March 4, 1947. L. L. MALLARD 2,416,934

ICE CUBE TRAY

Filed Nov. 9, 1938

Fig. 1.

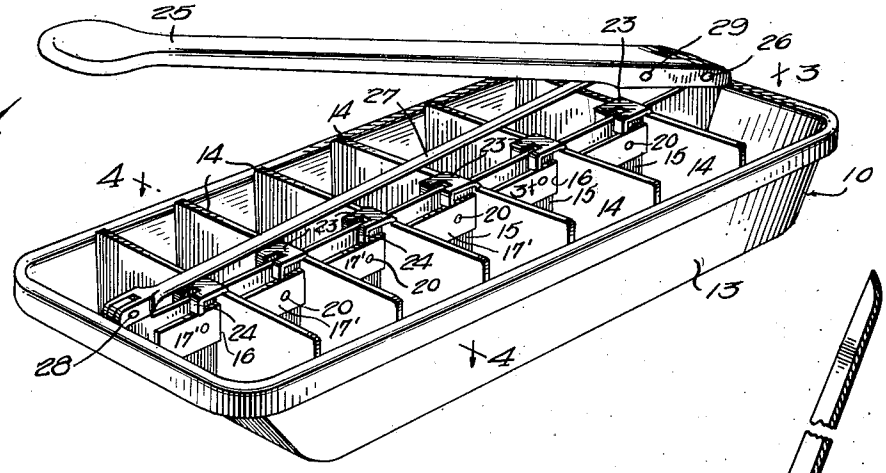


Fig. 2.

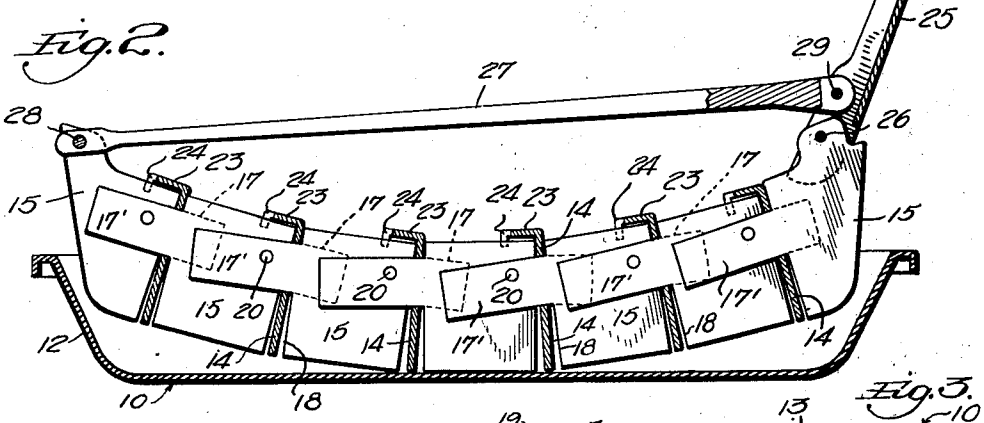


Fig. 5.

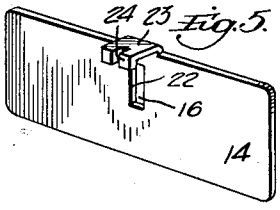


Fig. 6.

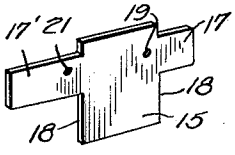
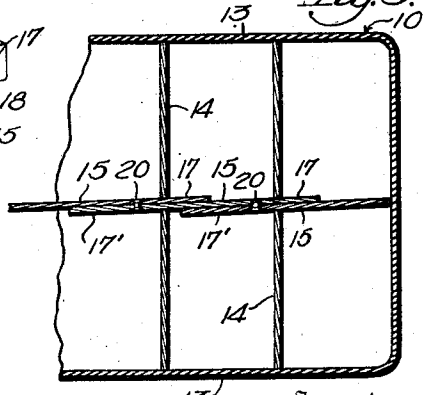


Fig. 3.



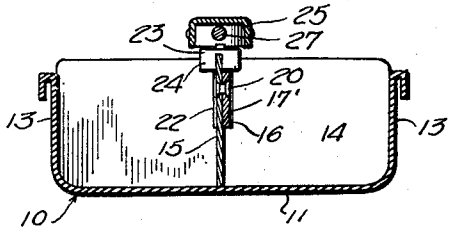


Fig. 4.

