Nov. 6, 1956 G. H. STRICKLAND 2,769,317

FREEZING DEVICE

Filed May 13, 1954 2 Sheets-Sheet 1

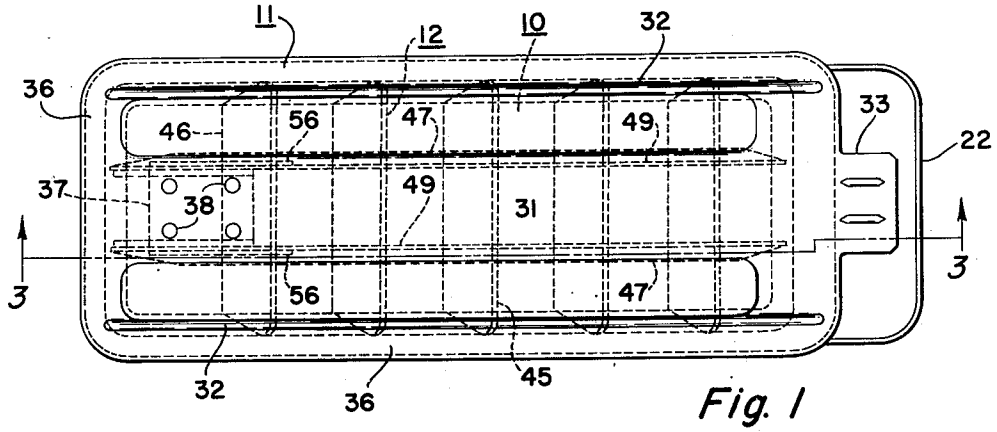


Fig. 1

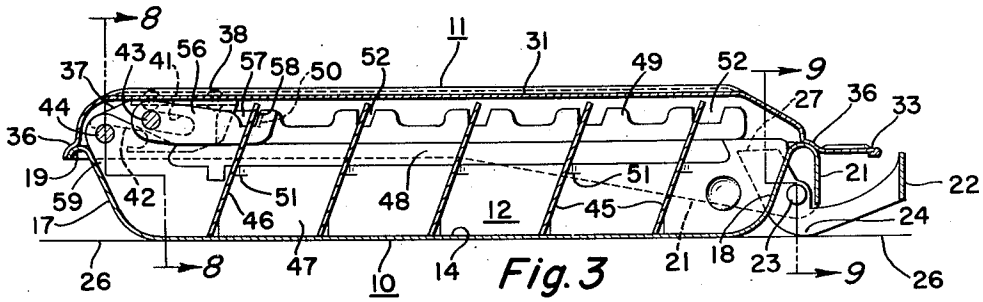


Fig. 3

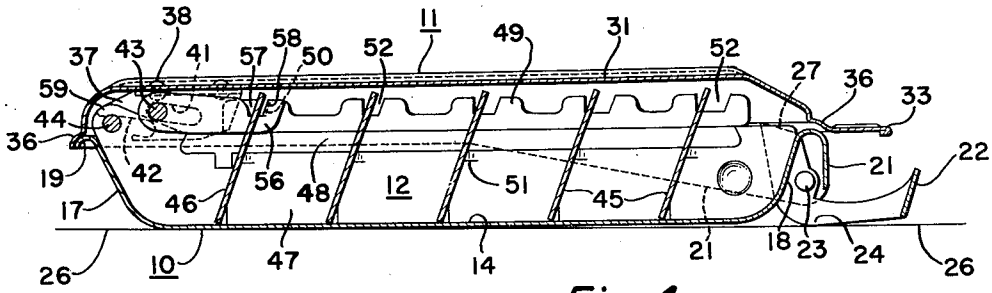


Fig. 4

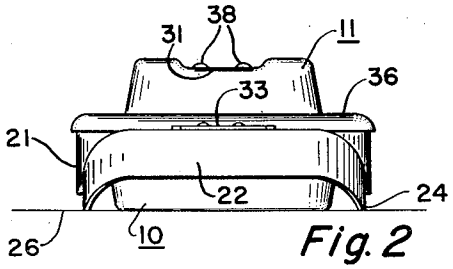


Fig. 2

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Nov. 6, 1956 G. H. STRICKLAND 2,769,317

