

Feb. 10, 1948.

H. E. SMITH

2,435,802

LIQUID FREEZING DEVICE

Filed June 30, 1944

2 Sheets-Sheet 1

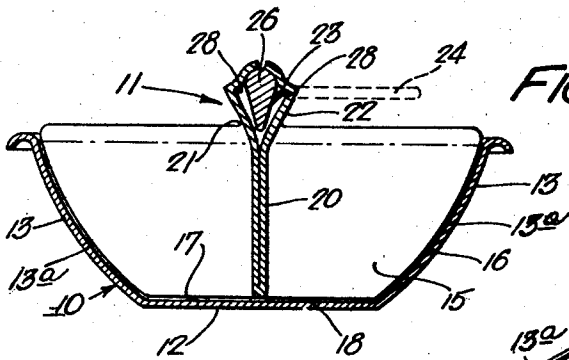


FIG. 2.

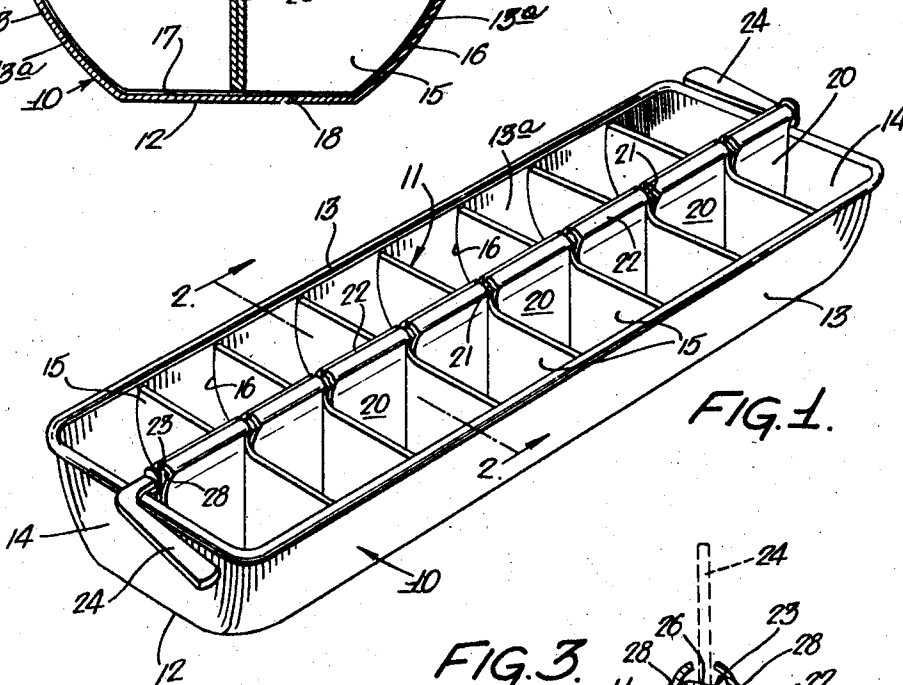


FIG. 1.

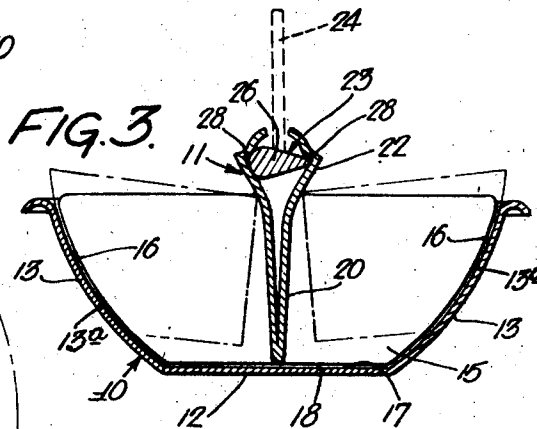


FIG. 3.

