March 19, 1957 E. C. SIMMONS ET AL 2,785,539

ICE EJECTOR TRAY

Filed March 8, 1956 3 Sheets-Sheet 1

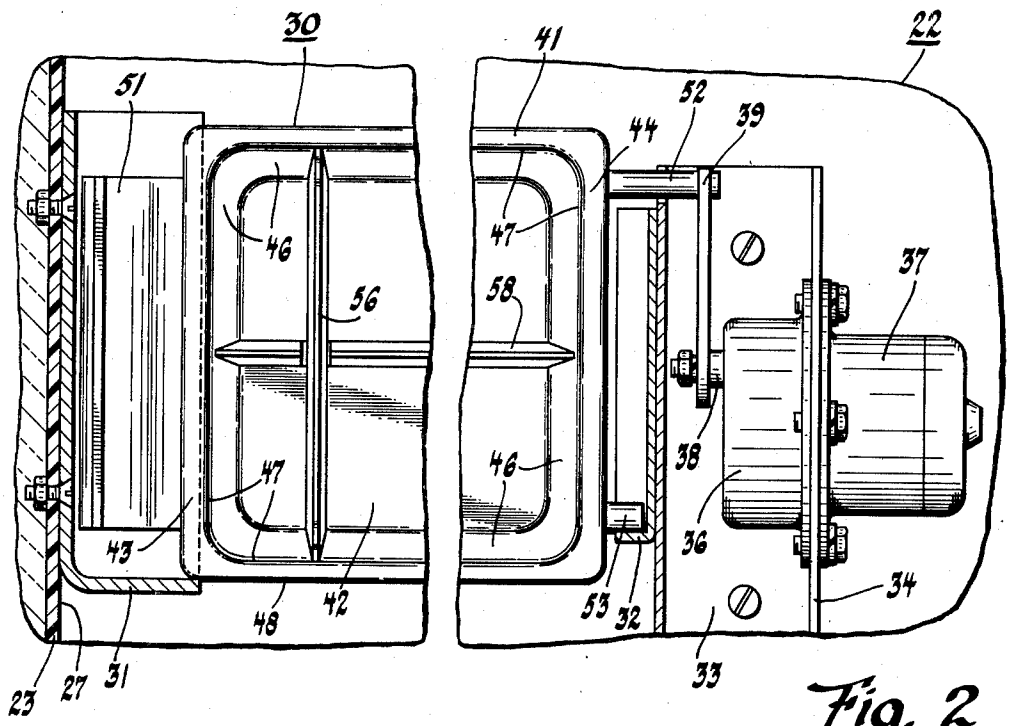


Fig. 2

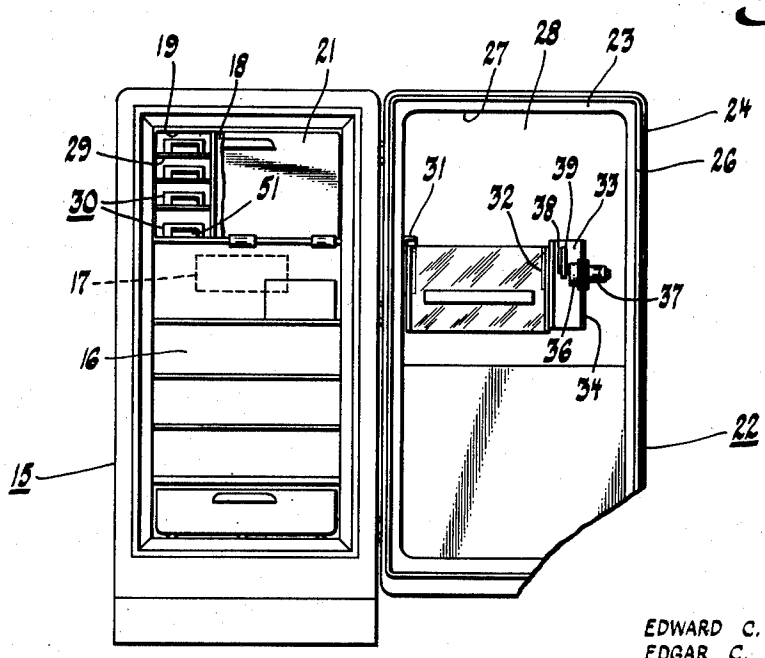


Fig. 1

INVENTORS
EDWARD C. SIMMONS
EDGAR C. ROBBINS

BY R. R. Candor.

THEIR ATTORNEY.

