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E. H. ROBERTS

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FREEZING TRAY

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Fig. I

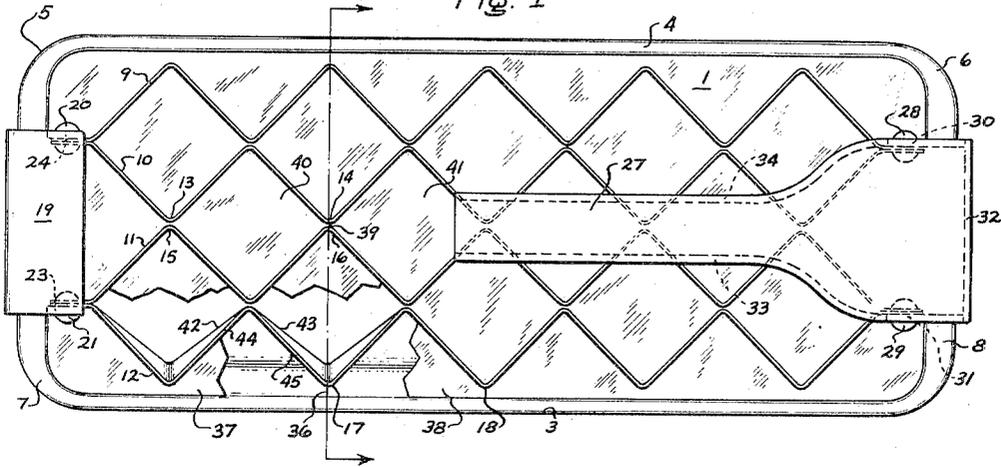


Fig. II

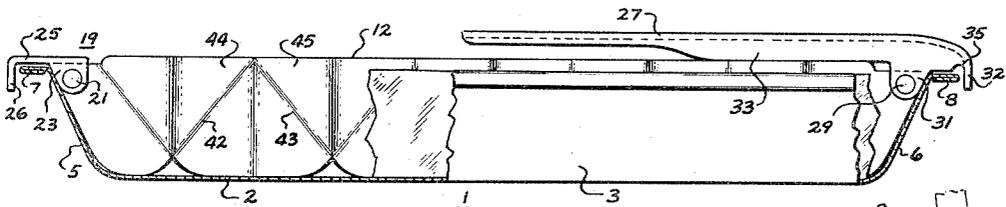


Fig. III

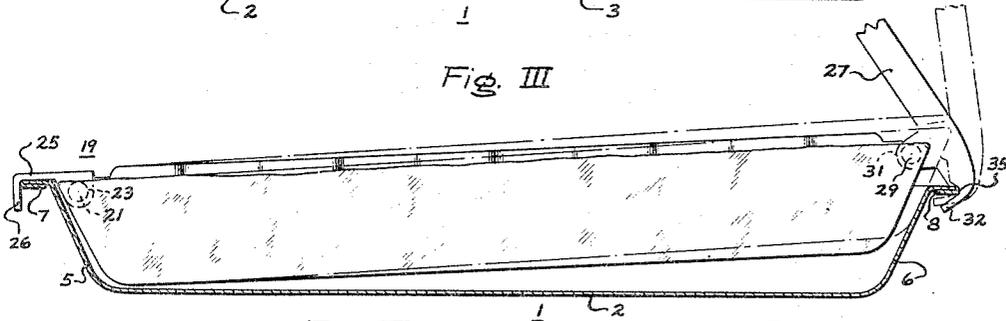


Fig. IV

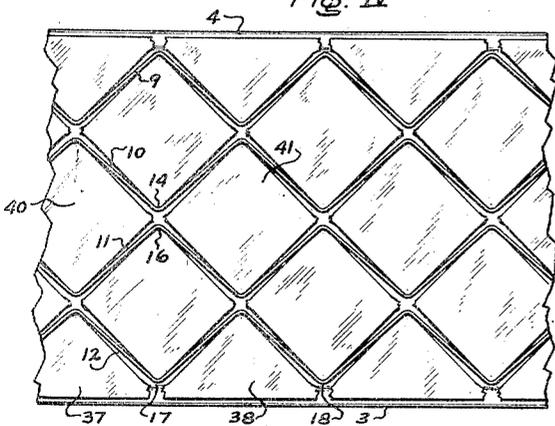
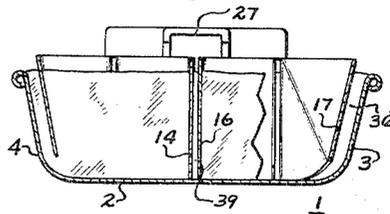


Fig. V



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**FREEZING TRAY**

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1 Claim. (Cl. 62—108.5)

My invention relates to ice freezing trays for use in household refrigerators and more particularly to devices for releasing ice cubes from such trays.

It is a primary object of my invention to provide new and improved means both for dividing an ice tray into a plurality of compartments and for readily freeing ice cubes from the compartments.

Another object of my invention is to provide an ice cube releasing device through which all the ice cubes in an ice tray are released at the same time as the result of a single operation.

My invention also has as its object the provision of ice cube freeing device which is very simple and inexpensive to manufacture.

In carrying my invention into effect I provide a lever actuated ice cube forming and releasing device in which the ice cubes are frozen in a tray having a floor and up-standing side and end walls. In this tray I position a plurality of longitudinally resilient undulated elements which cooperate to form a plurality of ice cube compartments. At their one ends these undulated elements are provided with means for detachably securing them to the tray. At their other ends the undulated elements are secured together and are provided with pivot means for pivotally attaching a lever thereto. Through the use of the lever an outward force may be applied to the ends of the undulated elements at which it is attached. Since the other ends of the elements are secured to the tray, the result is that the undulated elements are first tilted upwardly and then stretched somewhat, whereby the ice cubes are freed both from the tray and from the elements themselves.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention, however, both as to its organization and method of operation may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a top view, partially broken away, of a preferred embodiment of my new and improved ice cube forming and releasing means;

