Feb. 28, 1950 J. H. ROETHEL 2,498,965

ICE TRAY

Filed March 25, 1948 2 Sheets-Sheet 1

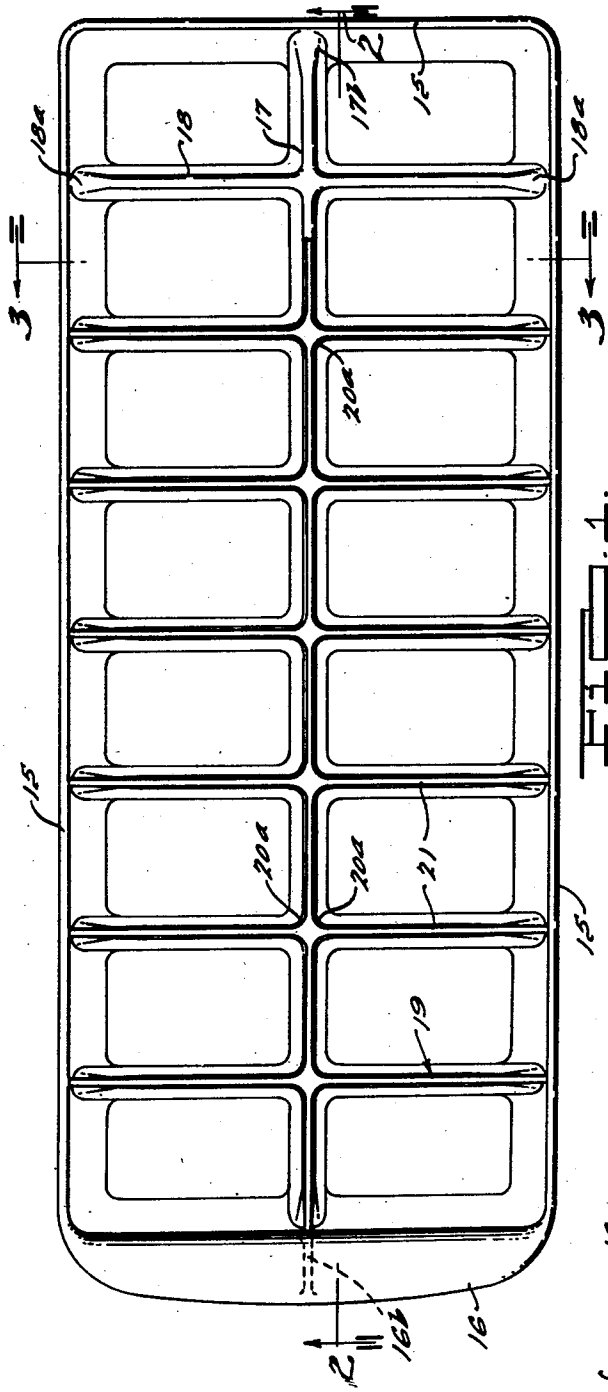


FIG. 1.

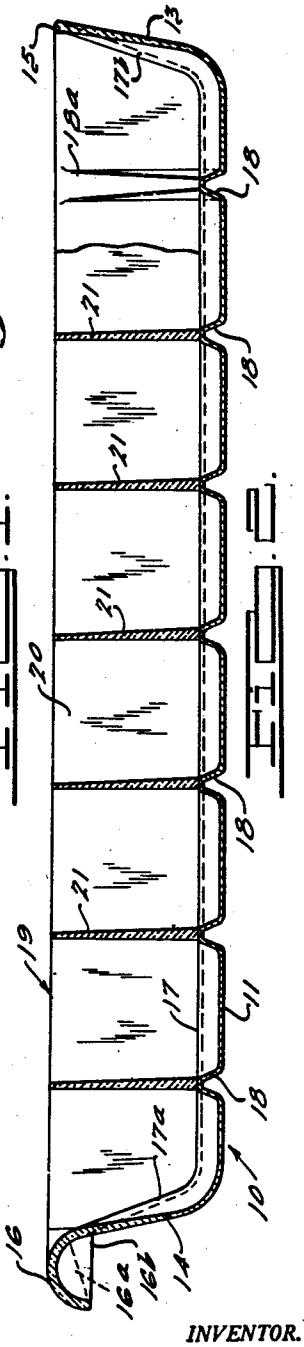


FIG. 2.