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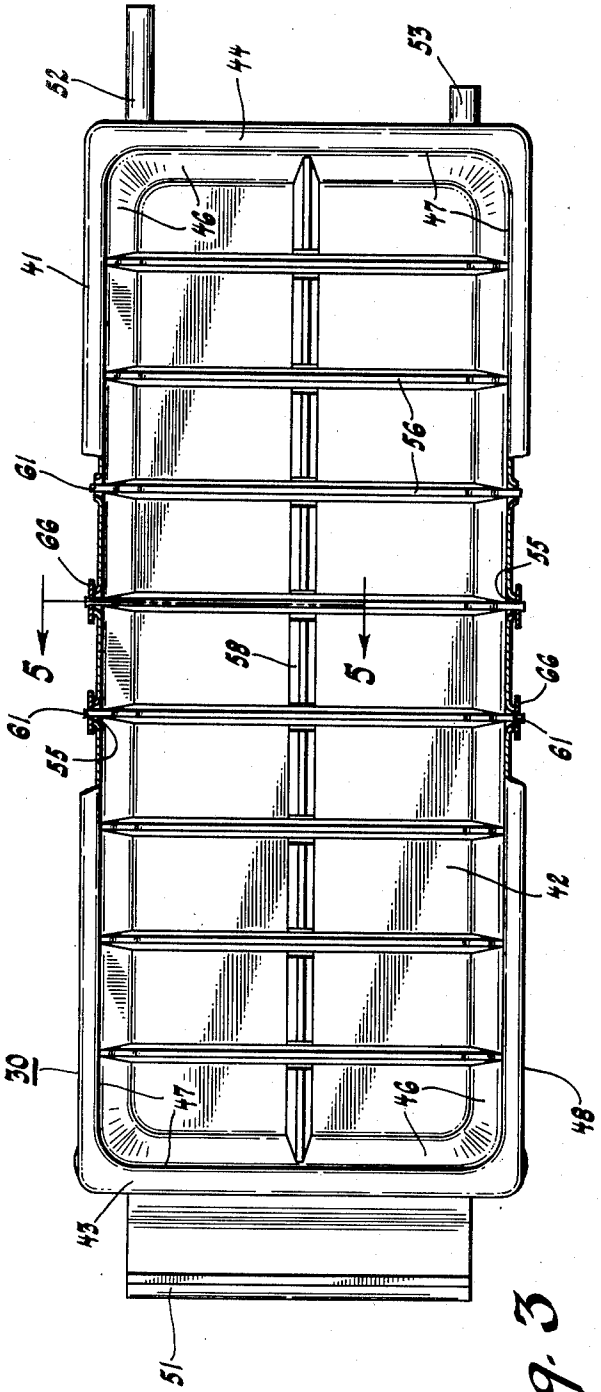


Fig. 3

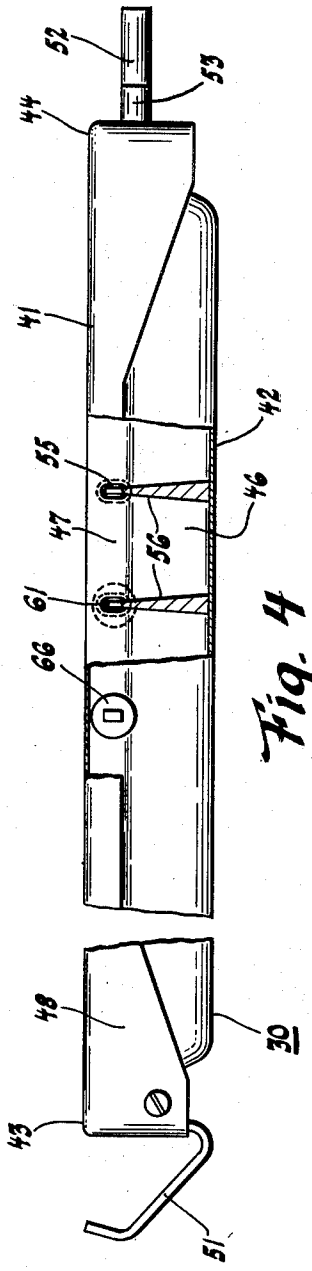


Fig. 4

INVENTORS
EDWARD C. SIMMONS
EDGAR C. ROBBINS
BY R. R. Candor.
THEIR ATTORNEY

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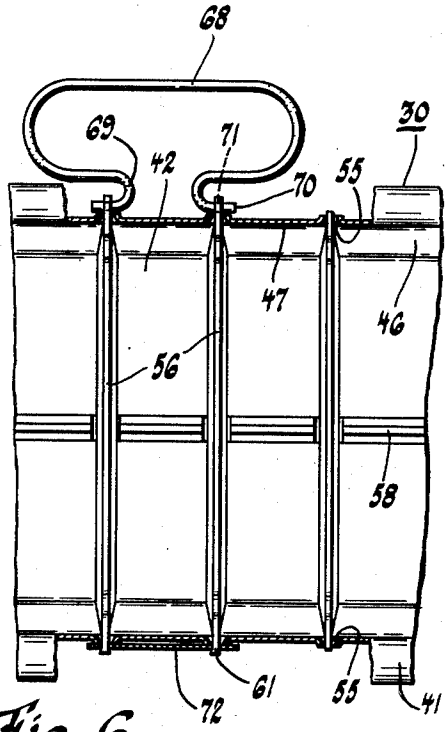


