June 9, 1942. H. D. GEYER ET AL 2,285,712

FREEZING TRAY

Filed May 12, 1938 4 Sheets-Sheet 1

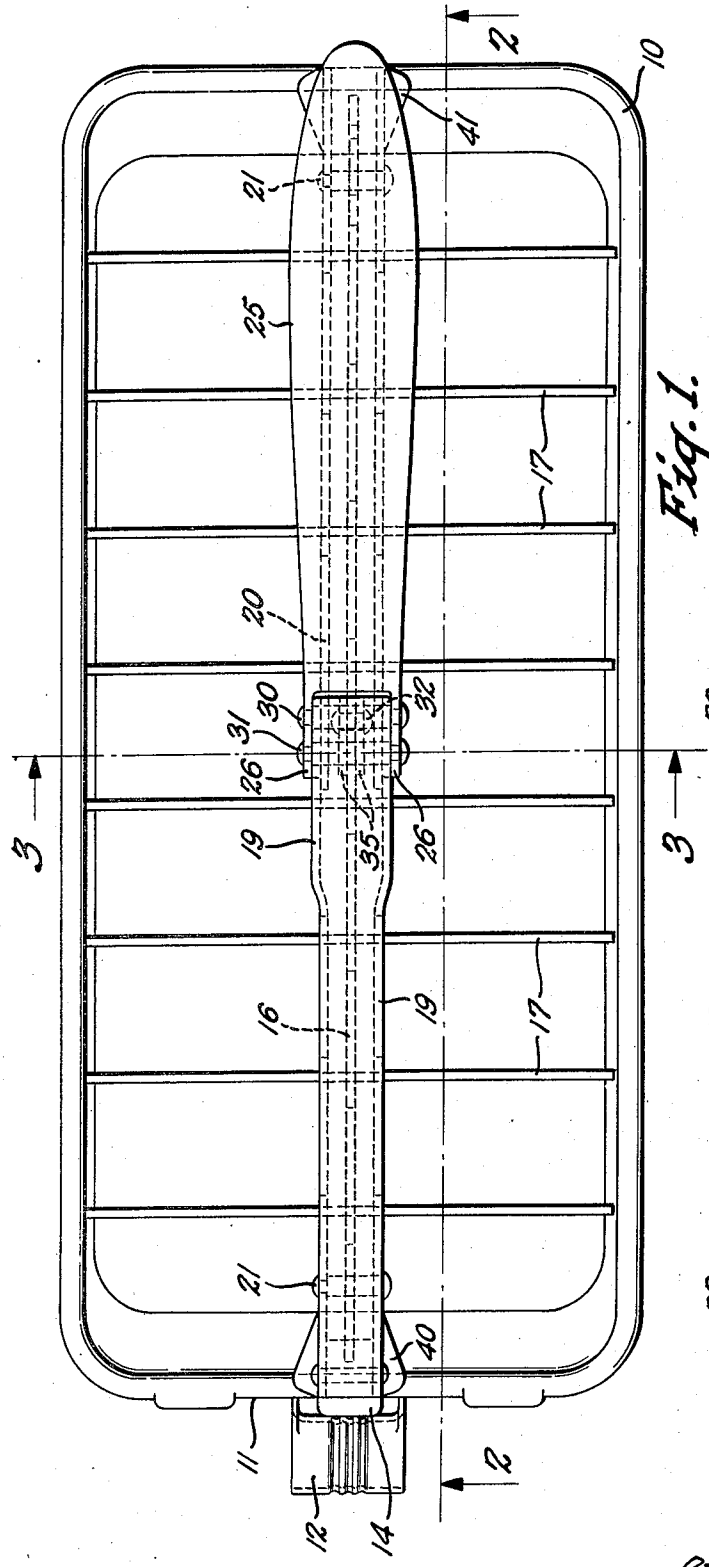


Fig. 1.