INVENTOR.
John H. Roethel.
BY
Elmer Jamison Gray
ATTORNEY.

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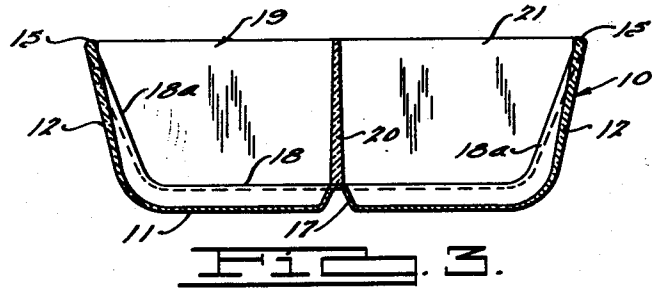


FIG. 3.

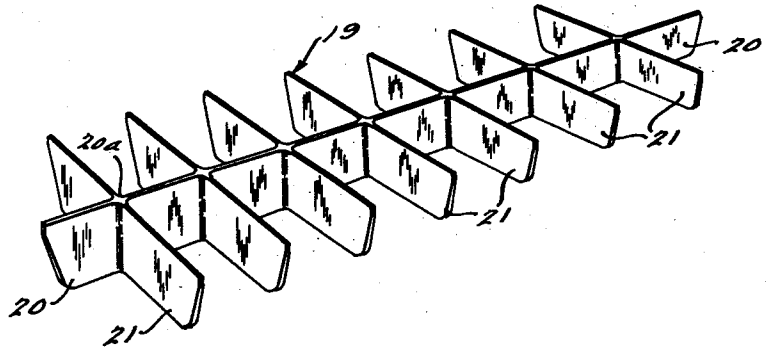


FIG. 4.

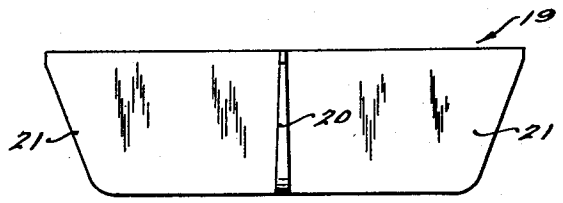


FIG. 5.

INVENTOR.
John H. Roethel.
BY
Elmer Jamison Gray
ATTORNEY.

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UNITED STATES PATENT OFFICE

2,498,965

ICE TRAY

John H. Roethel, Detroit, Mich., assignor to Roethel Engineering Corporation, Detroit, Mich., a corporation of Michigan

Application March 25, 1948, Serial No. 16,979

8 Claims. (Cl. 62—108.5)

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This invention relates to liquid freezing trays and particularly, although not exclusively, to ice trays of the general type having a pan-like tray within which the ice cubes or blocks of frozen substances are molded through the medium of a removable grid member receivable within the tray.

Ice trays of the foregoing type commonly used in refrigerators have been of three principal kinds, each utilizing an aluminum pan within which the grid or divider is mounted. One such kind involves the use of a rigidly connected metal grid or divider necessitating the use of warm water to loosen not only the divider with its ice cubes from the pan but also the cubes from the divider. A second kind involves the use of an integral rubber grid or divider, trays of this kind also requiring water to be run over the pan to loosen the grid and its cubes after which the cubes can be broken loose from the rubber grid only with considerable trouble. The third kind of ice tray above referred to involves the use of an articulated metal grid and lever to break the grid loose from the pan, such trays presenting not only the disadvantage of relatively high cost of manufacture but also disadvantages due to frequent breakage of the levers at their pivotal connections with the grids and, in addition, the frequent shattering of the ice cubes when loosened by operation of the levers.