Fig. 6

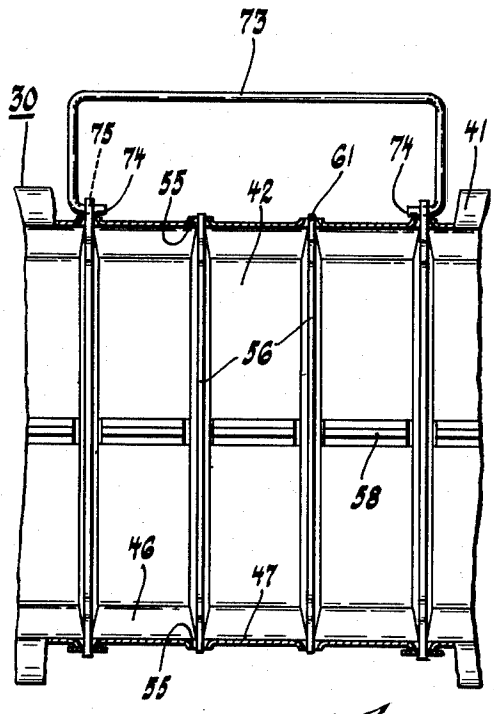


Fig. 7

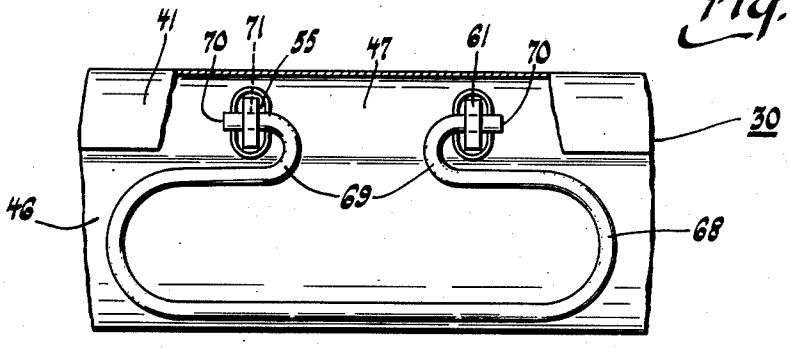


Fig. 8

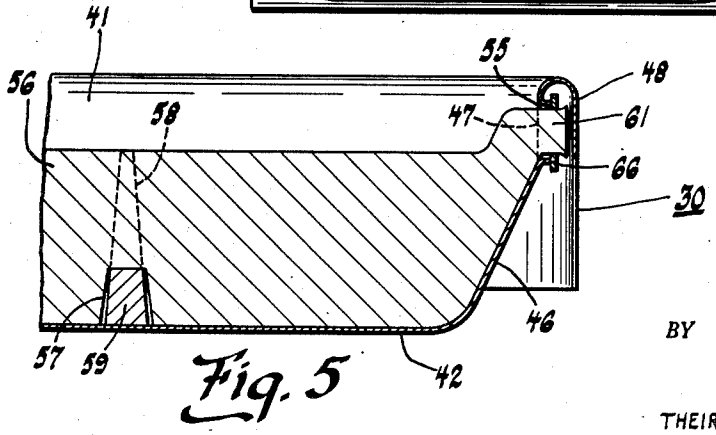


Fig. 5

INVENTORS
EDWARD C. SIMMONS
EDGAR C. ROBBINS

BY R. R. Candor.

THEIR ATTORNEY

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2,785,539

ICE EJECTOR TRAY

Edward C. Simmons and Edgar C. Robbins, Dayton, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application March 8, 1956, Serial No. 570,287

9 Claims. (Cl. 62—108.5)

This invention relates to unitary freezing devices of the tray and grid type.

More particularly our invention involves a freezing device including a resilient metal tray having grid walls loosely anchored in the tray for movement relative thereto and locked therein against removal therefrom and which tray is twistable from end to end for releasing ice blocks from the device of the general character shown and described in the copending Richard S. Gaugler application S. N. 438,897 filed June 24, 1954, now Patent No. 2,752,762, issued July 3, 1956, and in the copending Edmund F. Schweller and Edgar C. Robbins application S. N. 559,694 filed January 17, 1956, both of which applications are assigned to the assignee of this application. Freezing devices of the type disclosed in these two copending applications have been welcomed and favorably accepted by the public and it is our intention to improve and prolong the life of such devices.