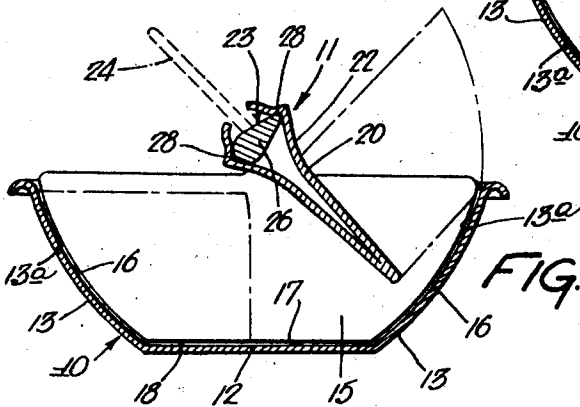


FIG. 4.

INVENTOR.
Helen E. Smith
BY
Howson & Howson
Attys.

Feb. 10, 1948.

H. E. SMITH

2,435,802

LIQUID FREEZING DEVICE

Filed June 30, 1944

2 Sheets-Sheet 2

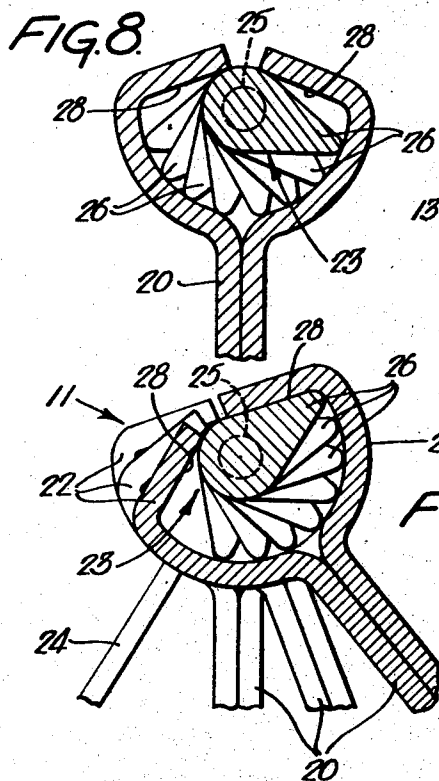
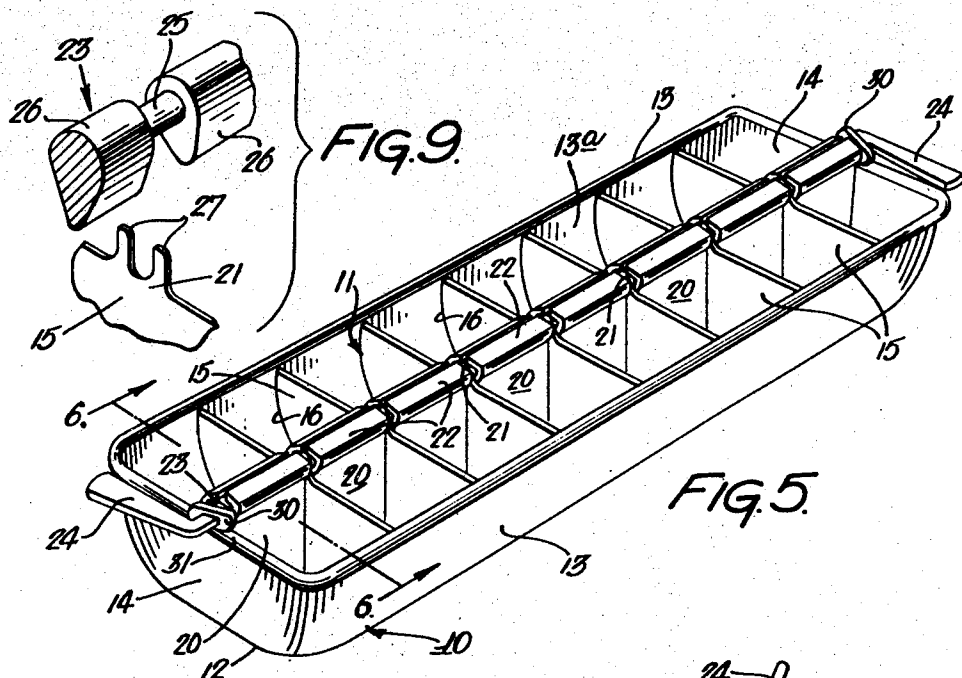


FIG. 7

INVENTOR.
Helen E. Smith
BY
Houston & Houston
Attys.

