Aug. 2, 1955 A. J. FREI 2,714,294

ICE TRAY GRID

Filed May 18, 1953 2 Sheets-Sheet 1

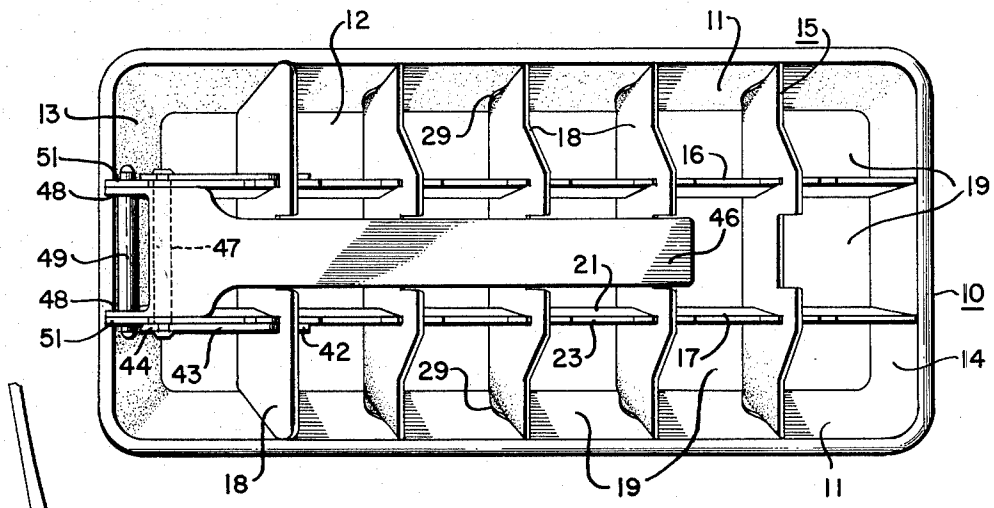


Fig. 1

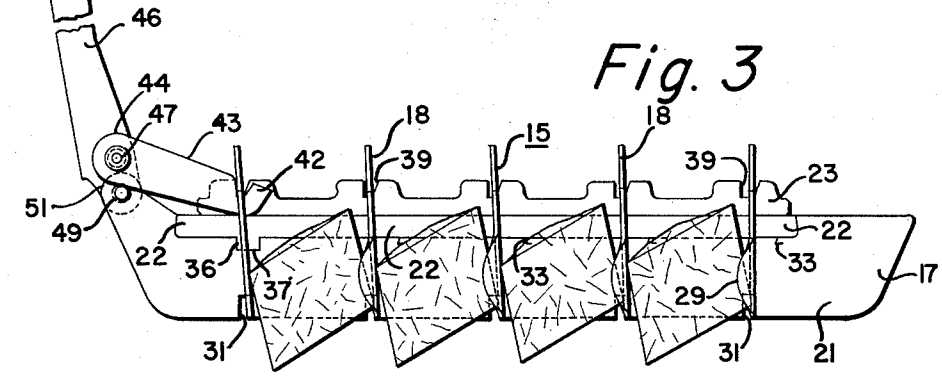


Fig. 3

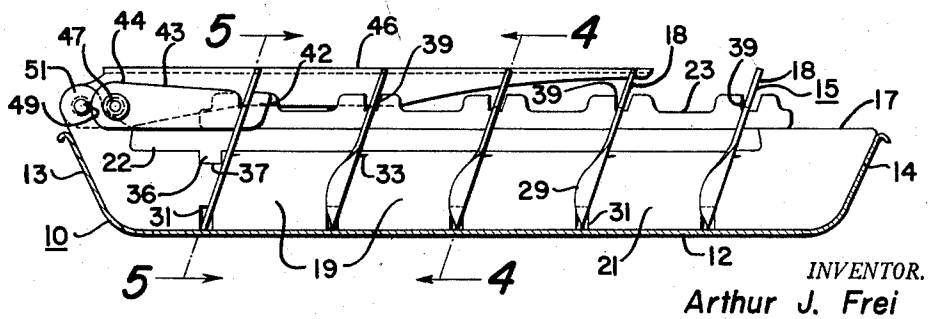


Fig. 2

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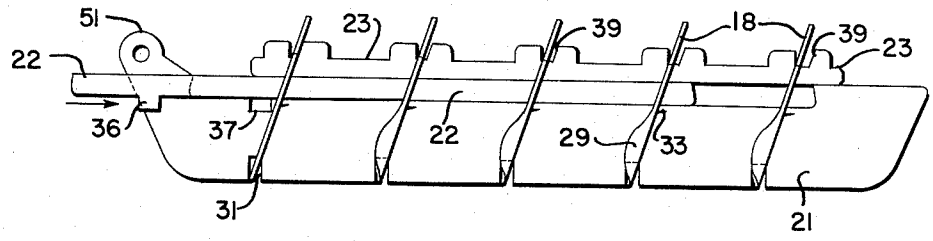


Fig. 6

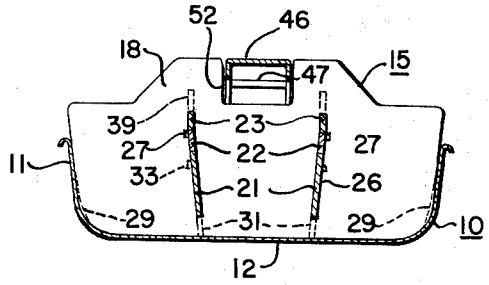


Fig. 4

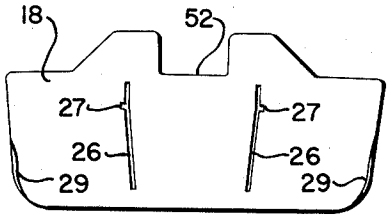


Fig. 7

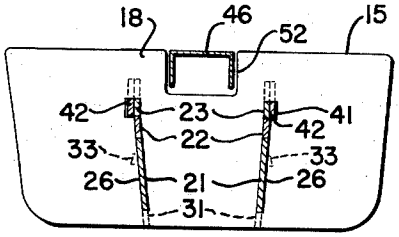


Fig. 5

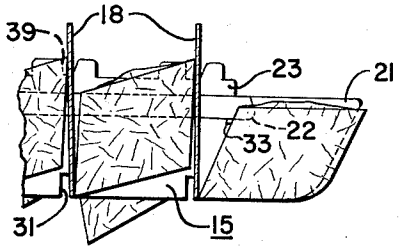


Fig. 8

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ICE TRAY GRID

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Application May 18, 1953, Serial No. 355,652

3 Claims. (Cl. 62—108.5)

This invention relates to ice trays and particularly to grids therefor as employed in household refrigerators.

The present application represents improvements in the art and specifically improvements and novel features over the devices disclosed in my copending applications S. N. 182,499, filed August 31, 1950, entitled Freezing Tray, and S. N. 292,897, field June 11, 1952, entitled Freezing Pan, now patents numbered 2,642,726 and 2,642,727, respectively, both issued June 23, 1953.

In the past ice trays and grids have been constructed so that ice blocks frozen in the trays and bonded to walls of a grid therein would be released from the grid walls during removal of the grid from a tray or released from the grid walls after the grid had been removed from a tray. In order to accomplish such ice block release, mechanical means has been provided to move certain of the grid walls relative to other of the walls thereof to cause the bond between ice blocks and their compartment walls to be broken whereafter the ice blocks would slide downwardly out of the bottom of the grid. This has not been entirely satisfactory because in attempting to remove only a few or the desired number of ice blocks for immediate use other of the ice blocks slide from the grid into the tray and interfere with or render it very difficult to replace the grid and ice blocks remaining therein into the tray. The operator thereupon becomes perturbed and usually removes the interfering ice blocks and throws them into the sink thus resulting in waste of ice blocks when only a few are desired to be harvested. It has been found to be more satisfactory and practical to retain ice blocks in their respective compartments of a grid, after they have been loosened from their movable compartment walls, and to harvest the desired number of loosened blocks for immediate use from the grid by pushing them upwardly out of their compartments from beneath the grid. A relatively simple grid construction can be designed to accomplish the retaining of loosened ice blocks in their compartments when a grid structure includes a single longitudinal wall only. However in a grid structure, for certain customers who desire more and/or smaller ice blocks, wherein two or more longitudinal partitioning walls are incorporated in the grid to provide three or more longitudinal rows of ice blocks, the problem of retaining loosened ice blocks in their respective compartments is increased.