An object of our invention is to loosely anchor a plurality of walls in a resilient distortable metal tray for shifting movement relative thereto to form a unitary freezing device and to provide means associated with some of the walls for locking all of the walls in the tray against detachment therefrom in a manner whereby twisting of the tray will not cause the locking means to damage same.

In carrying out the preceding object it is another object of our invention to provide a locking means for walls in a resilient distortable metal tray which will limit twisting movement imparted to the tray so as to eliminate distortion thereof beyond its normal resiliency and prevent the tray from taking a set position slightly twisted out of a straight line plane.

A further object of our invention is to provide a handle on an elongated freezing device which may be extended outwardly of one long side of the tray of the device in parallel relation thereto for facilitating the placing of the freezing device in end to end bridging supported position on an ice block harvesting means and removal therefrom and yet does not interfere with supporting the tray of a freezing device on a flat ledge or shelf.

A more specific object of our invention is to provide a handle extending parallelly along one long upright side of an elongated tray of a freezing device which serves the triple purpose of indicating to the user the proper positioning of the device into supported relation with an ice harvesting mechanism, of facilitating handling of the device and forms a locking means for one end of some of the cross walls in the tray thereof to prevent detachment of the walls therefrom.

Still further objects and advantages of our invention will become apparent as the following description proceeds, and the structural features of novelty which characterize our improved freezing device will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawings:

Figure 1 is a front view of a multiple compartmented household refrigerator cabinet with its main door opened showing an ice block harvesting mechanism located on the inner face of the door;

Figure 2 is a fragmentary sectional view of the ice harvesting mechanism showing a freezing device of the present invention supportingly associated therewith;

Figure 3 is a top view of a freezing device constructed in accordance with this invention with portions thereof in section to more clearly illustrate the structure;

Figure 4 is a broken side view of the freezing device disclosed in Figure 3 with portions thereof in section;

Figure 5 is a fragmentary vertical sectional view through a portion of the freezing device and is taken on the line 5—5 of Figure 3;

Figure 6 is a fragmentary top view of a modified form of freezing device showing a handle at a long side thereof;

Figure 7 is a fragmentary top view similar to Figure 6 of another modified form of freezing device; and

Figure 8 is a fragmentary side view of the device shown in Figure 6 with a portion thereof in section.

Referring to the drawings, we show in Figure 1 thereof a refrigerating apparatus including a suitable insulated household refrigerator cabinet 15 of the multiple compartment or chamber type in which a freezing device of the present invention is associated. Cabinet 15 is provided with a lower food storage compartment 16 cooled by a plate-like evaporator 17 of a refrigerating system carried by the cabinet. Cabinet 15 is also provided with an upper freezing or frozen food storage compartment or chamber which is cooled to a temperature well below 32° F. for the storage of frozen foods, for freezing foods and/or for freezing water into ice blocks for table use in chilling drinks in glasses. Chamber 18 is refrigerated by an evaporator (not shown) of the refrigerating system associated with cabinet 15 which evaporator may be incorporated in walls of a metal can-like member 19 or may be in the form of a conduit coil wrapped around the member 19 forming a liner for the chamber. The front access opening of freezing chamber 18 is normally closed by an insulated door 21. A second insulated main door structure 22, separate from door 21, extends across both chambers or compartments 16 and 18 to close the open front of cabinet 15 and is hingedly mounted on the cabinet for horizontal swinging movement relative thereto. This main cabinet door 22 includes suitably secured together inner and outer panels 23 and 24 respectively having insulating material therebetween and carries a gasket 26 for sealingly engaging the front wall of cabinet 15. The inner panel 23 is preferably dished, as at 27, toward the outer panel 24 to provide a recess 28 in the inner face of door 22. The freezing chamber 18 has a plurality of metal shelves or the like 29 secured, in any suitable manner, to a side wall of liner 19 so as to be in metal to metal conducting contact therewith and with the evaporator which cools chamber 18. Each shelf 29 is adapted to receive and support a unitary freezing device, generally represented by the reference numeral 30, of the type including a tray with grid walls therein for containing water to be frozen into separated ice blocks.