Fig. 2 is a side view partially in section of the device shown in Fig. 1;

Fig. 3 is a sectional view from the side illustrating the method of releasing ice cubes from the device;

Fig. 4 is a fragmentary top view showing the device after the ice cubes have been freed from the container sides; and

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1.

Referring now to the diagram, I have shown therein, as illustrative of my invention, an ice cube forming and releasing device including an ice tray 1 which is provided with a floor 2, side walls 3 and 4, and end walls 5 and 6. The end walls 5 and 6 are respectively provided at their upper edges with outstanding flanges 7 and 8 for a purpose to be explained hereinafter.

Positioned within the tray and extending between the

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end walls are a plurality of undulated elements 9, 10, 11, and 12. These undulated elements have crests, as for example the crests 13 and 14 on element 9 and the crests 15 and 16 on element 10, which cooperate to define essentially separate compartments within tray 1. Moreover, the outer two elements 9 and 12 have outwardly extending crests, as for example the crests 17 and 18 on element 12, which cooperate with the tray side walls to form essentially separate compartments. In the illustrated device the undulated elements are zigzag in configuration so that the compartments lying between adjacent elements are diamond shaped while the compartments lying between the outside elements and the tray walls are triangular shaped.

In any case, whether the undulated elements be of the illustrated zigzag configuration or of some smoother wave form, they are designed to be longitudinally resilient. That is, the undulated elements are capable of being stretched or expanded slightly along the axis of their greatest length without being deformed. Each element in effect acts as a spring tending to return to a stable position after slight stretching. The elements can of course be formed of any suitable resilient material such as sheet metals, various plastic materials, rubber, etc.

