.

R. L. HALLOCK

2,197,378

ICE TRAY

Filed Aug. 10, 1937

2 Sheets-Sheet 1

Fig. 1.

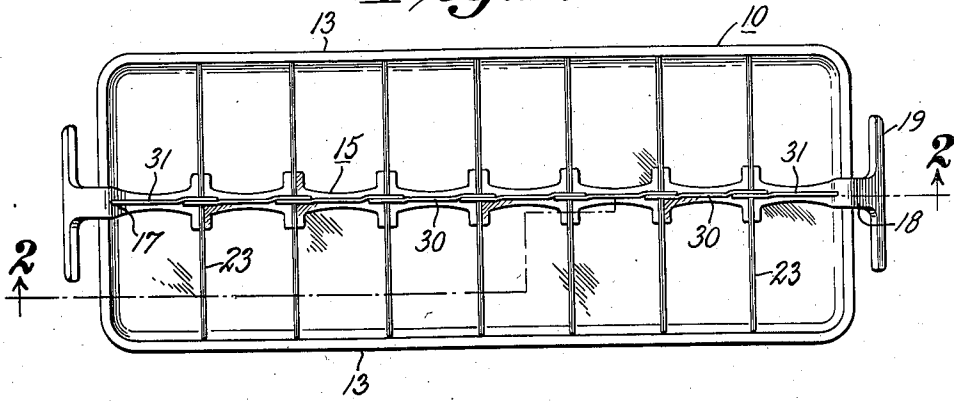


Fig. 2.

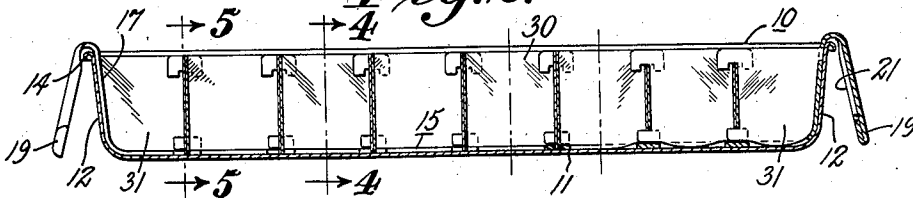


Fig. 3.

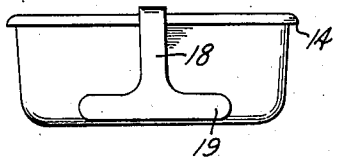


Fig. 6.

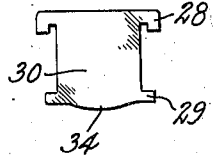


Fig. 7.

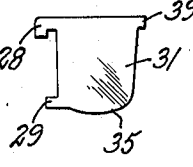


Fig. 4.

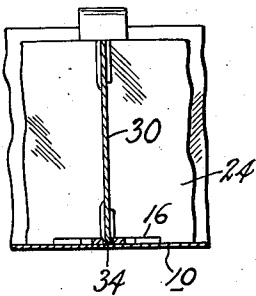


Fig. 5.

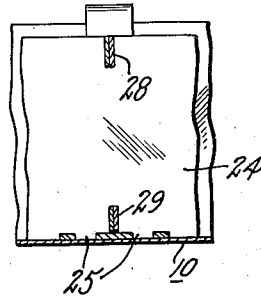
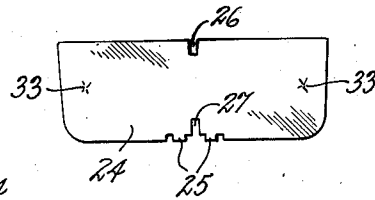


Fig. 8.



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2 Sheets-Sheet 2

Fig. 9.

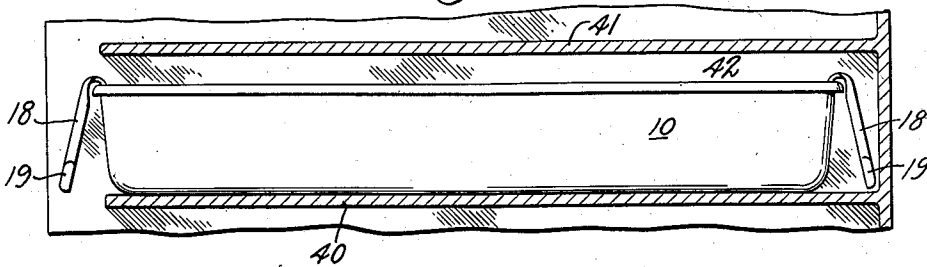


Fig. 10.