An object of my invention is to provide an improved substantially inflexible movable wall grid structure for disposition in and unitarily removable from an ice tray with a novel arrangement for harvesting a few ice blocks therefrom for immediate use and for preventing other ice blocks loosened from the grid walls from sliding out the bottom of the grid whereby the grid together with the loosened ice blocks remaining or retained therein can be readily replaced in the tray and returned to the evaporator or freezing zone provided therefor in a household refrigerator cabinet.

Another object of my invention is to provide an arrangement of two longitudinal walls in a grid structure for an

ice tray whereby these walls will, without the aid of additional means, retain ice blocks loosened from the grid walls in a central row of ice block forming compartments to thereby necessitate removal of the loosened ice blocks from the grid in a direction upwardly thereof.

A further object of my invention is to provide in a grid structure for disposition in a freezing tray, having a sectional longitudinal wall including a lower partitioning wall member, an intermediate wall member disposed in the same upright plane with said lower member, an upper element and a plurality of tiltable partitioning walls extending transversely across said longitudinal wall, a means for locking the intermediate member against lengthwise movement relative to the lower member which means is positioned so as to be laterally adjacent one of the transverse walls when the same is tilted for preventing the intermediate member from slipping out of the upright plane of the lower member.

A still further and more specific object of my invention is to provide a unitary rigid movable wall grid structure adapted to be removably disposed in an ice tray with a lever pivotally mounted upon a means which holds longitudinal walls of the grid stationary with respect to one another and to connect links pivotally carried by the lever with a transverse wall at an end of the grid so as to apply the initial force created by movement of the lever directly to this one transverse wall to tilt the same and to connect operating elements associated with each longitudinal wall with this one transverse wall for engaging and tilting other of the transverse walls one after the other in succession as determined by the amount of tilting of the end transverse wall.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a top plan view of a liquid freezing device comprising a tray and a grid positioned therein constructed in accordance with my invention;

Figure 2 is a side view of the grid showing the tray in section;

Figure 3 is a view of the grid removed from the tray and showing walls of the grid moved to loosen ice blocks within their respective compartments;

Figure 4 is a transverse vertical sectional view of the device taken on the line 4—4 of Figure 2 showing the interlocking connection between walls of the grid;

Figure 5 is a transverse vertical sectional view taken on the line 5—5 of Figure 2 showing the one transverse wall at the lever end of the grid;

Figure 6 is a side view of parts of the grid showing an intermediate member of a longitudinal wall thereof being assembled into the structure;

Figure 7 is a view of one of the transverse walls of the grid showing ice block retaining means along its side edges; and

Figure 8 is a fragmentary sectional view taken from Figure 3 on a line intermediate the two longitudinal walls of the grid showing loosened ice blocks in the central row of compartments retained therein after the grid walls have been moved.

Referring to the drawings for illustrating and describing various features of construction embodied in the present grid structure, I have shown my improved liquid freezing device as comrising a metal ice tray **10** having side walls **11** inclined outwardly from the bottom to the top thereof (see Figures 1 and 4), a bottom wall **12** and opposed outwardly inclined end walls **13** and **14**. The tray **10** has a unitary metal grid structure, generally represented by the reference character **15**, removably disposed therein. Grid **15** includes two sec-