There is an ice block harvesting mechanism or releasing means located within the recess 28 of door 22 which ejects ice blocks from a freezing device 30. A closed bottom end substantially U-shaped bracket 31 is stationarily mounted, at an acute angle with respect to the vertical, on the inwardly dished face part 27 of the inner panel 23 of door 22. A second closed bottom end substantially U-shaped bracket 32 is stationarily mounted, also at an acute angle with respect to the vertical, on a supporting bracket 33 secured to the inner face part 27 of door panel 23 in any suitable manner. The U-shaped brackets 31 and 32 parallel one another and are spaced apart to form a support for receiving end portions of a freezing device 30 in bridge-like supporting fashion

thereon. One leg 34 of bracket 33 has a gear box 36 mounted on one side thereof and an electric motor 37 is mounted on its other side. The drive shaft of motor 37 extends through leg 34 of bracket 33 into gear box 36 and drives a train of suitable reduction gears (not shown) contained in box 36. One of the gears of the train thereof in box 36 has a shaft 38 extending outwardly therefrom and a cam or lever 39 is mounted thereon. A freezing device 30 constructed in accordance with our invention as will be presently described together with ice blocks frozen therein is removed from chamber 18 and inserted in the supports or brackets 31 and 32. The motor 37 is energized to drive the train of gears in gear box 36 and rotate shaft 38 and consequently lever 39. Three corners of the freezing device 30 are held stationary with respect to one another by the brackets 31 and 32 and its fourth corner is engaged by lever 39 to twist the tray of device 30 and snap same for releasing ice blocks from the device. The arrangement of parts thus far described and operation of the ice block ejecting means on the refrigerator cabinet door is substantially the same as is shown and more fully described in the Schweller and Robbins copending application referred to and no further or detailed explanation is necessary herein.

The freezing devices 30 herein described are of the general nature of the device described in the Gaugler Patent No. 2,752,762 and embody improvements which render them especially suitable to be flexed or twisted while supported on an ice block ejecting means or releasing mechanism of the type exemplified in the Schweller and Robbins copending application hereinbefore referred to. Each device 30 includes an elongated resilient flexible sheet metal tray adapted to contain water to be frozen and has a grid therein for dividing the interior of the tray into ice block forming compartments. The resilient elongated tray 41 of the device 30 is relatively shallow and includes a bottom 42, upwardly extending long sides and ends 43 and 44. Upright sides and ends of the tray 41 have an outwardly diverging lower portion 46 and a substantially straight or vertical upper portion 47. The top of the two sides and ends 43 and 44 of the tray 41 are rolled or curled over to provide a rim 48 around the tray. Rim 48 extends downwardly from the top of tray 41 a greater distance at and adjacent its ends 43 and 44 than that portion of the rim intermediate ends of the tray. A combined lever and handle 51 is pivotally mounted, in any suitable or desirable manner, to the end portion 43 of tray 41. This handle 51 is utilized to pry a device 30 loose from its freezing support or shelf 29 and for withdrawing the freezing device from the chamber 18. A stud 52 is secured in any suitable or desirable manner to end 44 of tray 41 near one rear corner thereof. A second stud 53 is likewise secured to end 44 of a tray 41 near the adjacent corner thereof. A metal piece (not shown) may be positioned behind the flange 48 at the back of tray 41 and the studs 52 and 53 threaded thereinto whereby to reinforce the tray intermediate these studs. It is to be noted that the stud 52 is longer than stud 53 and stud 53 rests in the closed bottom of U-shaped bracket 32 on door 22 of cabinet 15 while the longer stud 52 is disposed above bracket 32 for engagement by the lever 39 of the ice block ejecting means. Tray 41 is preferably formed or stamped from thin sheet aluminum of approximately $\frac{1}{32}$" thickness and is polished, anodized and waxed. The long upright sides of the elongated tray 41 of a freezing device 30 is provided with a row of spaced apart outwardly flanged openings 55 in the straight or vertical portions 47 thereof. The openings 55 are located in the upper part of the tray sides to effect movement or shifting of rigid walls of a grid therein when tray 41 is twisted. The flanged openings 55 are preferably vertically elongated.