Inventor
LOGAN L. MALLARD

By

Attorney

Patented Mar. 4, 1947

2,416,934

UNITED STATES PATENT OFFICE

2,416,934

ICE CUBE TRAY

Logan L. Mallard, Norfolk, Va., assignor of one-half to H. Clay Hofheimer II, Norfolk, Va.

Application November 9, 1938, Serial No. 239,723

9 Claims. (Cl. 62—108.5)

1

This invention relates to an ice cube tray and more particularly to an ice cube tray having an improved and simplified mechanical means for securing the release of the ice cubes from the tray.

The present invention is an improvement upon the invention illustrated and described in my copending application Serial No. 204,646, filed April 27, 1938. In that application I illustrated and described a novel metal ice cube tray having a grid structure arranged therein formed of relatively movable parts and having lever means connected thereto for effecting relative movement of the parts whereby the cubes would be released from the tray and ejected from the grid structure, thereby eliminating the necessity of running water over the tray and grid structure in order that the cubes may be released from the tray as is the case with the conventional ice cube tray having a metallic receptacle provided with a rigid grid structure arranged therein.

The principal object of the present invention is to improve and simplify the construction disclosed in the above mentioned application by reducing the number of parts necessary to provide a relatively movable grid structure for securing the release of the ice cubes from the grid structure, whereby the cost of manufacture will be materially diminished.

A further object is to provide a novel grid structure formed of relatively movable parts and having a simplified leverage system connected thereto for securing relative movement of the parts to effect the release of the ice cubes from the grid structure and tray.

The above and other objects of the invention will become apparent during the course of the following description.

In the drawing I have shown one embodiment of the invention. In this showing,

Figure 1 is a perspective view showing a tray having the grid structure arranged therein.

Figure 2 is a central vertical longitudinal sectional view showing the grid structure in cube releasing position, parts being shown in elevation,

Figure 3 is a horizontal sectional view taken along the line 3—3 of Figure 1,

Figure 4 is a transverse vertical sectional view taken substantially on line 4—4 of Figure 1,

Figure 5 is a perspective view of a transverse grid plate, and

Figure 6 is a perspective view of a longitudinal grid plate.

2

Referring to the drawing the numeral 10 designates a conventional ice cube tray having a bottom 11, end walls 12 and side walls 13, the end walls preferably diverging upwardly, as shown. The ice tray forms no part of the present invention per se and may be of any desired form.

A grid structure is arranged within the tray and comprises a plurality of transverse plates 14 and a plurality of longitudinal plates 15. Each of the transverse plates 14 is provided with an opening 16 substantially centrally spaced from the edges of the tray for a purpose to be described.

The longitudinal plates 15 are arranged in overlapping relationship (Figure 3) and are pivotally connected together for relative movement with respect to each other. Each longitudinal plate 15 is provided with an integral reduced extension 17 on each vertical edge 18 thereof to provide means by which the longitudinal plates 15 may be connected together. The extensions 17 aid in securing the release of the cubes in a manner to be described.

The body of each plate 15 is drilled as at 19 for the reception of a pivot pin 20. Likewise, each plate has one arm 17, designated as 17', drilled as at 21 for the reception of a pivot pin 20. The pins 20 thus serve to pivotally connect the longitudinal plates 15 for relative movement with respect to each other. The drilled openings 19 and 21 are so positioned that the vertical edges 18 of each adjacent longitudinal plate 15 will be spaced from each other a distance slightly more than the thickness of one of the transverse plates 14.

As best shown in Figure 3, the extensions 17 and 17' of each longitudinal plate 15 are arranged in overlapping relationship with respect to the next adjacent longitudinal plates 15. The plates 15 being pivotally connected to each other, the extensions 17 and 17' will be slidable over the surfaces of the next adjacent longitudinal plates 15 upon relative pivotal movement of the plates 15. The arrangement of the plates, and particularly the openings 21 in the extensions 17', provide an arrangement whereby each plate 15 will be connected to the next adjacent plate 15 by a single pivot 20 thereby providing a continuous chain of longitudinal plates 15 wherein each plate 15 constitutes a link of the chain. It will be noted that only the extensions 17' are provided with openings 21 for the reception of the pivot pin 20 and that no openings are provided in the extensions 17. It is desirable that the pivotal connection be made through similarly positioned extensions and obviously this connec-

tion could be as readily made with the extensions 17 instead of with the extensions 17'.