FREEZING DEVICE

Filed May 13, 1954 2 Sheets-Sheet 2

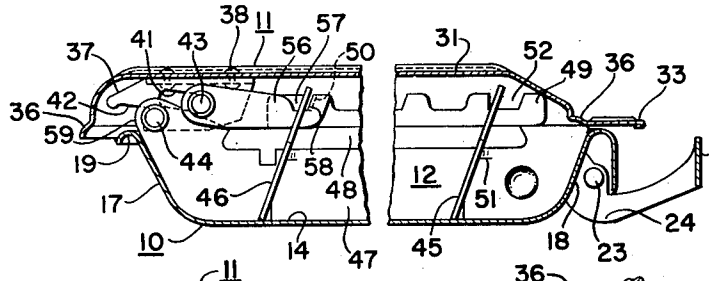


Fig. 5

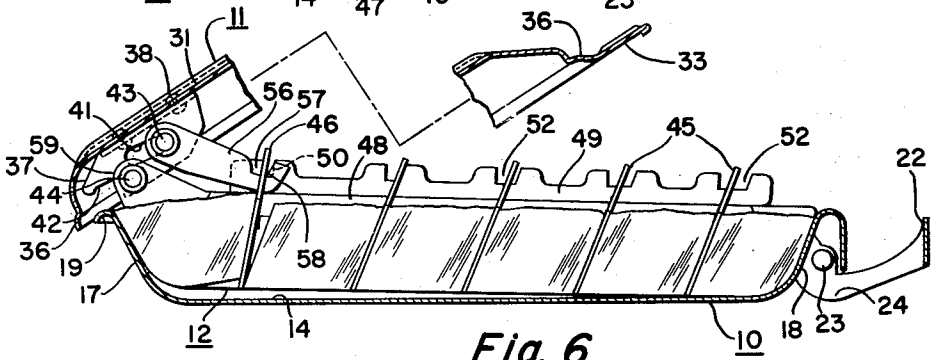


Fig. 6

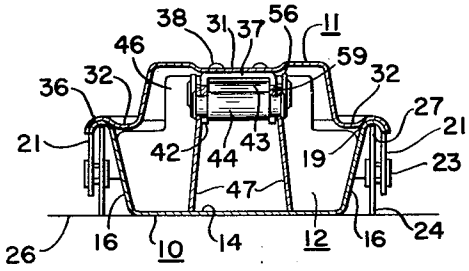


Fig. 8

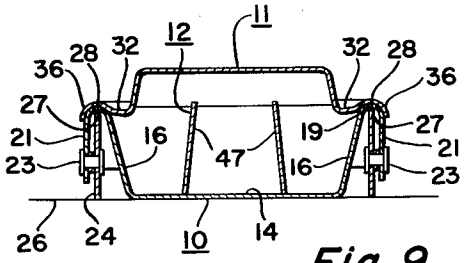


Fig. 9

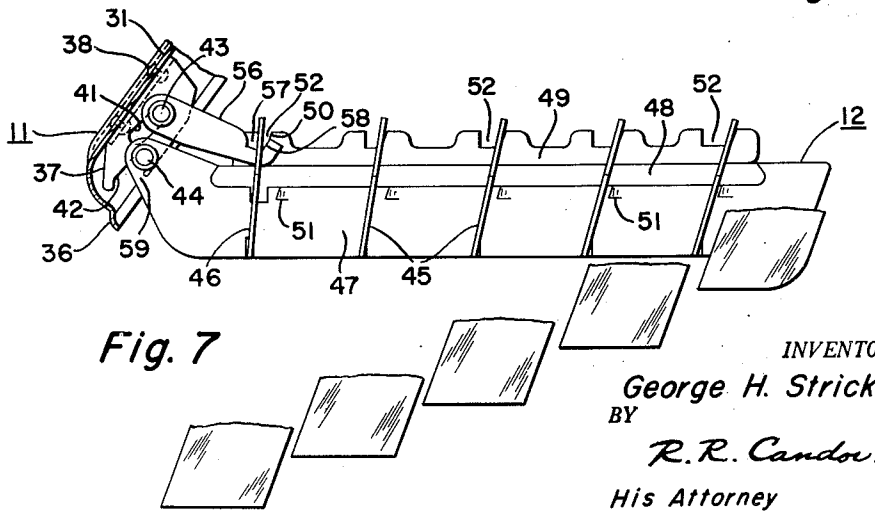


Fig. 7

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United States Patent Office 2,769,317 Patented Nov. 6, 1956

2,769,317

FREEZING DEVICE

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Application May 13, 1954, Serial No. 429,502

2 Claims. (Cl. 62—108.5)

The present invention relates to freezing devices employed in freezing compartments of mechanically refrigerated refrigerators for the production of blocks of ice.