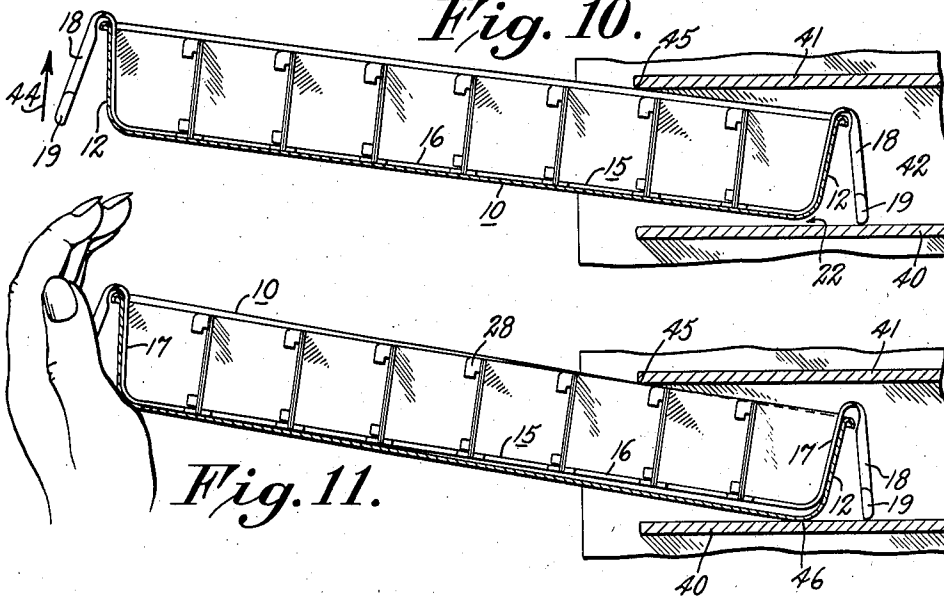


Fig. 11.

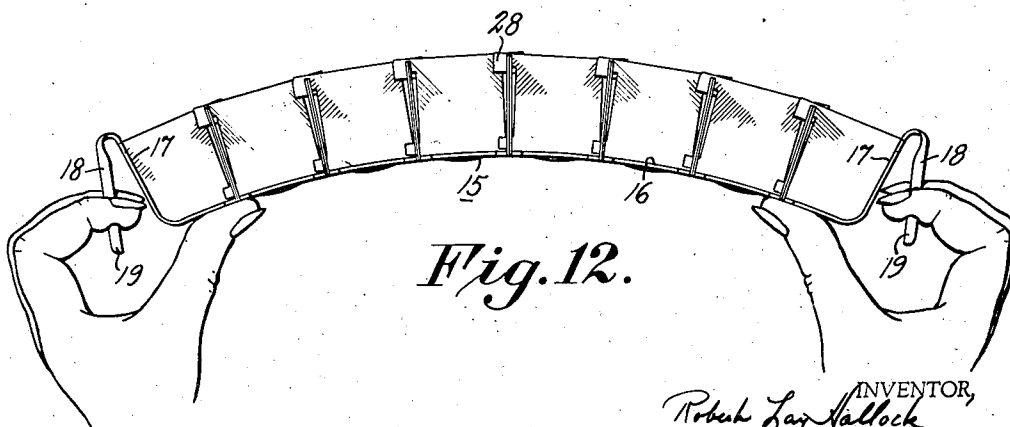


Fig. 12.

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UNITED STATES PATENT OFFICE

2,197,378

ICE TRAY

Robert Lay Hallock, Larchmont, N. Y.

Application August 10, 1937, Serial No. 158,276

12 Claims. (Cl. 62—108.5)

My invention relates to ice trays, to grids for ice trays, the removal of grids from ice trays, and the removal of ice cubes from grids. The object of my invention is to simplify these various removals.

In accordance with the preferred form of my invention, I employ a grid of the kind which is bowed, or arched, for removal of cubes. A grid of this kind is disclosed and claimed in my co-pending application, Ser. No. 147,238, filed June 9, 1937. The grid shown in that application employs levers at the ends for assisting in removal of the grid from the tray and constituting extensions of the grid backbone for assisting in distorting the grid. In accordance with the present invention, the levers are omitted and I provide the grid with rigid extensions which project downwardly over one or both ends of the tray and which extensions are constructed in such manner that on cocking the tray, with the grid in it and ice frozen therein, between adjacent super-imposed shelves of an evaporator, and exerting pressure on the tray, the grid with ice cubes thereon is separated from the tray. This action and the structure incident thereto will be understood from reference to the following more detailed specification of the preferred form of the invention.