The extensions 17 and 17' extend through the openings 16 provided in the transverse plates 14. This arrangement of the extensions 17 and 17' permits the sliding engagement of the extensions of each plate with the adjacent longitudinal plates 15 and also permits the adjacent vertical edges 18 of adjacent plates 15 to hold the respective transverse plates 14 in proper relative positions. The opening 16 in each transverse plate 14 is slightly larger than the combined thickness of an arm 17 and an arm 17' whereby some relative movement of the transverse plates 14 will be permitted with respect to the longitudinal plates 15. However, this play provided by the opening 16 will not prevent the edges 22 of the openings 16 from serving the purpose of retaining the plates 14 and 15 in substantially upright positions when the parts are in the relative positions shown in Figure 1.

The above arrangement will provide an arm 17 or 17' on every vertical edge 18 of each longitudinal plate 15. Since the edges 18 space the transverse plates 14 from each other thereby providing adjacent compartments, each plate 15 will have an arm 17 or 17' extending into the next adjacent compartment. The overlapping relationship of the plates 15 will result in each surface of each plate having only one arm, either 17 or 17', slidable thereover.

Each of the transverse plates 14 has a preferably integral member 23 centrally of the top thereof. Each member 23 is provided with depending lugs 24 spaced apart a distance substantially equal to the thickness of the longitudinal plates 15. The lugs 24 are engageable with the sides of the longitudinal plates 15 adjacent the top thereof and serve to prevent movement of the transverse plates 14 from a position substantially at right angles to the longitudinal plates 15. The lugs 24 also cooperate with the edges 22 of the opening 16 in holding the longitudinal plates 15 in an upright position. The construction described provides a grid structure wherein the longitudinal plates 15 are relatively movable with respect to each other and with respect to the transverse plates 14.

A lever 25 is provided for effecting relative movement of the elements of the grid structure to secure the release of ice cubes positioned in the various compartments thereof. The lever 25 is connected to an end longitudinal plate 15 by a pivot 26. A connecting member 27 is connected to the other end longitudinal plate 15 by a pivot 28. The other end of the connecting member 27 is pivotally connected to the lever 25 by a pivot 29. The pivot 29 is located adjacent the pivot 26 and the distance between the pivots 26 and 29 plus the length of the connected member 27 is substantially equal to the distance between the pivots 26 and 28 when the grid structure occupies its normal position in the receptacle 10.

The operation of the device is as follows:

The tray is filled with water to the proper level, slightly below the upper edge of the tray, and the tray is placed in the refrigerator with the lever 25 lying flat against the member 27. After the water has frozen into pieces defined by the pockets in the tray and it is desired to release the cubes, the tray is removed from the refrigerator and preferably placed on a suitable supporting surface. The free end of the lever 25 is then lifted so as to turn it about its pivot 26. This will result in the pivot 29 being caused

to move in an arc about the pivot 26 to raise that end of the member 27 which is connected to the pivot 29. Since the other end of the member 27 is connected to the pivot 28 and the pivot 29 is moving in an arc about the pivot 26, it will be apparent that upward movement of the lever 25 will cause relative movement of the pivots 26 and 28 toward each other.

Initial substantial movement of the lever 25 will cause relatively slight movement of the pivots 26 and 28 toward each other whereby a high leverage ratio will be obtained in the initial operation of the device. However, toward the end of the movement of the lever 25 to the position shown in Figure 2, the member 27 will approach a position wherein it is tangential to the circle described by the movement of the pivot 29 about the pivot 26 and a given movement of the lever 25 will result in a proportionately greater movement of the pivots 26 and 28 toward each other than results from initial movement of the lever 25. The pivot 26 acting as a fulcrum for the lever 25, it will be apparent that the leverage ratio provided by the system will decrease as the lever 25 approaches the position shown in Figure 2.

Initial movement of the lever 25, although causing slight movement of the pivots 26 and 28 toward each other, will serve to break the cubes loose from the receptacle 10. From the beginning of such movement, it will be apparent that the longitudinal plates 15 will have a pivotal movement with respect to each other. It is this movement in connection with the action exerted by the extensions 17 and 17' that results in the release of the cubes from the grid structure.

The pivotal movement of the longitudinal plates 15 with respect to each other effects a sliding movement of each extension 17 and 17' over the adjacent surface of a longitudinal plate 15 which will cause the cubes of ice to be released from their bond with the longitudinal plates 15. The positions which the extensions 17 and 17' occupy with respect to the adjacent longitudinal plates 15 at the releasing position is clearly shown in Figure 2. The sliding movement of the extensions 17 and 17' will result in a slight relative movement of the extensions with respect to the cubes of ice, which slight movement will be sufficient to break the bond between the cubes of ice and the extensions 17 and 17'.