An important object of the present invention is to provide an ice tray or the like of the pan and grid type which overcomes the principal disadvantages of trays of this general type now or heretofore used, especially trays of the three types above mentioned, and in pursuance of such object to provide an ice tray of this type wherein both the pan and the separable grid or divider are both molded from plastic material, namely, polyethylene plastic or the equivalent, and so constructed as to be self-sustaining while at the same time enabling the grid and its cubes to be easily loosened from the pan and the cubes easily removed or freed individually or collectively from the grid or divider members.

A further object of the invention is to form the pan of polyethylene or equivalent plastic material so that the bottom is relatively thin in order to accelerate the freezing rate, the bottom and side walls being so formed as to make the pan self-sustaining when filled with water, the preferred construction being such as to utilize the maximum amount of space within the pan for ice cubes while at the same time ensuring sufficient rigidity or strength in the pan to prevent bending or buckling thereof when lifted from one end after filling.

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Still another object of the invention is to provide an ice tray of the foregoing kind in which the grid may be quickly loosened by torsionally twisting or bending the pan, thereby enabling the grid with its cubes to be removed and the requisite number of cubes detached therefrom without requiring any appreciable effort, or necessitating the use of warm water or levers to free the ice cubes as heretofore.

Another object of the invention is to provide an ice tray or the like having its pan and removable grid or divider molded with a relatively thin highly flexible bottom wall from polyethylene plastic or the like, such material being of such character as to inhibit any appreciable adhesion of the ice thereto and, hence, enabling easy release of the ice cubes, the pan preferably being formed with longitudinal and transverse stiffening ribs disposed preferably for engagement by the lower edges of the divider members and the latter preferably being so formed as to permit and facilitate removal of the ice cubes without necessitating removal of the divider members by applying pressure to the bottom of the tray to eject the cubes therefrom.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a plan view of an ice tray embodying the present invention.

Fig. 2 is a sectional view taken substantially through lines 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a section taken substantially through lines 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a perspective view of the grid or dividing member.

Fig. 5 is an end view of the grid or dividing member.

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.

In the drawings there is illustrated, by way of example, an ice tray comprising a pan-like receptacle adapted to contain water and constructed to receive a removable grid or dividing member by means of which a number of ice cubes or blocks may be produced within the receptacle in the ice freezing compartment of a refrigerator. The pan-like receptacle 10 is generally rectangular in shape and is molded in one piece from polyethylene or equivalent plastic material to provide a generally flat bottom 11 terminating in parallel side walls 12 and rear and front walls 13 and 14 which are integral with the bottom and extend continuously around the four sides of the tray. The bottom of the receptacle is relatively thin and after merging into the side and end walls the latter preferably increase in thickness in the direction of the upper edges thereof. The side walls 12 and rear end wall 13 terminate at their upper edges in a thickened edge 15 which extends continuously around three sides of the tray. The front end wall 14 increases in thickness and merges into a handle 16, which may be grasped to remove the tray from the refrigerator compartment, and the front ends of the edges 15 merge into this handle. At the junctures between the ends of the wall 14 and handle 16 there are reinforcing webs 16*a*. Midway of the wall 14 an additional reinforcing web or gusset 16*b* is provided.

The pan-shaped receptacle 10 is molded to provide in its bottom a central longitudinal rib 17 which is preferably substantially V-shaped and extends upwardly from the plane of the bottom a distance materially less than the height of the receptacle. The rib 17 has a portion 17*a*, as shown particularly in Fig. 2, which continues upwardly into the front wall 14 and progressively diminishes in depth so as to disappear at the upper edge of the wall 14 where it merges into the handle 16. Similarly, the rib 17 has a portion 17*b* which continues into the rear end wall 13 and progressively diminishes in depth so as to disappear at the upper edge of this wall. The pan-shaped receptacle 10 is also molded to provide a series of parallel transverse ribs 18 in the bottom thereof which correspond in height to the rib 17 and, in like manner, are generally V-shaped in cross-section. Each transverse rib 18 intersects the longitudinal rib 17 and extends the full width of the bottom. At each end thereof each of the transverse ribs 18 has a portion 18*a* continuing into the side wall 12. Thus, as shown in Fig. 3, each upwardly extending portion 18*a* of each transverse rib progressively diminishes in depth and disappears at the locality of the edge 15. From the foregoing it will be seen that the marginal edge 15 and handle 16 extending around the upper edge of the tray receptacle together with the longitudinal and transverse ribs provide a stiffening means for the tray receptacle enabling it to retain its shape, or substantially so, when filled with water so as not to buckle upon lifting the tray with its contents from one end while the tray is being carried to or from the refrigerator.