Referring to the accompanying drawings which form a part of this specification:

Fig. 1 is a top or plan view of the tray and grid assembly;

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is an end view of the tray and grid assembly;

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 2;

Fig. 6 is a side view of an intermediate longitudinal element of the grid;

Fig. 7 is a side view of an end longitudinal element of the grid;

Fig. 8 is a side view of a transverse element of the grid;

Fig. 9 is a vertical cross-sectional view of an evaporator with a grid and tray assembly in accordance with the invention therein;

Fig. 10 shows the tray and grid cocked in the evaporator;

Fig. 11 shows the relative position of the parts in the evaporator just after applying pressure to the tray; and

Fig. 12 shows the grid bowed.

Tray 10 is shallow as shown and of greater length than width. The height of the tray is preferably not greater than one-half the width. The tray is preferably made of relatively thin sheet material such as aluminum or stainless steel, and has a flat bottom 11, vertical end walls 12, and vertical side walls 13. The tray is preferably formed with an upper turned-over edge or flange 14, to provide strength and to prevent buckling in bending.

The grid includes a longitudinally extending backbone member 15. This member includes a bottom portion 16 extending substantially the full length of the grid. Portion 16 rests against the inside bottom surface of the tray when the grid is positioned in the tray. At each end, member 15 extends upwardly in the form of parts or portions 17. These parts extend upwardly just inside the end walls 12 of the tray and rest against the end walls when the grid is in position in the tray. The parts 17 project over the end walls 12 of the tray and then the backbone member 15 continues in downward preferably rigid extensions 18, and at the bottoms of extensions 18 are transverse portions 19 which form a bearing surface for pressure between the backbone member and an evaporator shelf and which serve for manipulation in bowing the grid as shown in Fig. 12. I prefer to make the overhanging end parts in the form of an inverted T. The rigidity of the extension 18 may be obtained by flanging this part at the edges as shown at 21 in Fig. 2. The handle and bearing part 19 may be formed by bending over the metal. It will be understood, however, that the member 15 need not be continuous all the way from one end part 19 to the other end part 19, but may be made up of one, two or more parts as desired.

For reasons which will later appear, the overhanging parts 18 (including transverse parts 19) extend downwardly to substantially the plane of the lowest surface of the part 16. With the parts assembled and with the tray resting on an evaporator shelf, or other horizontal surface, the bearing should be on the bottom surface of the tray and the handles 19 should not touch the surface. In other words, the handle 19 should not lift the tray so as to lose good contact surface with the shelf. On the other hand, the overhanging extensions should not end materially above the bottom of the grid. In cocking the tray and grid assembly in the evaporator, the bottom of the tray should be raised from the supporting shelf, as shown at 22 in Fig. 10. The grid is symmetrical.

The backbone member 15 is preferably made of spring steel or other similar material, such that the grid can be bowed as shown in Fig. 12, but will return to its normal position as shown in Figs. 1 and 2 when the bending pressure on the grid is removed.

Mounted on the backbone member 15 are transverse dividing members 23 and longitudinal members 30, 31. Each transverse dividing member or wall 23 is made of two plates 24 as shown in Fig. 8. These plates are preferably of thin stainless steel of a thickness, for example, on the order of ten to twenty thousandths of an inch. Each plate 24 is formed to have projections 25 at its lower edge. These projections extend into apertures in member 15 and are welded to member 15 or may be upset, like rivet heads, for securing plates 24 to the member 15, or the securing may be by other means. These plates are also formed to have upper recesses 26, and lower recesses 27 for receiving upper hook-like projections 28 and lower projections 29 of the longitudinal dividing members 30 and 31 shown in Figs. 6 and 7. The two plates 24 of each wall 23 are spot-welded together at each side, as at 33, but are otherwise free to separate.

The longitudinal central wall of the grid is made up of end pieces 31 and intermediate pieces 30. These are likewise preferably made of thin stainless steel and made of the same thickness as the plates 24, or somewhat thicker. These longitudinal dividing pieces have lower extensions 34 (Fig. 6) and 35 (Fig. 7) which extend into slots centrally of the backbone member 15. The projections 29 are held under the transverse wall members 23 and the upper projections 28 are hook-like and extend through the slots 26. Projections 28 have such spacing under the hooks as to permit adjacent plates 24 to separate as they cling to the ice when the grid is bowed. After bowing the grid to a certain arc, further bowing results in the hooks 28 contacting the transverse plates 24 and peeling them away from the ice. This action and the specific structure may be understood by reference to said copending application Ser No. 147,238, filed June 9, 1937, the disclosure of which is incorporated herein by reference.