An object of my invention is to provide a low cost improved covered freezing device of the tray and grip type.

Another object of my invention is to provide a combined movable rigid walled grid and cover for an ice tray of a freezing device which is removable from the tray as a unit and wherein the cover is pivotally or hingedly connected with the grid and its upward movement relative thereto about the connection is utilized to tilt certain walls of the grid relative to others thereof.

Another object of my invention is to provide a closed or covered ice block producing device of the tray and grid type wherein the cover itself serves as a lever or force multiplying means for releasing a grid structure and ice blocks bonded thereto from the tray and for moving certain walls of the movable walled grid structure in the tray relative to other walls thereof to loosen or free ice blocks from the grid.

A further object of my invention is to provide a substantially inflexible one-piece sheet metal cover for a tray of a freezing device which is reinforced in such manner and connected to an actuating means for moving walls of a movable rigid walled grid structure relative to one another whereby operation of the cover moves the grid relative to the tray to first break a bond between ice blocks in the grid and walls of the tray and further movement of the cover thereafter loosens or releases ice blocks from walls of the grid to facilitate harvesting of ice blocks from the device.

It is a still further object of my invention to provide a covered freezing device for the production of ice blocks in a low temperature compartment of a refrigerator with means for breaking a bond between the tray of the device and its support in or on the compartment which means also moves the cover of the device to break a bond between the tray and its cover whereby the cover is loosened therefrom and is thereafter employed as a moveable force multiplying means or mechanism for elevating the grid in the tray together with ice blocks bonded thereto and for moving certain walls of the grid relative to others thereof so as to release ice blocks from the grid walls with a plurality of separate and individual continued forces capable of being applied to the device by a housewife with a minimum of effort in carrying out an ice block harvesting operation.

A more specific object of my invention is to provide a pivoted link connection between a cover of a covered freezing device and an actuating means in a rigid walled grid of the device for moving some of the rigid walls relative to others thereof with a slidable joint which permits movement of the cover relative to the grid to break an ice bond between the cover and tray of the device prior to further movement of the cover to carry out the idea of breaking up or dividing the total force required in an ice block harvesting operation into a plurality of continued or successive lesser forces to ease such operation.

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 invention is clearly shown.

In the drawings:

Figure 1 is a top plan view of a covered freezing device having my invention embodied therein;

Figure 2 is a front view of the freezing device shown in Figure 1 disclosing a handle mounted on the end of the tray thereof;

Figure 3 is a vertical longitudinal sectional view of the freezing device taken on the line 3—3 of Figure 1 with elements thereof in a normal ice block freezing position on a support therefor;

Figure 4 is a vertical fragmentary sectional view similar to Figure 3 showing the freezing device elevated relative to its support and the cover thereof moved relative to the tray;

Figure 5 is a view similar to Figure 4 with the grid in elevation and showing the cover shifted lengthwise relative to the tray and grid;

Figure 6 is a view similar to Figure 5 showing the cover of the freezing device moved to elevate the grid thereof and ice blocks upwardly relative to the tray;

Figure 7 is a view of the freezing device showing the cover thereof moved a further distance than is shown in Figure 6 to operate an actuating means for releasing ice blocks from walls of the grid;

Figure 8 is a transverse vertical sectional view taken along the line 8—8 of Figure 3 showing a pivoted link connection between the cover and grid of the freezing device; and

Figure 9 is a transverse sectional view taken on the line 9—9 of Figure 3 showing the pivotal mounting of a handle on the tray of the device.