In accordance with the present invention the pan or receptacle 10 is adapted to receive the grid or divider member 19 for the purpose of molding or forming ice cubes or frozen blocks in suitable number in accordance with the size desired. In the present instance the grid 19 is designed so as to form sixteen ice blocks, although it will be understood that the grid may be designed to produce a smaller or larger number thereof. As in the case of the pan or receptacle 10, I prefer to utilize an injection molding process for producing the grid or divider member 19, and as illustrated particularly in Fig. 4 this member comprises a central longitudinally extending divider strip 20 integrally joined to and intersected by transverse right-angularly extending divider strips 21. Each of the divider strips 20 and 21 preferably diminishes in thickness toward the upper edge thereof so as to have tapering side walls. These divider strips all merge integrally into one another and at the locality of their intersections are joined by fillets 20*a* which serve to hold the divider strips permanently in correct relative positions. Since the divider strips are substantially thicker at their lower edges they form restricted bottom openings of less areas than the areas of the openings between the divider strips at the upper edges thereof, and as a consequence provide means for restraining the ice cubes within the spaces between the divider strips against removal through these restricted openings.

From the foregoing it will be noted that the strips or members 20 and 21 forming the divider or grid 19 taper somewhat in the direction of the upper edges thereof, and in addition the side and end walls of the pan or receptacle 10 also are tapered or inclined, this construction facilitating the removal of the ice blocks from the grid without necessitating the removal of the latter. The ends of the divider strips 20 and 21 are tapered so as to conform to the inclination of the side and end walls so as to cause the grid to fit rather snugly within the pan or receptacle 10.

In accordance with the preferred embodiment the grid strips 20 and 21 are arranged so as to extend in vertical alignment with the ribs 17 and 18, so that when the grid is inserted within the pan the lower edge of the grid 20 will rest upon the upper edge of the rib 17 and the grid strips 21 will rest upon the upper edges of the transverse ribs 18. By virtue of this construction the height of the grid may be shortened and the ice forming spaces will be formed between the sides of the grid strips, the ribs 17 and 18, and the bottom 11 of the receptacle.

In preferred practice the pan shaped receptacle 10 and the grid 19 are each formed in a single injection molding operation from polyethylene plastic or equivalent material. Polyethylene is particularly adapted for use in the fabrication of the present ice tray for the reason that this material has a wax-like surface which is non-wettable by water and, hence, inhibits the adherence of ice thereto. Polyethylene is not only tough, flexible and substantially unbreakable, even under conditions of hard usage, but will also yield under tension in order to compensate for the expansion of ice upon freezing. After the formation of ice cubes in the tray the frozen contents together with the grid member may be readily loosened from the bottom and side walls of the pan or receptacle 10 upon grasping the ends of the pan and torsionally twisting or flexing the same. This action will loosen the grid and its contained ice cubes as a unit permitting the removal thereof from the pan. One simple method of removing the grid and ice cubes as a unit from the pan consists in inverting and placing the pan upon a table top and then either twisting or flexing somewhat the ends of the pan or pressing upon the bottom thereof so as to separate the pan from the grid and its ice cubes. On the other hand, if a few cubes are desired, the pan may be held rightside up and pressure ap-

plied by the thumbs to the bottom of the pan beneath the ice cube to force it upwardly or outwardly from the pan without removing the grid. This method of ejecting the cubes individually from the pan and grid is possible by reason of the thin flexible character of the bottom wall of the pan and the taper given to the side walls of the pan and grid.