tional horizontally spaced apart longitudinal partitioning walls **16** and **17** and a plurality of rigid single thickness partitioning walls **18** extending transversely across the longitudinal walls in spaced apart relation along the length thereof (see Figure 1) to provide three longitudinal rows of ice block forming compartments **19**. The transverse walls **18** are mounted upon and loosely interlocked with the longitudinal walls for tilting movement relative thereto. Each longitudinal wall **16** and **17** includes a lower partitioning wall member **21**, an intermediate wall member **22**, disposed in the same upright plane with lower member **21** (see Figure 4), and an upper movable element **23**. Intermediate wall members **22** are located within a depression provided in the upper edge portion of lower wall members **21**. It is to be noted that the longitudinal partitioning walls **16** and **17** or at least the members **21** thereof are inclined outwardly away from one another from the bottom to the upper part thereof (see Figures 4 and 5) for a purpose to be hereinafter described. Each of the transverse partitioning walls **18** are provided with oppositely inclined elongated openings **26** (see Figure 7) and each opening **26** has a small lateral offset portion **27** for a purpose to be described. All of the transverse walls **18**, except the one at the lever end of grid **15**, have the lower portion of their side edges flanged or formed forwardly to provide tabs **29** for a purpose to also be hereinafter described. Members **21** each have spaced apart slots **31** extending upwardly from their bottom edge. The lower member **21** of each longitudinal wall **16** and **17** is also slit and bent laterally to provide a plurality of spaced apart ears **33** the purpose of which will become apparent hereinafter. The intermediate members **22** of grid **15** are inset in a depression or a cutaway part at the upper edge of lower members **21** to prevent lengthwise movement of a member **22** relative to its associate member **21**. These intermediate members **22** are provided with a downwardly extending projection **36** which registers with and fits into a recess **37** provided in the upper edge portion of the depression in lower members **21**. Movable elements **23** are each provided with open notches **39** suitably spaced along the upper edge thereof to loosely receive continuous portions of the transverse walls **18** above the elongated openings therein (see Figures 2 and 4). The notches **39** are progressively wider than one another from one end to the other end of members **23**. That is when the grid is assembled the rear wall of notch **39** at the lever end of the grid is in engagement with the plain transverse wall while the rear wall of other of the notches are progressively spaced a greater distance from the cross wall **18** fitting therein. Elements **23** are interlocked with each of transverse walls **18** and are unattached to a lever provided on the grid. The one transverse wall at the lever end of grid **15** is devoid of the side lips **29** and has the upper end of the elongated openings **26** therein widened, as at **41** (see Figure 5), for the reception of a notched end **42** of each of a pair of links **43**. The other end **44** of each of the pair of links **43** is pivotally mounted to a stamped metal lever **46** by a metal pin or stud **47**. This lever **46** has spaced apart legs **48** (see Figure 1) pivotally mounted upon a pin or stud **49** extending between and located in suitable holes provided in an upturned end portion **51** of each of the members **21**. Pin or stud **49** holds the members **21**, and consequently members **22**, of the longitudinal partitioning walls **16** and **17** of grid **15** stationary against movement relative to one another. Each cross or transverse partitioning wall **18** which underlies hand operated lever **46**, when in its down or normal position, has the central upper edge cut away at **52**, as best shown in Figure 7, to permit lever **46** to lie flush with the upper edges of the cross walls as shown in Figure 2 of the drawings. The one transverse wall at the lever end of grid **15** has its top edge surface extended straight out

to the sides thereof (see Figure 5) to provide a flat support for facilitating stacking of the trays one upon another.