In order to illustrate my invention I have shown in the drawings, forming a part of this application, a covered freezing device adapted to contain water to be frozen into ice blocks or cubes with the device positioned on a support in or on an evaporator of a refrigerating system or on a support within a freezing chamber of a mechanically refrigerated refrigerator wherein the cover or closure member for the tray of the device serves as a lever or force multiplying means movable to carry out the operation of harvesting ice blocks from the device. A cover on such a freezing device prevents foreign matter from entering the water to be frozen, prevents the water from absorbing odors of foods stored in a refrigerator and provides for the production of clearer ice blocks.

Referring now to the drawings Figure 1 is a top view of a covered freezing device comprising a tray **10**, a cover or closure **11** for tray **10**, a movably rigid walled grid structure **12** disposed in tray **10** and a pivoted slip joint link connection (see Figure 3) between cover **11** and grid **12** to be hereinafter more fully described. The covered freezing device also comprises means for breaking a bond between the tray thereof and a support to which the tray becomes bonded and for also breaking a bond between the cover and the tray of the device. This means is better shown in other figures of the drawings.

Tray **10** is preferably stamped or drawn in one-piece from sheet aluminum alloy and has a flat bottom **14**, slightly outwardly inclined side walls **16** (see Figures 8 and 9) and end walls **17** and **18**. The rear end wall **17** is inclined outwardly at a greater angle than the side walls **16** to permit the camming of ice blocks in this end of tray **10** upwardly along the inclined surface of wall **17** in a manner and for a purpose to be hereinafter described. Upright walls of tray **10** are bent or

rolled over to provide a rim 19 around the tray and the material of this rim is extended downwardly from the top of tray 10 to provide a depending skirt 21 in the vicinity of the front thereof. The skirt 21 reinforces tray 10 and provides a mounting flange thereon for the reception of a substantially U-shaped handle 22 attached thereto, as by pins or studs 23, for pivotal movement relative to tray 10. Handle 22 includes cam-like portions 24 for engaging the tray freezing support, indicated by the line 26, and breaking the tray loose therefrom. The legs of U-shaped handle 22 terminate in upwardly directed cam-like ends 27 adapted to extend through suitable slots 28 provided in the rim 19 of tray 10 (see Figure 9) and to engage the under side of cover 11 of the freezing device as will be hereinafter described.

Cover 11 of the device may also be formed of sheet aluminum alloy and is provided with a depression 31 extending lengthwise thereof, narrow side depressions or ridges 32, a front finger gripping extension 33 and a bounding lip 36 for nestingly engaging and sealing against the rim 19 on tray 10. Finger gripping extension 33 may be reinforced by corrugating the same. The extension 33 and lips 36 together with the depressions 31 and 32 in cover 11 in addition to having certain purposes in the construction disclosed also serve to increase the structural strength of this cover in order to prevent bending or bowing thereof from end to end during its movement as will hereinafter be described while the same is functioning as a lever or force multiplying means for the device. Cover 11 has an inverted U-shaped bracket 37 rigidly secured, such as by rivets 38, to its bottom surface adjacent the rear thereof. Each leg of inverted U-shaped bracket 37 is provided with an elongated opening 41 and an elongated slot 42 therein for the reception of pins or short shafts 43 and 44 respectively. Openings 41 and slots 42 are slightly inclined and are elongated in a direction paralleling one another. The openings 41 and slots 42 together with shafts 43 and 44 provide a slip joint in a hinged connection between the cover 11 and movably walled grid structure 12 disposed in tray 10 for a purpose to be hereinafter described.

The grid structure 12 of the freezing device is combined as a unit with the cover 11 and is removably disposed in tray 10. This grid structure is generally constructed in accordance with the grid disclosed in the co-pending application S. N. 355,652 of Arthur J. Frei filed May 18, 1953, now Patent No. 2,714,294 and assigned to the assignee of the present application. The method of assembling walls of the presently disclosed movably walled grid is similar to that illustrated and described in the co-pending Frei application. Grid 12 of the present freezing device includes two sectional horizontally spaced apart substantially inflexible metal longitudinal partitions or walls and a plurality of rigid or substantially inflexible single thickness metal partitioning walls 46 extending transversely across the sectional longitudinal partitions in spaced apart relation along the length thereof (see Figure 3) for cooperation walls of tray 10 to provide three longitudinal rows of ice block forming compartments in the tray. Transverse walls 45 and 46 are movably interlocked with the sectional longitudinal walls or partitions for tilting movement relative thereto. The transverse walls 45 and 46 are normally inclined with respect to the vertical and are moved toward the vertical to enlarge the ice block forming compartments. Each of the sectional longitudinal partitions or walls comprises a lower rigid metal wall member 47, an intermediate rigid wall member 48, disposed in the same plane with lower wall member 47 (see Figure 3), and an upper rigid metal actuating means or bar element 49 adapted to engage and move certain of the plurality of transverse grid walls relative to others thereof and relative to the sectional longitudinal partitions toward the vertical. Intermediate wall member 48 serves to lock parts of the grid structure together after assembly