A grid disposed in tray 41 includes a plurality of rigid or inflexible walls 56 extending transversely and continuously across the tray in spaced apart relation to one another and divide the interior of tray 41 into a plurality of compartments in which water is to be frozen into ice blocks. Each rigid wall 56 is formed of aluminum but they may be formed of any suitable molded plastic material such, for example, as polystyrene. Each wall 56 has its sides tapered toward one another from the bottom to the top thereof and is provided centrally of its ends with a cutout slot 57 extending upwardly from its bottom (see Figure 5). A rigid longitudinal grid wall 58, similar in cross-sectional contour to the plurality of transverse walls 56, is loosely disposed in tray 41 and is provided with a plurality of spaced apart cutout slots extending downwardly from the top edge to provide webs 59 thereon (see Figure 5). Longitudinal wall 58 is placed beneath the plurality of transverse walls 56 with the webs 59 fitting in the slots 57 of walls 56 to movably interlock the grid walls 56 and 58 together. The ends of each transverse wall 56 is provided with an integral extension or projection in the form of an ear 61 at the top thereof. Opposed ears or projections 61 on wall 56 are extended into the transversely aligned flanged openings 55 in the upright long sides of tray 41. The ears or projections 61 are shorter in height than the distance of vertical elongation of openings 55 and the ears 61 are somewhat thinner than the width of openings 55 to fit freely therein and provide points of loose attachment or anchorage of walls 56 to upright sides of the tray. Walls of openings 55 engage the ears or projections 61 on transverse walls 56, when the tray is distorted or twisted and move these walls relative to the tray and to one another. After longitudinal wall 58 has been placed in tray 41 the cross walls 56 are located therein and the projections 61 thereon are pressed or snapped into the openings 55, by springing side walls of tray 41 away from one another, to loosely anchor the walls in the tray. The openings 55 in upright sides of tray 41 in addition to serving as loose anchoring points for walls 56 also permit drainage of water out of the tray when filling same to establish a positive predetermined level of water therein substantially at the top of grid walls 56 and 58. All of the walls 56 and 58 are disposed or anchored loosely in tray 41 and are bodily shiftable with respect thereto by virtue of their loose anchorage when the tray is twisted. The two pivot or loose anchoring points of attachment of each cross wall 56 to upright sides of tray 41 permit a slight elevation of these walls relative to the tray. Twisting of the flexible resilient tray from end to end thereof will move the grid wall anchoring points, openings 55 in the two sides of tray 41, in opposite directions with respect to one another to cause shifting of the transverse walls 56 bodily and angularly relative to the tray in a direction along the length thereof. Movement of walls 56 both upwardly and angularly with respect to tray 41 impart a rocking or tilting movement to these walls in the tray. By torsionally twisting the flexible tray 41 a movement of the transverse walls 56 in a plurality of directions is produced and this movement will break bonds between walls of ice block compartments and ice blocks therein. When the tray is returned or snapped back into a nontwisted state the ice blocks will be released from or flipped out of the freezing device 30.

In accordance with our invention we provide means for preventing detachment of movable walls 56 from the tray 41 without damaging or preventing flexure thereof which means also serves to prevent the tray from taking a permanent set after a number of twisting operations have been performed thereon. During twisting of device 30 at least the central portions of upright sides of tray 41 tend to move outwardly with respect to one another or spread apart. This may result in projections 61 on several of the cross walls 56 and particularly those located centrally of ends of tray 41 slipping out of the openings 55 and becoming detached from the tray. For

this reason we make the projections 61 on some and particularly the center-most cross walls 56 longer than the projections on the other of the walls 56. We slip or slide a washer 66 over the ends of one or more of the longer projections 61 on center-most cross or transverse walls 56 and peen or pinch the end portion of the longer projections to stake or secure the washer thereon (see Figures 3, 4 and 5). The peening or staking of the relatively soft aluminum projections, upon which the washers 66 are placed, swells or expands the end of these projections to lock the washer against removal from walls 56. When the tray 41 of a device 30 is twisted throughout its length, by the ice block harvesting mechanism or ejecting means on door 22 of the refrigerator cabinet 15, the washers 66 on the longer projections 61 at opposed ends of walls 56 engage outer wall surfaces, the edge of flanges at openings 55, of opposite upright sides of the tray to limit outward movement of or spreading apart of these tray sides. By limiting spreading apart of upright sides of tray 41 the projections 61 on walls 56 are prevented from slipping out of the openings 55 and thus do not become detached from the tray. The washers 66 prevent the tray from being twisted beyond its natural point of flexibility to thereby eliminate the possibility of the tray assuming a permanent slightly twisted state or set. It is to be understood that by limiting twisting of tray 41 of a freezing device 30 in this manner it does not impair continued or prolonged application of twisting movement thereto and that the tray retains a predetermined torsional force when twisted to insure its snapping back into a non-twisted state upon releasing the twisting means therefrom. While we show the washers 66 as being staked upon the projections on some of the cross walls 56 it is to be understood that cotter pins or the like could be passed through holes provided in the ends of the projections 61. It has been found that washers 66 need be staked to only one or two of the center-most cross walls 56 to prevent all other of the walls 56 from becoming detached from the tray 41. This therefore obviates the necessity of applying washers 66 to all the transverse walls 56 and the time consuming operation of staking the projections 61 of a great number of walls.