UNITED STATES PATENT OFFICE

2,435,802

LIQUID FREEZING DEVICE

Helen E. Smith, Philadelphia, Pa., assignor, by
mesne assignments, to Philco Corporation,
Philadelphia, Pa., a corporation of Pennsyl-
vania

Application June 30, 1944, Serial No. 542,943

11 Claims. (Cl. 62—108.5)

1

The present invention relates to liquid freezing devices and more particularly to complementary tray and grid members of the kind commonly employed to produce ice cubes in domestic refrigerators. More specifically, the invention pertains to improvements in the structures of the ice tray and its grid.

One object of the invention is to provide an ice cube tray and grid of the type adapted for manipulation to free the ice cubes for more ready removal from the tray, the grid being manually operable first to break the bond between the ice cubes and elements of the grid and the tray, and then to displace the cubes with respect to the tray and said grid elements so as to bring cubes into readily accessible positions.

Another object of the invention is to provide an ice tray and grid assembly capable of manipulation to loosen the ice cubes from both the grid and the tray without actual removal of the grid from the tray, and capable also of lifting the loosened ice cubes in the tray so that individual cubes may be removed while leaving the remaining cubes in the tray.

Still another object of the invention is to provide an ice tray and grid combination which will permit the ice cubes to be broken loose from the tray and elevated above the edges thereof to a readily accessible position.

The invention also contemplates an ice tray and grid assembly wherein provision is made for breaking the ice cubes loose from the grid and tray and to separately and successively elevate the cubes above the edges of the tray for individual removal as may be required.

Other objects and advantages of the invention will appear from the following description of the embodiments illustrated in the accompanying drawings in which:

Figure 1 is a perspective view of one form of the improved ice tray and grid device;

Figure 2 is an enlarged transverse cross-sectional view taken substantially on line 2—2 of Figure 1;

Figures 3 and 4 are views similar to Figure 2 illustrating successive steps in the operation of the device;

Figure 5 is a perspective view of another form of the improved ice tray and grid device;

Figure 6 is an enlarged transverse cross-sectional view looking in the general direction of arrows 6—6 in Figure 5;

Figure 7 is a greatly enlarged detail view of a portion of the device shown in Figure 6 illustrating the mode of operation;

2

Figure 8 is a view corresponding to Figure 7 but showing the parts in the normal position which is assumed during the freezing process, and

Figure 9 is a fragmentary enlarged perspective view of parts of the grid showing a possible mode of assembling the same.

With reference to the drawings, the device may comprise complementary tray and grid members 10 and 11 respectively. The tray member 10 may be, and preferably is, made in accordance with the usual practice from a single sheet of material, such as aluminum, formed to provide a bottom wall 12, opposite side walls 13, and end walls 14. It is to be noted, however, that the tray 10 differs from the usual ice tray structure in that the inner surfaces of the side walls 13 have a definite curvature, as indicated at 13a.

The grid member 11 includes a plurality of non-flexible wall elements 15 which may suitably be in the form of metal plates and which are adapted to extend transversely of the tray 10 between the side wall surfaces 14 thereof. The outer side marginal edge portions 16 of each plate are preferably curved to correspond to the curvature of the inner surfaces 13a of the side walls 13, of the tray so that the plates may assume a position within the tray wherein the lower marginal edge portions 17 of said plates will lie substantially parallel to the inner surfaces 18 of the tray bottom wall 12.

Interposed between the wall elements or plates 15, are separator elements 20, which preferably are in the form of rigid substantially rectangular blanks. The plates 15 and separator blanks 20 are conveniently assembled in a unitary structure in a manner such that the blanks are free to swing in the transverse direction or longitudinally of the plates 15. Although various constructions may be utilized to accomplish this purpose, I prefer to employ that illustrated in the drawings wherein the upper marginal edge portions of the plates and blanks are provided with suitably-shaped bearing means 21 and 22 respectively, adapted to accommodate an oscillatory rod or rock shaft 23. In order to facilitate oscillation of the rod 23 a handle 24 may be attached to either or both of the ends of said rod.