thereof. The longitudinal partitions are inclined inwardly toward one another from the bottom to the upper part thereof to permit ice blocks in the central row of compartments to slide downwardly out of the grid structure 12 when its walls are moved. Lower wall member 47 of each of the longitudinal dividers is slit and bent laterally as at 51 to provide stops against which the transverse walls 45 and 46 normally rest in an inclined position. The elements or actuating means 49 are each provided with notches 52 suitably spaced apart along the upper edges thereof to loosely receive continuous portions of the transverse walls 45 and 46 above openings therein through which the bars or elements 49 extend. Like the Frei grid structure referred to and other now conventional structures the notches 52 are progressively wider than one another from end to end of actuating means or bar 49 so that this bar will progressively engage and move the transverse grid walls 45 one after the other in succession. In the present structure the transverse grid wall 46 at the rear of the device is the endmost wall and this wall normally rests against the stop 51 with the one or right hand wall 50 of the endmost notch 52 spaced slightly therefrom for a purpose which will become apparent from the description of operation of the device. A pair of links 56 each having one end thereof passed through a widened slot provided in the endmost transverse wall 46, in accordance with the patented Frei disclosure, are also each provided with an upwardly opening notch 57 receiving an upper continuous portion of wall 46. The wall 58 of notch 57 in each link 56 is normally spaced from wall 46 for the purpose of permitting an initial movement of cover 11 relative to the tray 10 and grid 12 to break an ice bond between the cover and tray before any force is applied to walls of the grid. The opposite end of each link 56 has a round hole therein fitted over the pin or short shaft 43 while the pin or short shaft 44 is mounted upon an upstanding end portion 59 provided on each of the lower wall members 47 of the longitudinal partitions.

Wall members 47 and 48, elements 49 and links 56 of the grid structure 12 are assembled together and to the transverse walls 45 and 46 in movable interlocking relationship with one another in the manner illustrated and described in the copending Frei application hereinbefore referred to and thereafter cover 11 is assembled to the grid structure so as to be removable therewith as a unit from tray 10. The pin or short shaft 43 is passed through a suitable round hole provided in links 56 and through the elongated openings 41 in bracket 37 whereafter its end is riveted over to pivotally lock links 56 to the cover bracket 37. Pins or short shaft 44 is passed through a suitable round hole provided in the portion 59 of wall members 47 and through the slot 42 in the legs of U-shaped bracket 37 whereafter the end of this pin or shaft 44 is riveted over to pivotally lock the bracket 37 to partition 47 of grid structure 12. Since the pins or short shafts 43 and 44 are anchored in round holes and since the notched end 57 of links 56 are interlocked with walls of the grid member the distance between shafts 43 and 44 remains constant at all times and shaft 44 is prevented from slipping out of the elongated slots 42. This arrangement in addition to forming a pivoted link connection between the cover 11 and the actuating means or bar 49 also provides a slidable or slip joint in such connection between cover 11 and grid 12 which together with the fact that wall 58 of notch 57 in links 56 are normally spaced from cross-wall 46 permits an initial movement of the cover relative to tray 10 and grid 12 with moving or before any movement of the grid walls can take place. This feature permits a bond between the cover 11 and tray 10 to be broken for freeing the cover from the tray independently of and prior to applying force to the grid structure 12 or its walls 45 and 46 to thus divide or break

up forces to be applied to the device to carry out an ice block harvesting operation.