Since the brackets 31 and 32 of the ice ejecting or freezing device twisting means in the recess in the inner face of door 22 on the refrigerator cabinet 15, upon which a device 30 is to be bridgingly supported, are arranged at an acute angle with respect to the vertical it is awkward and difficult to manipulate a device 30 into a position to slide same in end to end supported relationship on the brackets. This also requires considerable handling of the cold tray of the freezing device which chills hands of a user and is objectionable. In order to facilitate handling of a device 30 and to indicate to the user which long side is to be uppermost when the device is removed from the freezing chamber and pushed into supported association on the brackets 31 and 32, we provide a handle on the device which extends parallel along one long upright side of the tray thereof. A bail or wire handle 68 (see Figure 6) has reversely bent portions 69 adjacent its ends with the ends 70 thereof fitted in a hole 71 provided in the end portion of the long projections 61 of two center-most of the cross or transverse walls. After the handle member 68 is sprung into position the reversely bent portions 69 thereof prevent its being slipped out of the holes 71 in the projections. The distance between the hand hold portion of handle 68 and its pivoted mounting is preferably less than the distance between its pivot mounting and the bottom of tray 41 (see Figure 8) so as not to interfere with supporting the tray flat upon a shelf or ledge 29 in freezing chamber 18. Handle member 68 serves the purpose of washers 66 on the one long upright side of tray 41 and instead of employing two washers on the ends of walls 56 at the opposite long side of tray 41 in this modified form of our invention a single metal strip 72 may be slipped over the ends of the projections 61 and staked thereto for bridging these transverse walls. Another modified form of our invention is shown in Figure 7 of the drawings wherein a bail or wire handle member 73 has ends 74 fitting in a hole 75 provided in the projections 61 of spaced cross walls 56. After handle member 73 is sprung into position on walls 56 to pivotally mount same on a device 30 that portion thereof intermediate its hand hold part and its end 74 prevent the ends 74 from slipping out of the mounting holes 75. The handle members 68 and 73 serve to fulfill the purpose of washers 66 on the one longer upright side of tray 41 and facilitate handling of a device 30 upon withdrawing same from chamber 18 and moving it into bridging supported position on the brackets 31 and 32 of the tray twisting and ice ejecting means located on door 22 of cabinet 15. In other words the end portions 70 and 74 of handle members 68 and 73 respectively engage the outer surface, the flange at openings 55, on the one side of tray 41 to limit spreading apart movement of upright sides of the tray.

It is the trend in twistable freezing devices of the type herein disclosed to snap the tray, under torsional force stored up therein upon twisting same, back into a non-twisted state to flip or toss ice blocks therefrom. Our invention in addition to preventing walls loosely anchored in a twistable tray of a freezing device from becoming detached therefrom also prolongs the life of the tray and insures continued snapping of the device by limiting the degree of twist imparted to the tray. The provision of a handle on one long upright side of an elongated freezing device serves to indicate to a user which of the two long sides of the device should be uppermost, facilitates handling of the device and forms a means for locking one end of grid walls in the tray of the device against detachment therefrom by preventing spreading apart of upright sides of the tray.

While the forms of embodiment of the invention as herein disclosed constitutes preferred forms, 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 unitary freezing device comprising, an elongated flexible metal tray capable of being twisted from end to end and a plurality of spaced apart walls extending continuously thereacross dividing the interior thereof into compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said walls being provided with a projection at each of their ends, a portion of the projections on said walls extending into opposed openings in the sides of said tray and loosely anchored therein to render said walls bodily shiftable in at least one direction relative to said tray in response to twisting same for releasing ice blocks from said device, a portion of the projections on one of said walls extending through opposed openings in said tray, a washer fitted over and locked to the projection on opposed ends of said one wall, and said washers being adapted to engage the outer surface of opposite long sides of said tray adjacent the openings therein during twisting thereof for limiting spreading apart movement of said upright tray sides whereby to prevent detachment of said loosely anchored walls from the device.

2. A unitary freezing device comprising, an elongated flexible metal tray capable of being twisted from end to end and a plurality of spaced apart walls extending continuously thereacross dividing the interior thereof into compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said walls being provided with a projection at each of their ends, a portion of the projections on said walls extending into opposed openings in the sides of said tray and loosely anchored therein to

render said walls bodily shiftable in at least one direction relative to said tray in response to twisting same for releasing ice blocks from said device, a portion of the projections on some of said walls extending through opposed openings in said tray, a handle paralleling one long side of said tray and locked to the projection on ends of said some of said walls, means separate from said tray and said walls locked to the projection on ends of said some of said walls at the long side of said tray opposite said handle side thereof, and said handle and said means cooperating with one another and engageable with the outer surface of opposite long sides of said tray adjacent openings therein during twisting thereof for limiting spreading apart of said upright tray sides whereby to prevent detachment of said loosely anchored walls from said device.