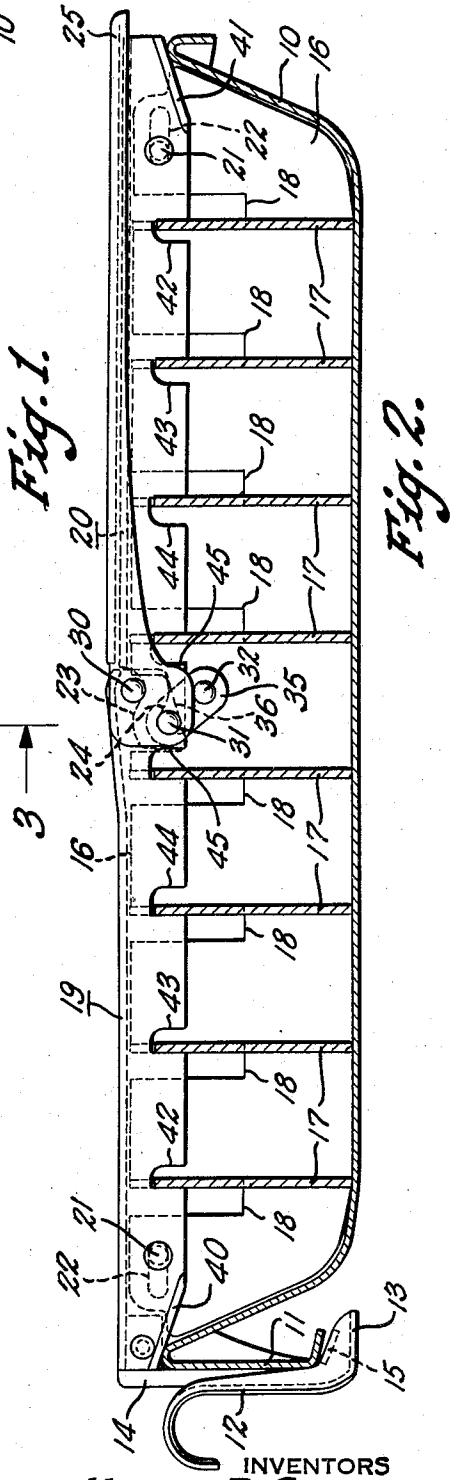


Fig. 2.

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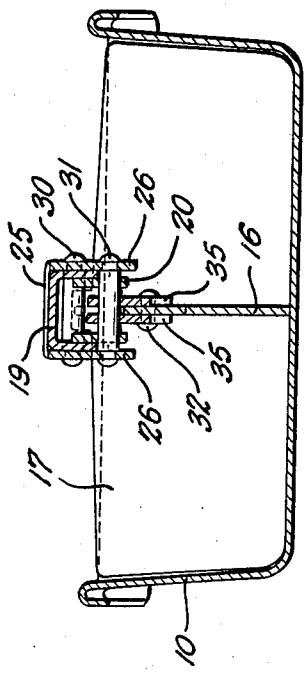


Fig. 3.

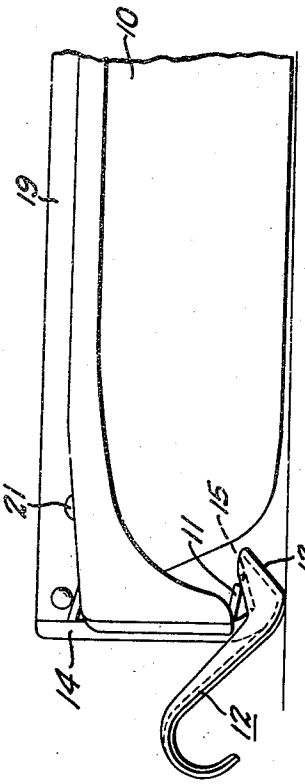


Fig. 4.