Assembly

The parts of grid **15** may be assembled to one another as follows. Cross or transverse walls **18** are held in a fixture and the end opposite the raised end **51** of lower members **21** of the longitudinal partitioning walls are pushed through the elongated openings **26** in the cross walls **18**. The ears **33** on wall members **21** are at this time aligned with the laterally offset portions **27** of openings **26** in walls **18** and freely pass therethrough. Wall members **21** are then lowered within openings **26** so that the slots **31** along the bottom edge of member **21** straddle the continuous portions of transverse walls **18** immediately below the opening **26** therein (see Figure 4). This lowering of wall members **21** moves the ears **33** thereon downwardly beyond the lateral offset portions **27** of openings **26** in transverse walls **18** (see Figure 4) whereupon the ears **33** form stops to locate transverse walls **18** parallel to one another in a normally inclined position relative to the vertical (see Figure 2). With the longitudinal partitioning wall members **21** lowered to the position described and shown in Figure 6 there is ample space between the edge of the depression in the top of members **21** and the upper part of openings **26** in cross walls **18** for the reception of the raised portions, adjacent the notches **39**, on movable or actuating elements **23**. Thus the elements **23** may now be pushed through the openings **26** in the cross or transverse walls **18** and raised within these openings to cause the notches **39** to straddle the continuous portions of walls **18** immediately above the openings **26** therein. The space in openings **26** of the plurality of spaced apart cross walls **18** between elements **23** and lower wall members **21** is now to be filled or taken up by the intermediate longitudinal members **22**. Therefore the end of intermediate members **22**, opposite end end thereof provided with the projection **36**, is fed through openings **26** in cross walls **18** (see Figure 6). As the projection **36** on members **22** approaches or is brought toward the recess **37** in members **21** these intermediate members **22** are bowed slightly to permit the end thereof and projection **36** thereon to clear and slide past the end portion of members **21** so that the projections **36** register with recesses **37**. This end of intermediate members **22** is then sprung into the same upright plane with wall members **21** whereupon the projections **36** enter and snugly fit in the recesses **37** to provide means for locking or preventing lengthwise movement of the intermediate members **22** relative to the lower wall members **21**. This locking means, projections **36** and recesses **37**, is positioned immediately in front of the transverse wall at the lever end of the grid (see Figures 2 and 6) and when this wall is tilted toward the vertical it overlaps or is laterally adjacent to the projections **36** (see Figure 3) to prevent, due to the looseness of the connection between various parts of grid **15**, intermediate members **22** from slipping out of the upright plane of lower wall members **21**. The notched end **42** of links **43** are now placed adjacent to the elements **23**, in a tilted fashion, and rotated so as to pass through the enlarged upper open portion **41** (see Figure 5) of opening **26** in the one plain transverse wall **18** at the lever end of the grid. The notch in the end **42** of links **43** straddles this plain transverse end wall **18** and the end **42** is prevented from becoming disengaged from plain transverse end wall **18** by its resting upon or bearing on the bottom horizontal wall part of the enlarged portion **41** of openings **26**. Lever **46** carrying the two studs or pins **47** and **49** is now brought into position at the end of grid **15**. The raised end portion **51** of each wall member **21** is sprung outwardly to permit the reduced ends of pin or stud **49** to enter suitable holes provided in this raised upper part

51 of members 21. The raised end portion 51 of each wall member 21 then springs back into engagement with the legs 48 on lever 46 to lock the pin or stud 49 between members 21 and hold them stationary relative to one another. The final step of assembling parts of grid 15 together consists in placing the ends 44 of links 43 over the pin or stud 47 and riveting over the ends of pin or stud 47 to thereby secure the links 43 thereto. It is to be understood that the various parts of the grid are firmly assembled together but their connections are loose to permit free movement of certain parts relative to others thereof.

Operation

The pan or tray 10 with the grid structure 15 disposed therein is filled with water, preferably to a normal water level at or slightly below the upper edges of tray 10, and placed in a freezing chamber, such as a compartment formed by walls of an evaporator of a refrigerating system associated with a household refrigerator cabinet, until the water is hard-frozen. To harvest ice blocks from the ice block forming compartments provided by the cooperation of walls of grid 15 with walls of tray 10, the device is removed from its freezing chamber and then set upon a table or other supporting surface and the hand lever 46 operated to loosen all or less than all of the ice blocks, as may be desired for use at the time, from walls of the compartments. When the lever 46 is swung upwardly it carries therewith pin or stud 47, about the axis of pin or stud 49, which consequently lifts the pivoted end 44 of links 43 upwardly and moves the links in a direction toward the lever end of the grid. The notched end 42 of links 43 pulls on the upper part of the plain transverse end wall 18 to tilt this wall relative to the stationary longitudinal wall members 21 and 22 toward the vertical. The initial tilting of the one plain transverse end wall 18 forces ice blocks at the lever end of grid 15 against the inclined end wall 13 of tray 10 and causes the bond between all the ice blocks and the tray walls 11, 12, 13 and 14 to be broken whereupon the grid and ice blocks bonded thereto may be removed from tray 10. This continued pulling force is then also applied by links 43, through the one plain transverse end wall 18, to the upper actuating element 23 and since these elements 23 are disposed above ice formed in the grid they are relatively easy to move. The first end transverse wall is the most difficult to move and since lever 46 and links 43 are above the level of ice blocks formed in the device all force obtained by the initial upward swinging movement of lever 46 can be readily performed by a housewife without undue exertion. Upon removing grid 15 and ice blocks therein from tray 10 the corner ice blocks at the lever end of the grid, having been broken loose by the initial movement of lever 46, will fall away from the grid.