As more clearly shown in Figure 9 of the drawings, the rod 23 is provided with longitudinally interspersed reduced portions 25, of substantially circular cross-section, and enlarged cam portions 26 of substantially oval cross-section, the reduced circular portions 25 being in engagement with the bearing portions 21 of the plates 15, and the enlarged cam portions 26 being in engagement

3

with the bearing portions 22 of the blanks 20. Also, as is more clearly shown in Figure 9, the bearing portions of the plates 15 are preferably formed by spaced ears 27 between which are inserted the round portions 25 of the rod 23 and which thereafter are pinched together above said portions.

As indicated in the drawings, each blank 20 consists preferably of a sheet of suitable material, such as aluminum, folded upon itself, the free longitudinal edges of the folded sheet being shaped to form the bearing portions 22. It is to be noted that said bearing portions of the blanks 20 are provided with cam contact surfaces 28 so that when the rod 23 is rotated to bring the cam portions into engagement with one of said surfaces, the blanks are capable of following the continued movement of said rod and of rotating therewith.

In the form of the invention illustrated in Figures 1 through 4 the cam portions 26 on the rod 23 are disposed in aligned relationship so that all of the blanks 20 are rotated simultaneously, whereas in the form of the invention illustrated in Figures 5 through 8 the cam portions 26, as best seen in Figures 7 and 8, are disposed at different angles about the axis of the rod so that the blanks are moved in progressive sequence.

Moreover, in the form illustrated in Figures 1 through 4, the center of rotation is so located that the initial movement of rod 23 will cause the cam portions 26 to force the folded sides of the blanks 20 apart thus applying laterally directed forces to the ice cubes to break the bond between said cubes and the walls of the tray and the elements of the grid (Figure 3) so that upon continued rotation of the rod to rotate the separator blanks 20, the cubes are free to be elevated above the edges of the tray into positions readily accessible for removal (Figure 4).

In the embodiment illustrated in Figures 5 through 8, the ice cubes are broken loose from the walls of the tray by slightly lifting the grid, as a whole, in relation to the tray. For that purpose, the rod is provided with a cam 30 disposed so as to bear upon the edge 31 of the tray so that the initial movement of the rod causes said cam 30 to press on said edge 31 and accordingly break the bond between the ice cubes and walls of the tray. Continued rotation of the rod then separately and progressively brings the cams 26 into action to loosen the ice cubes from the walls of the grid and to elevate the loosened cubes in succession above the edges of the tray for individual removal (Figure 6).

From the foregoing description it will be appreciated that with an ice cube freezing tray and grid device constructed in accordance with the present invention, it is possible by manipulation of a single element such as the rod 23 to free the ice cubes and elevate the same above the edges of the tray so that the cubes become immediately accessible for removal from the tray.

It is to be understood that the particular embodiments herein shown and described are subject to modification without departure from the invention as defined in the appended claims.

I claim:

1. In an ice tray, a receptacle including a pair of walls defining opposite sides of a freezing compartment, and a member constituting both a support for one of said walls in the receptacle and a means for first pivoting said wall in relation to the other wall about an axis in the lower part of the tray, thereby to loosen the ice mass within

4

said compartment, and for subsequently rotating said wall about an axis in the upper part of the tray to thereby elevate the loosened ice mass in said compartment.

2. In an ice tray, a receptacle including a pair of walls defining opposite sides of a freezing compartment, and means operatively associated with one of said walls for first pivoting said wall in relation to the other wall about an axis in the lower part of the tray, thereby to loosen the ice mass within said compartment, and subsequently rotating said wall about an axis in the upper part of the tray to thereby elevate the loosened ice mass in said compartment.

3. In an ice tray, a receptacle including a pair of walls defining opposite sides of a freezing compartment, a rotatable member toward the top of the tray connected with one of said walls and operative when rotated to swing the said wall upwardly toward the other wall of said pair in an arc concentric with the axis of rotation of said member, and the said other wall sloping away from the bottom of the compartment and forming a ramp on which the ice in said compartment may be readily elevated by the said swinging movement of the wall first named.

4. In an ice tray, a receptacle comprising a pair of fixed relatively spaced walls, a movable wall interposed between said fixed walls and extending in spaced longitudinal relation thereto, and means constituting a support for said movable wall in the receptacle for moving the same in an arcuate path between the said fixed walls and upwardly in the direction of either of said fixed walls, selectively, toward the top of the receptacle, said fixed walls sloping outwardly to an extent permitting displacement of the ice from the receptacle by the said movement of the movable wall.