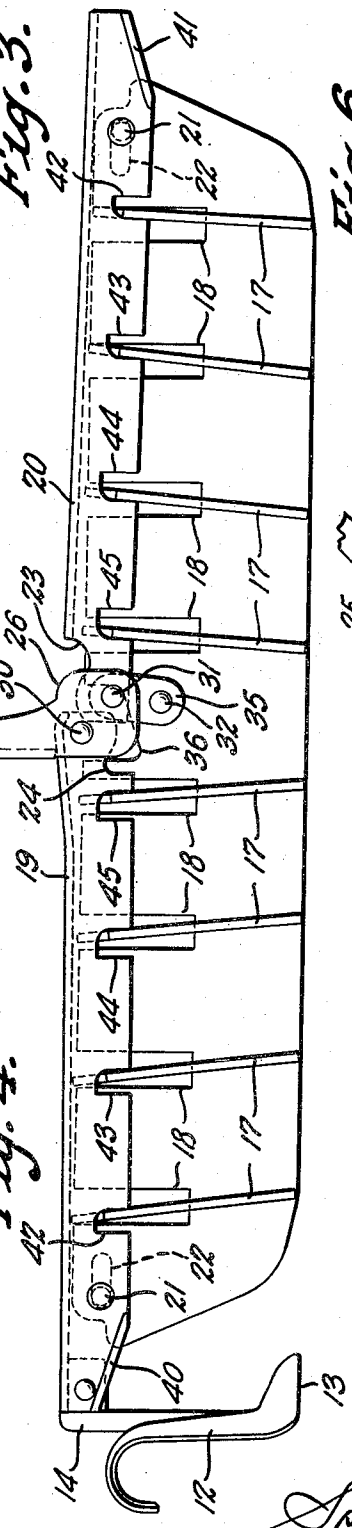


Fig. 6.

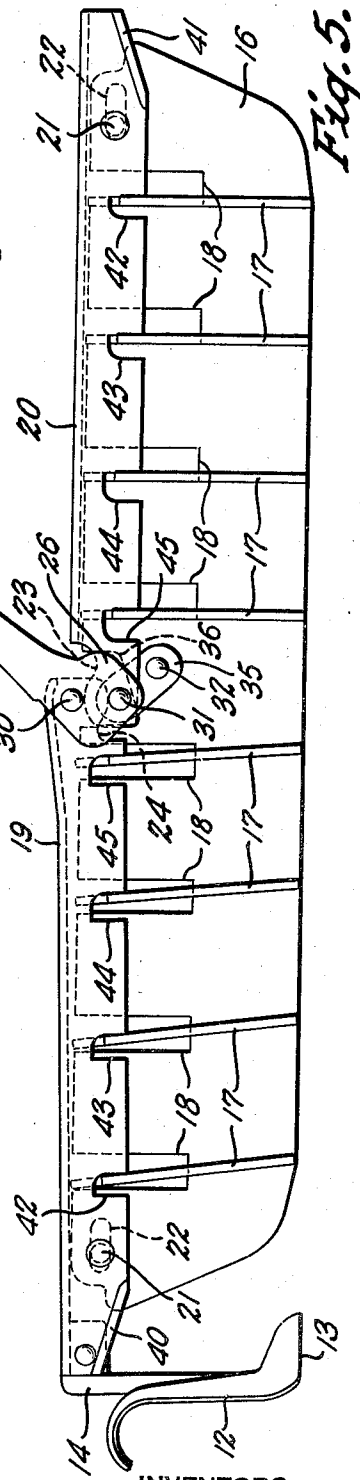


Fig. 5.

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FREEZING TRAY

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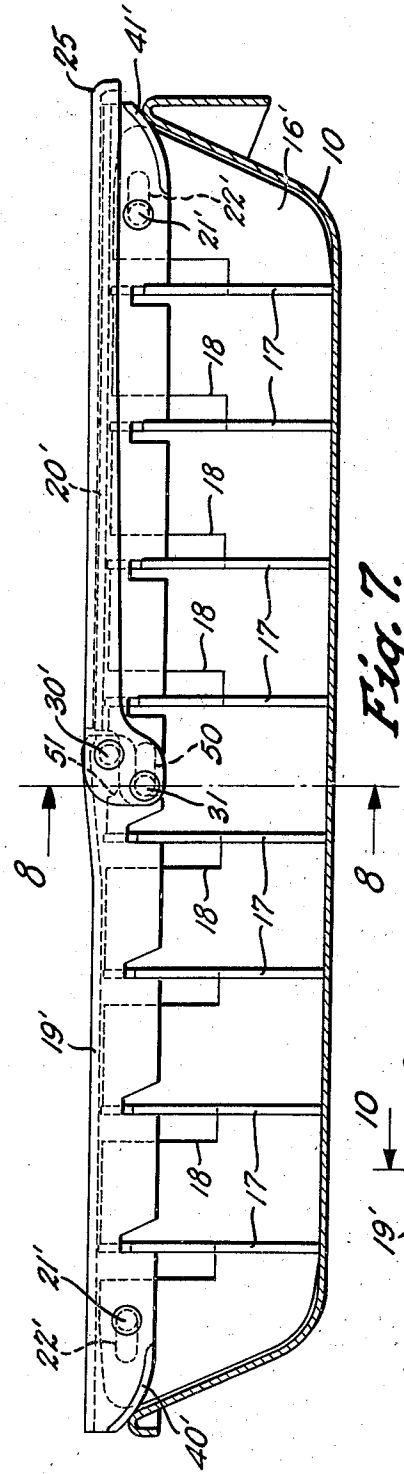