It will be apparent that the pivotal movement of the longitudinal plates 15 with respect to each other results in the extensions 17 and 17' moving downwardly with respect to the longitudinal plates 15 against which the extensions are slidable. This motion imparts an ejecting action to the cubes to release them from the grid structure. The distance between each adjacent pair of pivots 20 is fixed, and when the operations referred to take place, the portions of adjacent edges 18 at the tops of the plates 15 will move toward each other, while the portions of adjacent edges 18 below the pivots 20 will move apart. The upper ends of each adjacent pair of edges 18 will move toward engagement with the upper edge of the adjacent transverse plate 14 thus causing the lower edge of the latter to assume a position substantially bisecting the angle between the adjacent edges 18 of the adjacent plates 15. In addition, the lower edges of adjacent plates 14 will be spread apart a distance slightly greater than when the grid structure is in its normal position within the receptacle 10. This spread-

ing action of the bottom portions of the plates 14 also aids in releasing the cubes from the grid structure.

It will be apparent that I have provided a simplified grid structure composed of relatively movable parts with means for causing relative movement of the parts to release the ice cubes from the grid structure. The number of parts necessary to produce this action have been reduced to a minimum without any sacrifice of efficiency whereby the cost of production has been materially reduced.

It will be noted that all of the longitudinal plates except the end plates are duplicates of each other and each is made of a single piece of material, thus eliminating the necessity for securing to the plates separate members corresponding to the extensions 17 and 17'. By employing the structure of the plates 15 and arranging the plates in overlapping relationship, each face of each of the plates 15 is provided with a member movable thereover to break the adjacent portion of an ice cube loose therefrom.

It also will be noted that the transverse plates 14 are duplicates of each other and each is formed of a single piece of material. By providing the overhanging portions 23 and lugs 24, each plate 14 is provided with a point of engagement with an adjacent plate 15 spaced from the plane of the plate 14, thus preventing the latter from partaking of excessive relative movement with respect to the plate 15. It also will be noted that each plate 14 is provided with a slot 16 to receive one each of the extensions 17 and 17', the slot 16 being substantially less than one-half the height of the plate 14 and being completely surrounded by the metal of the plate. Accordingly the plates 14 are not materially weakened by the provision of the openings 16. These openings, and the structure of the plates 15, permits the elements of the device to be very quickly and easily assembled.

Attention is invited to the fact that the means for effecting turning movement of the longitudinal plates need be connected only to the remote or end plates 15. In this connection, it will be noted that the turning movement of each adjacent pair of plates 15 is limited by engagement of the upper ends of the adjacent edges of such plates against opposite faces of the corresponding transverse plate 14 above the opening 16 therein. Accordingly, swinging movement of the lever 25 will first cause turning movement of the two end plates 15 with respect to the two adjacent plates, whereupon the turning movement between the plates 15 referred to will be limited and further movement of the lever 25 will effect turning movement between the second and third plates 15 from each end, etc. Accordingly a simple lever means may be employed to provide a positive action moving the pivots 26 and 28 toward each other in order to release all of the cubes from the tray.

It will be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. An ice cube tray comprising a receptacle, a grid structure arranged in said receptacle comprising a plurality of transverse sections and a plurality of respectively relatively rigid longitudinal sections connected for relative movement with respect to each other, and lever means for effecting relative movement of said longitudinal sections comprising a member pivotally connected directly to said grid structure adjacent one end thereof, a second member pivotally connected at one end directly to said grid structure adjacent the other end thereof, said second member being shorter than the over-all length of said grid structure and pivotally connected at its other end to said first member.

2. An ice cube tray comprising a receptacle, a grid structure arranged in said receptacle comprising a plurality of transverse sections and a plurality of respectively relatively rigid longitudinal sections connected for relative movement with respect to each other, and lever means for effecting relative movement of said longitudinal sections comprising a pivot carried by one end of said grid structure, a second pivot carried by the other end of said grid structure, a member directly connected at one end to said first pivot, and a second member directly connected at one end to said second pivot, said second member having a pivotal connection at its other end with said first mentioned member, said first mentioned pivot providing a fulcrum for said first mentioned member.

3. An ice cube tray comprising a receptacle, a grid structure arranged in said receptacle comprising a plurality of transverse sections and a plurality of respectively relatively rigid longitudinal sections connected for relative movement with respect to each other, and lever means for effecting relative movement of said longitudinal sections comprising a first pivot carried by one end of said grid structure, a second pivot carried by the other end of said grid structure, a first member directly connected at one end to said first pivot, a third pivot on said first member, and a second member directly pivotally connected at its respective ends to said second and third pivots, the length of said second member plus the distance between said first and third pivots being approximately equal to the distance between said first and second pivots when said three pivots are substantially in alinement.