Operation

The pan or tray **10** of the freezing device is filled with water to a point near its top and then the grid **12** is inserted in the tray with the bounding lip **36** on cover **11** engaging rim **19** on tray **10** to close and substantially seal the interior of the tray. The device is placed on the support **26** of a freezing chamber, formed by walls of an evaporator of a refrigerating system or walls of a frozen food storage compartment of a household refrigerator cabinet, and permitted to remain thereon until the water in the device is hard-frozen. In order to remove the freezing device from its support **26** handle **22**, at the front of tray **10**, is moved downwardly thus rotating the same about its pivotal mountings **23** whereupon cam portions **24** thereon are forced against support **26** to pry or elevate the device relative thereto and break a bond between tray **10** and support **26**. Further downward movement of handle **22** causes the cam ends **27** thereon to pass through slots **28**, in rim **19** of tray **10**, and engage the lip **36** of cover **11** to thereby raise the forward end thereof relative to tray **10** for breaking an ice bond therebetween (see Figure 4). In the present device raising of the forward end of cover **11** causes a downward angular force to be applied by the rear end thereof against rim **19** at the back of tray **10**. This force creates or sets up a reactive upward angular force of bracket **37** relative to the tray and grid therein which causes the walls of opening **41** and slot **42** in the bracket to move along or with respect to the pins or short shafts **43** and **44** respectively for permitting the initial bond breaking movement of cover **11** as described. After the bond has been broken between the tray and cover as shown in Figure 4 of the drawings the device may be removed from the freezing chamber or support **26** and cover **11** is thereafter shifted rearwardly relative to tray **10** and grid **12** until the pins or short shafts **43** and **44** engage the lower or right hand end wall of elongated opening **41** and elongated slot **42** respectively in the legs of the bracket **37** (see Figure 5). Elements of the present freezing device are now in an operative position to carry out an ice block harvesting operation. The finger grip of handle portion **33** on cover **11** is grasped by the hand and raised upward relative to tray **10** about the pivot pin or shaft **44**. Upward swinging movement of cover **11** causes pin or shaft **43** to rotate about pin or shaft **44** whereby shaft **43** engages the right hand wall of opening **41**. Continued upward swinging movement of cover **11** will now cause wall **58** of notch **57** in links **56** to engage and move or tilt the endmost transverse wall **46**. Movement of this end transverse wall **46** is utilized to wedge the loosened end ice blocks in the device against the inclined tray end wall **17** whereby this wedging breaks the bond between all other ice blocks in the grid **12** and walls of tray **10** and causes the grid together with ice blocks remaining bonded to its walls to be elevated relative to the tray. This action is now common and well-known to those skilled in the art. After the bond has been broken between ice blocks in grid **12** and walls of tray **10** the next step in the operation of harvesting blocks of ice from the freezing device is that of loosening or releasing the ice blocks from walls of the grid so as to permit them to freely fall therefrom. Therefore grid **12** together with the ice blocks bonded thereto is raised out of tray **10** and cover **11** is then swung further in the same direction whereby the pin or shaft **43** pulls on links **56**, while rotating about the axis of pin or shaft **44**, to further tilt transverse wall **46** and thereby move the actuating bar **49** to cause the wall of the next notch **52**, to the right of wall **46**, to engage and tilt the transverse wall **45** therein toward the vertical. Movement of the force multiplying means or cover **11** is continued to tilt all the transverse walls **45** one after the other in succession as is now conventional in the art (see Figure 7). The ice blocks released from walls of grid **12** may be caught in tray **10** or in any other suitable or desirable receptacle.