Movement of upper elements 23, upon swinging lever 46 beyond its initial movement to tilt the first or endmost cross wall 18, lengthwise of the stationary wall members 21 and 22 of the longitudinal partitions 16 and 17, causes the one differently spaced apart rear wall of each notch 39 to progressively engage and tilt other of the transverse walls 18 relative to walls 16 and 17 in succession or one after the other along the length of the grid toward the vertical to loosen all ice blocks from their compartment walls. Only a few of all of the ice blocks may be loosened from their compartment walls at one time merely by stopping the swinging movement of lever 46 whenever or at any position thereof desired. All loosened ice blocks, except the corner ice blocks at the lever end of grid 15 and the corner ice blocks at the opposite end of the grid, remain in the grid until they are pushed upwardly out of their respective compartments from beneath the grid. In the present disclosure the means for retaining loosened ice blocks in their respective compartments in the central row of compartments includes the inclination of at least a part of one of the longitudinal walls 16 or 17 outwardly from the other from the bottom to an upper part thereof. Obviously this inclination of one or both of the longitudinal walls relative to one another provides the central row of ice block forming compartments, between the longitudinal walls, with a smaller area at the bottom relative to the top area thereof and prevents the central ice blocks from sliding out of the bottom of the grid. In Figure 8 of the drawings I show ice blocks loosened from walls of the central row of ice block forming compartments retained in these compartments by virtue of the difference in area between the bottom and top thereof thus necessitating removal of the ice blocks upwardly of the grid by hand from beneath the same. The loosened ice block retaining means for the outer longitudinal rows of compartments in the present disclosure includes the tabs 29 on the transverse walls 18. Due to the inclined side edge of walls 18 cooperating with the inclined side walls 11 of tray 10 the outer longitudinal rows of ice block forming compartments 19 are also of smaller area at their bottoms than the area at the top thereof. Thus tabs 29, being positioned under a portion of the loosened ice blocks along their outer side surface, retain the blocks in both of the outer rows of compartments in the grid structure (see Figure 2) until they are pushed upwardly of the grid from the under side thereof at least above the tabs 29. After the walls are moved relative to one another the construction of the grid is such that the various parts thereof are very loosely interlocked together and one or the other end of intermediate members 22 might slip out beyond the shoulder adjacent thereto on lower members 21. The locking means, provided by projection 36 and recess 37, is so positioned that when the one forward plain end cross wall 18 is tilted toward the vertical it is laterally adjacent thereto and prevents the intermediate members 22 from slipping out of the upright plane of lower members 21. Thus the loosely interlocked parts of the grid 15 do not separate from one another during or after the moving operation of the grid walls to cause disassembly of the grid structure.

From the foregoing it should be apparent that I have provided an improved unitary rigid movable wall grid structure adapted to be removably disposed in a freezing tray. The features of construction of the improved grid include that of holding two or more longitudinal walls stationary with respect to one another while tilting transverse walls relative thereto, inclining at least a portion of one longitudinal wall relative to an adjacent horizontally spaced longitudinal wall to retain ice blocks loosened in the center row of ice block forming compartments in the grid structure until removed upwardly therefrom by hand and that of preventing locking means for certain walls of the grid from becoming unlatched during or after moving certain walls of a grid relative to other walls thereof. Other features and advantages are derived from specific and novel structural arrangements incorporated in the presently disclosed grid construction such, for example, as the ease of manipulating the grid lever and the transverse wall actuating element by virtue of locating these elements entirely out of ice frozen in the grid and tray.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A removable unitary grid structure for disposition in a freezing tray comprising, two substantially inflexible longitudinal walls and a plurality of substantially inflexible walls extending transversely thereacross in spaced apart relation therealong to provide three longitudinal rows of ice block forming compartments, said transverse walls being normally inclined with respect to the vertical and movably interlocked with each of said