5. In an ice tray, a receptacle comprising a pair of fixed relatively spaced walls, a movable wall interposed between said fixed walls and extending in spaced longitudinal relation thereto, said movable wall including laterally spreadable side elements, and means associated with the movable wall and operable first to spread said elements and then to bodily rotate the movable wall selectively in the direction of the fixed walls.

6. In an ice tray, a receptacle comprising a pair of fixed relatively spaced rigid walls, a movable wall interposed between said fixed walls and extending in spaced longitudinal relation thereto, said movable wall having laterally spreadable surface portions, and a member associated with the movable wall and including cam means operable in an initial movement of said member to spread said surfaces and in continued movement thereof to rotate the movable wall laterally between the fixed walls.

7. In an ice tray, a receptacle comprising a pair of fixed relatively spaced rigid walls, a movable wall interposed between said fixed walls and extending in longitudinal relation thereto, said movable wall being divided longitudinally into a plurality of independently movable sections, and means associated with said wall sections for successively moving the sections in an arcuate path laterally between the fixed walls and upwardly toward the top of the receptacle.

8. In an ice tray, a receptacle comprising a pair of fixed relatively spaced rigid walls, a movable wall interposed between said fixed walls and extending in longitudinal relation thereto, said movable wall being divided longitudinally into a plurality of separately movable sections each having a bearing portion at its upper edge, and

5

a rock shaft passing through said bearing portions of the wall sections and having a plurality of cam portions disposed in different angular positions about the axis of said rod and arranged to successively engage the respective sections for progressively rotating the same about the axis of the shaft and in relation to the fixed walls.

9. In an ice tray grid, a longitudinal grid wall divided longitudinally into a plurality of sections having aligned bearing portions, transverse grid elements interposed between the facing edges of successive sections of said wall and cooperating with said sections to define a plurality of compartments, each of said elements being provided with a bearing portion located for axial alignment with the bearing portions of said sections, and a rotatable member extending through said bearing portions to interconnect said sections and interposed elements, said member and the bearing portions of the said wall sections having interengageable means for rotating said sections through an arc concentric with the axis of rotation of said member and of sufficient angular extent to sweep a major part of each of the compartments defined by the adjoining pairs of the transverse grid elements.

10. In an ice tray grid, a longitudinal grid wall divided longitudinally into a plurality of sections having aligned bearing portions and laterally relatively displaceable surface portions, transverse grid elements interposed between the facing edges of successive sections of the longitudinal grid wall and provided each with a bearing portion located for axial alignment with the bearing portions of said sections, and a rotatable member extending through said bearing portions to interconnect said sections and interposed elements, the said bearing portions of the longitudinal wall sections having cam contact surfaces and said member having cam means operative on said cam surfaces in the initial movement of said member to spread said laterally displaceable surface por-

6

tions of the sections and in a subsequent movement to rotate the wall sections bodily in an arc concentric with the axis of rotation of said member.

11. In an ice tray grid, a longitudinal grid wall divided longitudinally into a plurality of sections having aligned bearing portions, transverse grid elements interposed between the facing edges of successive sections of said wall and provided each with a bearing portion located for axial alignment with the bearing portions of said sections, and a rotatable rod extending through said bearing portions to interconnect said sections and interposed elements, the bearing portions of said wall sections having cam contact surfaces and the rod having a plurality of cam portions for engagement with said surfaces to rotate said wall sections concentrically with the axis of rotation of said rod, the said cam portions of the several sections being angularly displaced about said axis with respect to each other so that rotation of the cam rod effects a consecutive rotational movement of said sections.

HELEN E. SMITH.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,143,977	Crosley	Jan. 17, 1939
2,265,705	Steenstrup	Dec. 9, 1941
2,278,408	Ashbaugh	Apr. 7, 1942
2,307,606	Steenstrup	Jan. 5, 1943
2,388,378	Amore	Nov. 6, 1945
2,416,934	Mallard	Mar. 4, 1947

FOREIGN PATENTS

Number	Country	Date
490,847	Great Britain	Aug. 22, 1938