The height of the dividing members 22 and 23 is such that the top of the grid is below the top edge of the tray (except for the end overhanging). The end pieces 31 may be anchored in slots in the backbone 15 by means of projections 39 (Fig. 7).

In operation, the grid is disposed in the tray as shown in Figs. 1 and 2 and the tray is filled with water to a height not exceeding the top of the dividing walls 22 and 23. The assembly with the water is then placed in an evaporator as shown in Fig. 9. The evaporator includes a shelf 40 on which the tray rests and a shelf or other higher disposed part 41. We may say that the parts 40 and 41 bound a pocket or compartment 42 for receiving the tray and grid, which compartment has a floor consisting of the top surface of shelf 40 on which the tray rests, and a roof consisting of the under-side of shelf, or upper structure 41, and it will be seen that the tray rests squarely on the floor of the compartment 42 and that the handle 19 at the inward end is just above the floor of compartment 42.

When the ice is frozen, the operator can remove the tray by grasping the handle 19 at the outward end. A lever release device of known kind may be applied to the tray to break the ice

bond between the tray and the shelf 40. The tray is now partially removed from the pocket 42 to a point such that better than one-half the tray is out of the pocket 42. The tray is then pushed upwardly by application of force as shown by the arrow 44 in Fig. 10. In the position shown in Fig. 10, the tray is cocked between shelves 40 and 41. The tray does not touch shelf 40 but the lower end of handle 19 is the only part of the assembly which touches shelf 40. The upper edge of the tray at the two sides contacts the roof or shelf 41 at 45. Further upward pressure at the outer end of the tray causes the grid with ice attached thereto to be sheared and peeled from the tray. The separation is illustrated in Fig. 11. The limit of movement is determined by the contact of the tray with shelf 40, at 46, and the contact of the ice block and grid with the edge of the upper shelf 41 at 45. I have found in actual operation that the separation takes place easily and quickly. The action be analyzed as follows: The assembly shown in Fig. 10 may be considered as a beam loaded as follows: There is an upward force at the outer end of the tray produced by the upward push of the hand. There is an upward force at the bottom of the inner handle 19. There is a downward force or pressure exerted at 45. Thus, the two overhanging extensions 18 are in compression and the assembly is subjected to bending like a beam supported at the ends and subject to a downward concentrated load at an intermediate point between supports. With this loading of a beam, the upper fibers above the neutral axis are in compression and the lower fibers are in tension. External shear on such a beam results in internal shear which acts not alone vertically, but horizontally, and in other directions. A beam so loaded may be likened to a series of layers in which there is shearing stress between the layers as they tend to slide on each other. In this case, so far as concerns the bond between ice and tray, the internal shear should be greatest at the end (right-hand end in Fig. 10) which is in the pocket 42, since the tray has been removed beyond the middle point and since shear is greatest at a vertical intermediate point. Consequently, the upward forces cause shearing internally of the assembly, which shearing acts along the surface between the member 15 and the inside surface of the tray. Consequently, shearing takes place at the end, and when breaking is accomplished at this point, peeling takes place rapidly along the plane of bond between the ice cake and the inside surface of the pan or tray. It will be noted in this connection that the grid is so made as to be reinforced against tension at the bottom and so that in the position shown in Fig. 10, the top can take compression. There are no pockets in the upper part of the grid which can collapse under the bending moment applied.

The separation having been accomplished, the operator can now place the fingers and thumbs as shown in Fig. 12 to apply force-coupled to the ends of the grid. This bows the grid and the ice cubes are released. As above stated, the fan-like bowing causes separation of the walls 24, thereby resulting in the peeling of these walls from the ice cubes. This peeling action is facilitated by the welding at 33 (Fig. 8). After a certain amount of movement, the hook projections 28 pull the transverse walls together. The bowing upwardly of the bottom portion 16 causes

an upward pressure against each ice cube which assists in release of the ice cubes.

Obviously, variations may be made with the scope of the invention.

5 What I claim is:

1. An ice tray and grid combination, including a relatively rigid tray to hold water, and a grid fitting therein having a projecting part overhanging the tray, said tray extending above
10 an intermediate part of said grid, said projection extending downwardly somewhat short of the bottom of the tray, and said grid being constructed to resist bowing of the ends upwardly.