At their ends adjacent end wall 5 the undulated elements are detachably secured to the tray. In the illustrated embodiment the means for providing this separable attachment comprises a rigid L-shaped member 19 which is secured to elements 9 and 10 by means of a rivet 20 and to elements 11 and 12 by a similar rivet 21. A pair of spaced depending ears 23 and 24 are provided on a horizontal body portion 25 of member 19 to accommodate these rivets. The body portion 25 extends from ears 23 and 24 across the top of the flange 7 provided on end wall 5, and at its outer end it is provided with a bent down flange or lip 26. As will be later described, this lip supplies actual contact whereby member 19 and thus the undulated elements are detachably secured to the tray.

Preferably, as shown, the distance between ears 23 and 24 and depending lip 26 is slightly greater than the width of flange 7 so that a slight play is possible between member 19 and the flange. But it should be understood that such play is not absolutely necessary to the operation of my device and a much tighter fit could be used between member 19 and flange 7. Moreover, the undulated elements need not be necessarily attached to the tray by an L-shaped member. Any securing means which will allow some pivotal movement of the elements relative to the tray floor may be used with success.

In order to free the ice cubes from the various compartments formed in the tray, the undulated elements are provided at their ends remote from member 19 with a means for pivotally attaching an actuating member 27. In the illustrated embodiment, these attaching means are such that the actuating member is permanently secured to the undulated elements, but it should be understood that I also contemplate providing means whereby the actuating member may be readily detached from the undulated elements. With this later mounting, a single actuating member could, of course, be used to operate any number of my new and improved ice cube releasing devices.

In the illustrated device the actuating member consists of a handle or lever 27 which is mounted on the undulated elements by means of headed pins 28 and 29, a pair of depending ears 30 and 31 being provided on the handle to accommodate the pins. In addition to mounting handle 27, pins 28 and 29 also serve to secure together the undulated elements themselves, pin 28 joining elements 9 and 10 and pin 29 joining elements 11 and 12. Since pins 28 and 29 are headed outwardly of ears 30 and 31, handle 27 is permanently secured thereon, but it is obvious that a construction could be provided where-

by the handle would be readily removable. For example, the depending ears 30 and 31 could be provided with slots rather than being apertured to accommodate the pins, which arrangement would allow the ears to be slid off the pins. Or else the pins could be provided with a flange inwardly of the ears instead of being headed outwardly thereof so that the ears could be sprung on and off the pins.

As may be seen in the diagrams, the actuating handle or lever 27 extends in both directions from the pivot pins both rearwardly toward the end wall 5 and forwardly over end wall 6 and flange 8 thereof. Outwardly of the flange 8, the lever is provided with a down-turned or depending lip 32 which extends downwardly to a point somewhat below the lower surface of flange 8. In addition to down-turned lip 32, lever 27 is further provided along its sides with down-turned flanges 33 and 34 in order to strengthen the lever during use. At the point where flanges 33 and 34 would join lip 32, they are provided with similar grooves, only one of which, the groove 35 in flange 33, is shown. These grooves are adapted to engage the outer edge of flange 8 during operation of the lever but they are, however, not absolutely essential to proper operation of the device and may be omitted if desired.

In operation, tray 1 is filled with water and then placed in a freezing compartment and the water frozen. Since the adjacent crests of the undulated elements, as for example crests 13 and 15, do not necessarily touch and since the outside crests as for example crest 17, do not touch the side walls of the tray, therefore, the water freezes into one big block of ice, the various segments or cubes of which are joined together by very thin strips or necks. The manner in which the various cubes within the tray are joined together may be very well seen in both Figs. 1 and 5. Thus, for example, a thin neck of ice 36 extends between crest 17 and side wall 3 to join the ice blocks or cubes 37 and 38 which lie on opposite sides of the crest; and a similar although somewhat narrower strip of ice 39 extends between the crests 14 and 16 to join the ice cubes 40 and 41 lying on the opposite sides of those crests.