3. A unitary freezing device comprising, an elongated flexible metal tray capable of being twisted from end to end and a plurality of spaced apart walls extending continuously thereacross dividing the interior thereof into compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said walls being provided with a projection at each of their ends, a portion of the projections on said walls extending into opposed openings in the sides of said tray and loosely anchored therein to render said walls bodily shiftable in at least one direction relative to said tray in response to twisting same for releasing ice blocks from said device, a portion of the projections on some of said walls extending through opposed openings in said tray, a bail paralleling one long upright side of said tray and having its ends pivotally locked in a hole provided in the projections on said some of said walls, a washer fitted over and locked to the projection on said some of said walls at the opposite long side of said tray, and said bail and said washer cooperating with one another for engaging the outer surface of opposed long sides of said tray adjacent openings therein during twisting thereof to limit spreading apart movement of said tray sides whereby to prevent detachment of said loosely anchored walls from the device.

4. A unitary freezing device comprising, an elongated flexible metal tray capable of being twisted from end to end and a plurality of spaced apart walls extending continuously thereacross dividing the interior thereof into compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said walls being provided with a projection at each of their ends, a portion of the projections on said walls extending into opposed openings in the sides of said tray and loosely anchored therein to render said walls bodily shiftable in at least one direction relative to said tray in response to twisting same for releasing ice blocks from said device, a portion of the projections on a wall located centrally of ends of said tray extending through opposed openings in said tray, a member at one long side of the tray projecting through a hole provided in the projection on said centrally located wall, means separate from and independent of said tray and said walls and locked to the projection on said centrally located wall at the opposite side of said tray, and said member and said means cooperating with one another and adapted to engage the outer surface of opposed upright long sides of said tray adjacent the openings therein during twisting thereof to limit spreading apart movement of said tray sides whereby to prevent detachment of said loosely anchored walls from the device.

5. A unitary freezing device compirsing, an elongated flexible metal tray capable of being twisted from end to end and a plurality of spaced apart walls extending continuously thereacross dividing the interior thereof into compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said walls being provided with a projection at each of their ends, a portion of the projections on said walls extending into opposed openings in the sides of said tray and loosely anchored therein to render said walls bodily shiftable in at least one direction relative to said tray in response to twisting same for releasing ice blocks from said device, a portion of the projections on two of said walls extending through opposed openings in said tray, a handle pivotally mounted on the projection of each of said two walls and extending along one upright long side of said tray, means separate from and independent of said tray and said walls and locked to the projection on each of said two walls at the opposite side of said tray, and said handle and said means cooperating with one another and adapted to engage the outer surface of opposed upright long sides of said tray adjacent openings therein during twisting thereof to limit spreading apart movement of said tray sides whereby to prevent detachment of said loosely anchored walls from the device.

6. A unitary freezing device comprising, a stamped sheet metal elongated resilient tray having upright ends and sides formed integral with the bottom thereof and capable of being twisted, said device also comprising a plurality of spaced apart rigid walls extending continuously across said tray and dividing the interior thereof into compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said walls being provided with a projection at each of their ends, said wall projections extending into opposed openings in the sides of said tray to loosely anchor the walls therein and to render them bodily shiftable while anchored in said tray at least in one direction relative thereto in response to twisting same for releasing ice blocks from said device, a portion of the projections on one of said walls extending through opposed openings in said tray sides, means separate from said tray and said walls locked to said portion of the wall projections, and said means being engageable with the outer surface of opposite long sides of said tray adjacent openings therein during twisting thereof for limiting spreading apart movement of said upright tray sides whereby to prevent detachment of said plurality of loosely anchored walls from said device.

7. A unitary freezing device as defined in claim 6 wherein the sides of the loosely anchored walls are tapered toward one another from their bottom to their top.

8. A unitary freezing device comprising, a stamped sheet metal elongated resilient tray having upright ends and sides formed integral with the bottom thereof and capable of being twisted, said device also comprising a longitudinal wall within said tray and a plurality of spaced apart rigid walls extending across said tray over portions of said longitudinal wall to secure same in the tray, said walls dividing the interior of said tray into rows of compartments in which water is to be frozen into ice blocks, said tray being provided with openings in the long upright sides thereof, said rigid cross walls being provided with a projection at each of their ends, said cross wall projections extending into opposed openings in the sides of said tray to loosely anchor the rigid cross walls therein and to render them bodily shiftable while anchored in said tray at least in one direction relative thereto and to said longitudinal wall in response to twisting same for releasing ice blocks from said device, a portion of the projections on one of said cross walls extending through opposed openings in said tray, means separate from said tray and said walls locked to said portion of the projections on said one wall, and said means being engageable with the outer surface of opposite long sides of said tray adjacent openings therein during twisting thereof for limiting spreading apart movement of said upright tray sides whereby to prevent detachment of said loosely anchored cross walls from said device.

9. A unitary freezing device as defined in claim 7

wherein the sides of at least the cross walls are tapered toward one another from their bottom to their top.

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