longitudinal walls, a one-piece movable element extending along the top of each of said longitudinal walls continuously across and being interlocked with each of said transverse walls for progressively engaging and tilting them relative to said longitudinal walls toward the vertical, a level pivotally mounted upon said longitudinal walls at one end of the grid structure, said mounting of said lever to said longitudinal walls locking them together and holding them stationary relative to one another, a link associated with each of said longitudinal walls, each of said links having one end thereof pivotally mounted to said lever and having their other end unattached to said movable elements and interlocked with the first of said plurality of transverse walls at said one end of the grid structure, said lever being swingable about its pivotal mounting to move said links for initially applying a force directly to said first transverse wall simultaneously at two spaced apart points therealong adjacent its points of intersection with said longitudinal walls to tilt said first transverse wall without this initial force being transmitted to said one-piece movable elements, and said one-piece movable elemetns being unattached to said links and bodily shiftable lengthwise of said longitudinal walls solely through their interlocked connection with said first transverse wall by the tilting movement imparted thereto by said links upon continued swinging of said lever to thereafter tilt all other transverse walls of the grid one after another in succession.

2. A removable unitary grid structure for disposition in a freezing tray comprising, a plurality of horizontally spaced apart longitudinal partitioning walls, a plurality of partitioning walls each extending transversely across said longitudinal walls in spaced apart relation therealong to provide three or more lonigtudinal rows of ice block forming compartments, means other than said transverse walls for holding said longitudinal partitioning walls stationary relative ot one another, said transverse walls being normally inclined with respect to the vertical and movably interlocked with said longitudinal walls, said transverse walls having a bottom edge terminating in the same upright plane therewith and side edges, means for engaging and tilting said transverse walls relative to said stationary longitudinal walls toward the vertical for enlarging said compartments and breaking a bond between ice blocks frozen therein and said partitioning walls whereby the ice blocks are loosened within said enlarged compartments, at least a portion of one of said plurality of longitudinal walls being inclined outwardly away from an adjacent longitudinal wall in a direction from the bottom to the upper part thereof, the inclination of said portion of said one longitudinal wall preventing the loosened ice blocks within the one row of enlarged compartments between

said one and said adjacent longitudinal walls from sliding downwardly out of said grid structure, and means on said side edges only of the transverse walls preventing the loosened ice blocks in the row of enlarged compartments beyond said one row thereof from sliding laterally relative to said inclined portion of said one longitudinal wall and serving, without the aid of additional means, to prevent the latter ice blocks from sliding downwardly out of said grid structure.

3. A removable unitary grid structure for disposition in a freezing tray comprising, two horizontally spaced apart longitudinal partitioning walls, a plurality of partitioning walls each extending transversely across said longitudinal walls in spaced apart relation therealong to provide three longitudinal rows of ice block forming compartments, means other than said transverse walls extending between said longitudinal walls and holding them stationary relative to one another, said transverse walls being normally inclined with respect to the vertical and movably interlocked with said longitudinal walls, said transverse walls having a bottom edge terminating in the same upright plane therewith and side edges, a lever pivotally mounted on said holding means for tilting said transverse walls relative to said stationary longitudinal walls toward the vertical for enlarging said compartments and breaking a bond between ice blocks frozen therein and said partitioning walls whereby the ice blocks are loosened within said enlarged compartments, at least a portion of one of said two longitudinal walls being inclined outwardly away from the other longitudinal wall in a direction from the bottom to the upper part thereof, the inclination of said portion of said one longitudinal wall preventing the loosened ice blocks within the row of enlarged compartments between said longitudinal walls from sliding downwardly out of said grid structure, and a retaining tab on said side edges only of the transverse walls for preventing the loosened ice blocks in the outer rows of enlarged compartments from sliding laterally relative to said inclined portion of the one longitudinal wall and serving, without the aid of additional means, to prevent the latter ice blocks from sliding downwardly out of said grid structure.

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