4. An ice cube tray comprising a receptacle, a grid structure for said receptacle comprising a plurality of transverse plates each provided with an opening, a plurality of longitudinal plates each provided with a projection lying in the vertical plane thereof and extending from each vertical edge thereof through one of said openings, pivot means connecting one projection of each longitudinal plate with the next adjacent longitudinal plate whereby said longitudinal plates are mounted to turn with respect to said pivot means and whereby each projection will move over one face of one of said longitudinal plates to loosen an ice cube therefrom, each transverse plate being provided with means spaced from the plane thereof and engageable with an adjacent longitudinal plate to limit a predetermined relative movement of said transverse plates with respect to said longitudinal plates.

5. An ice cube tray comprising a receptacle, a grid structure for said receptacle comprising a plurality of transverse plates each provided with an opening, a plurality of longitudinal plates each provided with a projection lying in the vertical plane thereof and extending from each vertical edge thereof through one of said openings, pivot means connecting one projection of each

longitudinal plate with the next adjacent longitudinal plate whereby said longitudinal plates are mounted to turn with respect to said pivot means and whereby each projection will move over one face of one of said longitudinal plates to loosen an ice cube therefrom, each transverse plate being provided at its upper edge with a member fixed with respect thereto and extending horizontally therefrom and terminating in a pair of depending lugs engageable with opposite sides of the adjacent longitudinal plate.

6. An ice cube tray comprising a receptacle, a grid structure for said receptacle comprising a plurality of transverse plates each provided with an opening, a plurality of longitudinal plates each of certain of which is provided with a projection lying in the vertical plane thereof and extending from each vertical edge thereof through one of said openings, pivot means connecting one projection of each longitudinal plate with the next adjacent longitudinal plate whereby said longitudinal plates are mounted to turn with respect to said pivot means and whereby each projection will move over one face of one of said longitudinal plates to loosen an ice cube therefrom, and operating means for effecting turning movement of said longitudinal plates comprising a lever pivoted at one end to the longitudinal plate at one end of said grid structure, and a rod having one end pivoted to the longitudinal plate at the other end of said grid structure, the other end of said rod being pivoted to said lever at a point spaced from the pivot thereof.

7. A grid structure for an ice cube tray comprising a longitudinal grid unit formed of a plurality of longitudinal plates arranged in overlapping relationship, means pivotally connecting said plates to each other whereby said plates are adapted to swing substantially in their own planes and whereby overlapping portions of said plates move with relation to each other to loosen ice adhering thereto, and a plurality of transverse elements spaced from each other and carried by said longitudinal plates, each transverse plate having a member rigid therewith and extending from the plane thereof for engagement with said longitudinal unit to limit relative movement of each transverse plate with respect to said longitudinal unit.

8. An ice cube tray comprising a receptacle, a grid structure for said receptacle comprising longitudinal and transverse plates defining a plurality of compartments in said receptacle, certain of said longitudinal plates each having a projection in the plane thereof extending into an adjacent compartment, said longitudinal plates being pivotally connected to each other for relative turning movement whereby each projection will be movable over one face of one of said longitudinal plates to loosen an ice cube therefrom, a lever pivotally connected at one end to one of the end longitudinal plates, and a rod having one end pivotally connected to the other end longitudinal plate, said rod having its other end pivotally connected to said lever at a point relatively slightly spaced from the pivot thereof.

9. A grid structure for an ice cube tray comprising a plurality of spaced transverse plates each having an opening therethrough, a plurality of longitudinal plates each having a body portion arranged in one of the spaces between said transverse plates, certain of said longitudinal plates each having a projection in the plane thereof extending from its vertical edge through the opening of an adjacent transverse plate to lie in overlapping relationship with the body portion of an adjacent longitudinal plate, and means pivotally connecting one projection of each of said certain plates to the longitudinal plate which it overlies whereby said longitudinal plates are adapted to swing with respect to each other to move said projections over the longitudinal plates which they overlie to loosen ice adhering thereto, certain of said transverse plates each being provided at its upper edge with a horizontal extension terminating in depending lugs engageable with the upper edge portion of an adjacent longitudinal plate to limit relative movement between said transverse and longitudinal plates.

LOGAN L. MALLARD.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,110,511	Rudd	Mar. 8, 1938
2,337,450	Chilton	Dec. 21, 1943
2,362,320	Steenstrup	Nov. 7, 1944