2. Apparatus as defined by claim 1, in which the overhanging part extends downwardly and terminates above the plane of the bottom of the tray, but not much above, so that the tray can rest on its bottom when placed on a horizontal surface, but when tilted, the bottom of the projection touches the horizontal surface.

3. Apparatus as defined by claim 1 so constructed that on applying a couple such that one force acts against the projection and the other against the edge of the tray, internal shear
25 causes the tray to be peeled from the grid with ice cubes attached.

4. In the making of ice with a tray adapted to contain an insert and severing the ice block therefrom, the insert being movable with respect to the tray, the improvement which consists in freezing the water onto such an insert having a projection extending outwardly of the tray, and abutting spaced parts of the tray and projection against surfaces spaced a greater distance apart than the height of the tray to apply a force couple to the tray and ice block such that one force of the couple acts against the projection in one direction and the other force acts against the tray in the opposite direction to remove the insert with respect to the tray to
40 loosen an ice bond.

5. The combination with an evaporator having an ice tray receiving pocket having a floor and a ceiling, of an ice tray adapted to be placed
45 in said pocket, and a grid fitting the ice tray, said grid having an overhanging downward projection, the length of said projection being such that it is above and out of contact with the floor of the pocket when the tray with grid therein rests on the floor of the pocket and such that it contacts the floor of the pocket when the tray is partially removed from the pocket and lifted at its outer end to contact the ceiling of the pocket, the length of said projection being also such
50 that when so partially removed and lifted, the tray is entirely free of contact with the floor of the pocket.

6. Structure as defined by claim 5 in which, when the tray is partially removed from the pocket and lifted at its outer end to contact the ceiling of the pocket, all parts are positioned to be out of contact with the ceiling except the tray edge and all parts are positioned to be out of contact with the floor except the projection
65 on the grid.

7. A grid for an ice tray having a bowable longitudinal member extending upwardly at each end and then downwardly and terminating above the bottom of the grid, said grid including a
70 plurality of separate members mounted on said longitudinal member adapted to be spread on bowing said longitudinal member.

8. An ice tray and grid combination including a metal tray and a metal grid therein having a bottom backbone adapted to be bowed, extensions at the ends of the backbone overhanging the tray and extending substantially to the bottom of the tray, and dividing members mounted on said backbone, said grid being bendable downwardly at the ends but not upwardly relative to the middle.

9. The combination with an evaporator having an ice tray receiving pocket having a floor and a ceiling, of an ice tray adapted to be placed in said pocket, and a grid fitting the ice tray, said grid having an overhanging downward projection, the length of said projection being such
15 that it is above and out of contact with the floor of the pocket when the tray with grid therein rests on the floor of the pocket and such that it contacts the floor of the pocket when the tray is partially removed from the pocket and lifted at its outer end to contact the ceiling of the pocket, the length of said projection being also such that when so partially removed and lifted, the tray is entirely free of contact with the floor of the pocket, said grid having its top part below the upper edge of the tray at intermediate points of the tray to permit the grid to rise in the tray on pushing upwardly on the tray when partially in the pocket, and said grid including a bendable backbone and individual normally
30 abutting division members mounted on said backbone.

10. The combination with an evaporator having an ice tray receiving pocket having a floor and a ceiling, of an ice tray adapted to be placed
35 in said pocket, and a grid fitting the ice tray, said grid having an overhanging downward projection, the length of said projection being such that it is above and out of contact with the floor of the pocket when the tray with grid therein rests on the floor of the pocket and such that it contacts the floor of the pocket when the tray is partially removed from the pocket and lifted at its outer end to contact the ceiling of the pocket, the length of said projection being also such
45 that when so partially removed and lifted, the tray is entirely free of contact with the floor of the pocket, said grid having its top part below the upper edge of the tray at intermediate points of the tray to permit the grid to rise in the tray on pushing upwardly on the tray when partially in the pocket.

11. In the method of removing ice from a tray and grid of the kind in which the grid is of lower height than the tray at an intermediate transverse section and has a rigid projection overhanging the tray and in which the grid is rigid against compressive distortion, the steps of placing the tray, grid and frozen contents between surfaces spaced a greater distance apart than the height
60 of the tray so that one surface contacts the overhanging projection of the grid and the other contacts the tray at the intermediate transverse section, and pushing on the tray and contents so as to increase the pressure at the surfaces to separate the grid from the tray.

12. The improvement defined by claim 4 in which the force couple is applied by holding the tray partly within a pocket of an evaporator and exerting pressure upwardly on the extended
70 part of the tray.

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