When it is desired to again place grid **12** in tray **10** and close the tray with cover **11** the cover is pivotally lowered toward the grid whereby the links **56** and actuating bars **49** move the cross walls **45** and **46** back to their normal inclined position against the stops **51**. The pins or short shafts **43** and **44** may be shifted to their normal position as shown in Figure 4 of the drawings during lowering of cover **11** or after the grid structure has been inserted into the tray. By operating the grid wall moving actuating means or bars **49** through the pivoted link connection, under force applied to cover **11** instead of prying the cover against tray **10**, and of utilizing the endmost ice blocks to break the bond between tray **10** and ice blocks in grid **12** less force is required to manipulate the device and the tray is prevented from becoming marred or damaged. It is to be understood that the primary invention disclosed can be carried out without the use of handle **22** on tray **10** since cover **11** may, if desired, be broken loose from the tray by applying force to the finger grip **33** on the cover. It is also to be understood that the shifting of cover **11** from the position shown in Figure 4 of the drawings into the position thereof disclosed in Figure 5 is for the purpose of permitting this cover to be swung into the position shown in Figure 6 of the drawings, to carry the step in an ice block harvesting operation of breaking the bond between ice blocks in grid **12** and walls of tray **10**, without interference of the cover with the tray. However if one forgets to shift the cover relative to the tray and grid prior to swinging the cover upwardly to effect this step in the ice block removing operation no harm or damage will result therefrom because the lifting force applied to cover **11** and transmitted to the rim **19** at the rear end of tray **10** causes or sets up a reacting force between the cover and the grid. This reacting force is utilized to slide walls of openings **41** and slots **42** over the pins or short shafts **43** and **44** and to move the right hand end wall of these openings and slots into engagement with shafts **43** and **44**. Bracket **37** is cut away at the slots **42** therein to permit sufficient swinging of cover **11** for sliding the actuating bar **49** an ample distance lengthwise of the longitudinal partition to engage and tilt the last or end transverse wall **45** farthest away from wall **46**.

From the foregoing it should be apparent that I have provided an improved covered freezing device wherein the cover of the device forms a lever or force multiplying means acting through a linkage connection with the grid of the device for moving certain walls relative to others thereof to effect release of ice blocks from both the tray and grid of the device. Manipulating or moving the cover of the freezing device as herein disclosed obviates the necessity of providing an additional operating lever on the grid thereof or of a grid wall actuating means extended through the cover. By reinforcing the cover in the manner described it is capable of operation over a long period of time without being deformed and this reinforcing does not interfere with supporting similar companion devices one on top of another in stacked form. The total force required to carry out an ice block harvesting operation in my improved freezing device is broken up or divided into a plurality of individual or continued lesser forces capable of being applied with a minimum of effort on the part of the user thereof.

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. In a refrigerator freezing device including a tray and a grid removably disposed therein, said grid having a plurality of walls interlocked together for relative movement therebetween and dividing the interior of said tray

into compartments in which water is to be frozen into ice blocks, actuating means associated with said device and adapted to engage and move some of said grid walls relative to others thereof, a rigid cover separate from said grid walls and movable with respect thereto independently thereof, a connection between said cover and said grid wall actuating means at one end of said device, said cover comprising a main body portion extending continuously over said tray with its peripheral edges engaging opposed upright sides thereof to close all of said compartments and an integral handle portion projecting outwardly beyond the side of said tray at the end of said device opposite its said one end thereof, the handle end of said cover being movable upwardly of said tray and said grid, means associated with said connection preventing initial upward movement of said cover from moving said grid walls whereby said initial movement of the cover is utilized solely for breaking a bond between said cover and sides of said tray, and further movement of said handle end of said cover beyond said initial movement thereof operating said actuating means through said connection to move said grid walls with respect to one another and loosen ice blocks from said tray and from said grid.

2. In a refrigerator freezing device including a tray and a grid removably disposed therein, said grid having a plurality of walls interlocked together for relative movement therebetween and dividing the interior of said tray into compartments in which water is to be frozen into ice blocks, actuating means associated with said device and adapted to engage and move some of said grid walls relative to others thereof, a rigid cover separate from said grid walls and movable with respect thereto independently thereof, a connection between said cover and

said grid walls actuating means at one end of said device, said cover comprising a main body portion extending continuously over said tray with its peripheral edges engaging opposed upright sides thereof to close all of said compartments and an integral handle portion projecting outwardly beyond the side of said tray at the end of said device opposite its said one end thereof, the handle end of said cover being movable upwardly of said tray and said grid, means associated with said connection preventing initial upward movement of said cover from moving said grid walls whereby said initial movement of the cover is utilized solely for breaking a bond between said cover and sides of said tray, said cover being shiftable along said tray after being freed therefrom to move its peripheral edge away from the upright side of said tray at said one end of said device, said cover thereafter being further movable upwardly beyond said initial movement thereof through said connection to move said grid walls with respect to one another and loosen ice blocks from said tray and from said grid, and said shifting of said cover along said tray preventing the cover from bearing against the tray during said further upward movement of said cover.

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