To free the entire ice block from the tray and to detach the various blocks or cubes one from another is a very simple process. Assuming lever 27 is attached to the undulated elements either by the permanent pivot means shown or else by some detachable pivot means, the housewife merely pulls the left-hand end of the handle 27 (as viewed in Figs. 2 and 3) upwardly, causing it to turn on its pivotal mounting. As it turns, the depending lip 32 engages the outer edge of flange 8 and applies a force tending to move the undulated elements and thereby the ice block formed around them both upwardly and toward the right-hand end of the ice tray (as viewed in Figs. 1 and 2). The aforesaid play between the edge of flange 7 and lip 26 of member 19 allows the elements and the ice block to move slightly toward end wall 6. And thus the combination lifting and translating force causes the entire ice block to break free of the bottom and sides of the tray as shown by the dotted lines in Fig. 4.

After the entire ice block breaks free from the tray, the housewife continues to turn lever 27 until the grooves, such as groove 35, lying between lip 32 and side flanges 33 and 34 fit over the edge of flange 8, or if such grooves are not included in the handle, until the creases between lip 32 and flanges 33 and 34 fit over the flange. About this time the play between member 19 and flange 7 has been used up, so that it is impossible for the ice block to be translated any further to the right. Therefore, as movement of the handle is continued, a stretching force is applied to the undulated elements. The elements then expand or stretch slightly under this force and tend to pull each separate ice block somewhat toward the right. The result of these stretching forces is that the thin necks of ice, as for example necks 36 and 39, are broken apart, and separate cubes are formed. Moreover, the various segments of the undulated elements pull away from the

ice blocks or cubes so that the ice cubes are effectively freed therefrom.

The actuating force from handle or lever 27 is thereupon terminated allowing the undulated elements to spring back to their original configuration. Then the resilient grid structure formed by the undulated elements is lifted from the tray and the separate loosened cubes drop away from the grid and remain in the tray. The ice cubes are thus completely separated and freed both from the tray and the grid, and may consequently be easily removed for use.

Since during the ice cube freeing process there are two elements acting on each of the center or diamond shaped cubes, there is little danger of the center elements 19 and 11 becoming sprung as a result of the process. However, on the outer or triangular shaped cubes only one undulated element, either element 9 or element 12, supplies any force; and therefore, there might be some danger that these outer elements would become sprung. To guard against this possibility, each of the various angled segments of these two outer elements is provided with a diagonal strengthening crease. These creases may be best seen in Figs. 1 and 2, where, for example, the creases 42 and 43 provided respectively on the segments 44 and 45 of element 12 are very clearly shown. These creases provide additional resilience in the outside elements 9 and 12 and insure that no permanent deformation will occur during the ice cube releasing process.

In summation, by my invention I have provided a new and improved device whereby all the ice cubes in an ice tray may be quickly and effectively removed therefrom by a single mechanical operation. By employing a plurality of longitudinally resilient undulated elements to divide an ice tray into compartments and by utilizing the same elements to free the cubes formed therebetween, I have provided a structure which is simple and inexpensive to manufacture and which is foolproof in operation. With respect to these undulated elements, it should be understood that my invention is not limited to the particular illustrated zigzag elements. Nor is it restricted to the exact structure described above for securing the elements to the tray at their one ends and for applying a force to them at their other ends. Clearly, various other attaching and actuating means could be used without appreciably affecting the results secured.

Thus, while in accordance with the patent statutes I have described what is considered to be the preferred embodiment of my invention, it should be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

In combination, an ice tray having a floor and up-standing side and end walls, with said end walls being provided with outwardly extending flanges, a plurality of longitudinally resilient zigzag elements positioned in said tray and cooperating to form ice cube pockets therein, said elements extending between said end walls and normally resting on said floor and adjacent of said elements having alternately spaced apart and adjacent peaks whereby said pockets are formed between said elements, said elements adjacent said side walls of said ice tray having a diagonal strengthening crease upon each of the angled segments between said alternate peaks, a rigid member attached to said zigzag elements at their one ends and adapted to engage one of said flanges to detachably secure said elements to the associated of said end walls, a lever pivotally mounted on said undulated elements at their other ends, and a down-turned lip formed on said lever and adapted to engage the other of said flanges upon a movement of said lever, thereby to free said

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ice cubes from said pockets by both tilting and stretching said elements.

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