The construction of the present ice tray not only permits its fabrication from flexible or yieldable polyethylene material but also enables the bottom of the pan to be made relatively thin so as to accelerate freezing of the water. I prefer to form the bottom 11 of the pan or receptacle 10 with wall thicknesses ranging from approximately .030 to .040 of an inch with the wall thickness of the upright sides and ends of the pan increasing progressively so as to have a uniform thickness of approximately .073 to .093 of an inch. This construction together with the ribs 17 and 18, which continue into the side and end walls, not only affords sufficient rigidity to the tray, irrespective of the thin bottom thereof, so as to render it substantially form-sustaining even when filled with water, but also ensures a high degree of flexibility to the bottom and side walls in the areas between the ribs which facilitate removal of the cubes and also accelerates freezing thereof. Although the thickness of the bottom 11 of the tray receptacle preferably falls within approximately the foregoing range, it will be understood that a wall thickness from approximately .020 to .065 of an inch will give good results. In the fabrication of relatively large trays the thickness of the bottom 11 may range from approximately .040 to .065 of an inch whereas in smaller size trays the bottom may be molded to a thickness from approximately .020 to .032 of an inch. The divider strips 20 and 21 preferably taper to substantially the width of the upper edges of the ribs 17 and 18 and it will be noted that these ribs are formed with flat upper edges so as to facilitate seating of the divider strips thereon.

I claim:

1. A liquid freezing tray comprising a pan-shaped member having a bottom and surrounding upright side walls, said bottom having a longitudinal rib intersected by a plurality of transverse ribs, and a removable grid member within said pan-shaped member and comprising connected longitudinal and transverse divider strips having their lower edges engaging said ribs, said strips increasing in thickness from their upper edges toward the lower edges thereof.

2. In a liquid freezing tray, a pan-shaped member formed of polyethylene plastic having a bottom and surrounding upwardly and outwardly inclined side walls diminishing in thickness toward the bottom, the latter being formed with longitudinal and transverse intersecting ribs projecting upwardly at their ends into the side walls.

3. In a liquid freezing tray, a pan-shaped member having a bottom and surrounding upwardly and outwardly inclined side walls diminishing in thickness toward the bottom, the latter being formed with longitudinal and transverse intersecting ribs projecting upwardly at their ends into the side walls, and a grid member within said pan-shaped member comprising intersecting longitudinal and transverse divider strips resting upon said ribs.

4. In a liquid freezing tray, a pan-shaped member having a bottom and surrounding upwardly and outwardly inclined side walls diminishing in thickness toward the bottom, the latter being formed with longitudinal and transverse intersecting ribs projecting upwardly at their ends into the side walls, and a grid member within said member comprising intersecting longitudinal and transverse divider strips resting upon said ribs, the walls of said strips increasing in thickness toward their lower edges.

5. In a liquid freezing tray, a pan-shaped member having a bottom and surrounding upwardly and outwardly inclined side walls diminishing in thickness toward the bottom, the latter being formed with shallow longitudinal and transverse intersecting generally V-shaped ribs extending upwardly from said bottom and of substantially the same height at the regions of the merger thereof.

6. In a liquid freezing tray, a pan-shaped member having a bottom and surrounding upwardly and outwardly inclined side walls diminishing in thickness toward the bottom, the latter being formed with shallow longitudinal and transverse intersecting generally V-shaped ribs extending upwardly from said bottom, said member being formed of polyethylene plastic and said bottom being thinner than the upper edges of the side walls.

7. In a liquid freezing tray, a pan-shaped member having a bottom and surrounding upwardly and outwardly inclined side walls diminishing in thickness toward the bottom, the latter being formed with longitudinal and transverse intersecting generally V-shaped ribs extending upwardly from said bottom, said member being formed of polyethylene plastic and said bottom being thinner than the upper edges of the side walls and having a thickness ranging from approximately .020 to .065 of an inch.

8. In a liquid freezing receptacle, a flexible pan-shaped member having a bottom and surrounding upright side walls, said bottom being formed with shallow upstanding longitudinal and transverse intersecting ribs having extensions at the ends thereof extending upwardly into said side walls above said ribs, and a flexible grid within said member and comprising longitudinal and transverse intersecting vertical divider strips engaging said ribs and extensions.

JOHN H. ROETHEL.

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