Fig. 7.

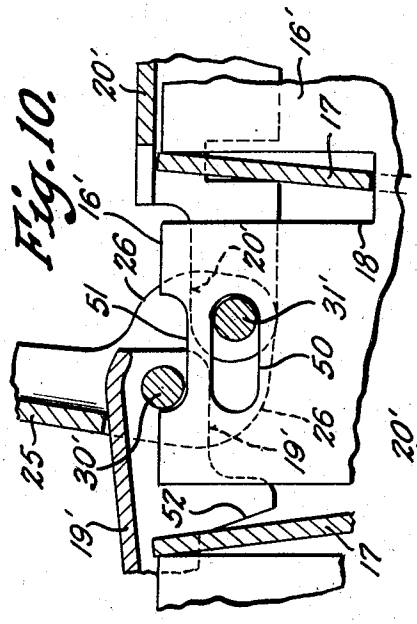


Fig. 10.

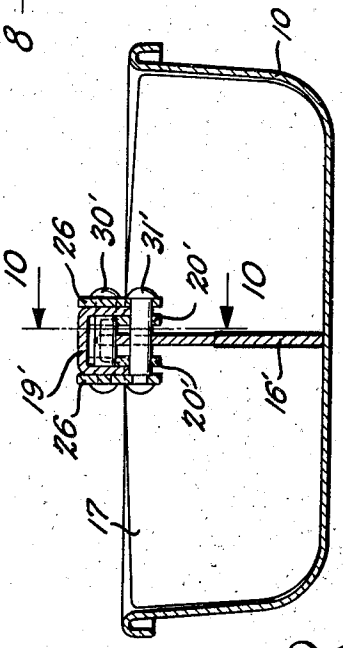


Fig. 8.

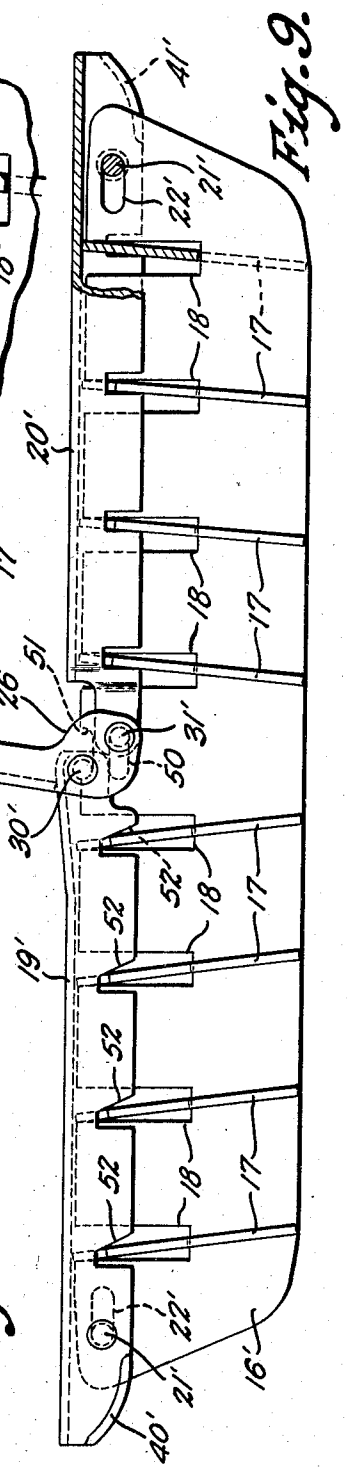


Fig. 9.

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FREEZING TRAY

Filed May 12, 1938 4 Sheets-Sheet 4

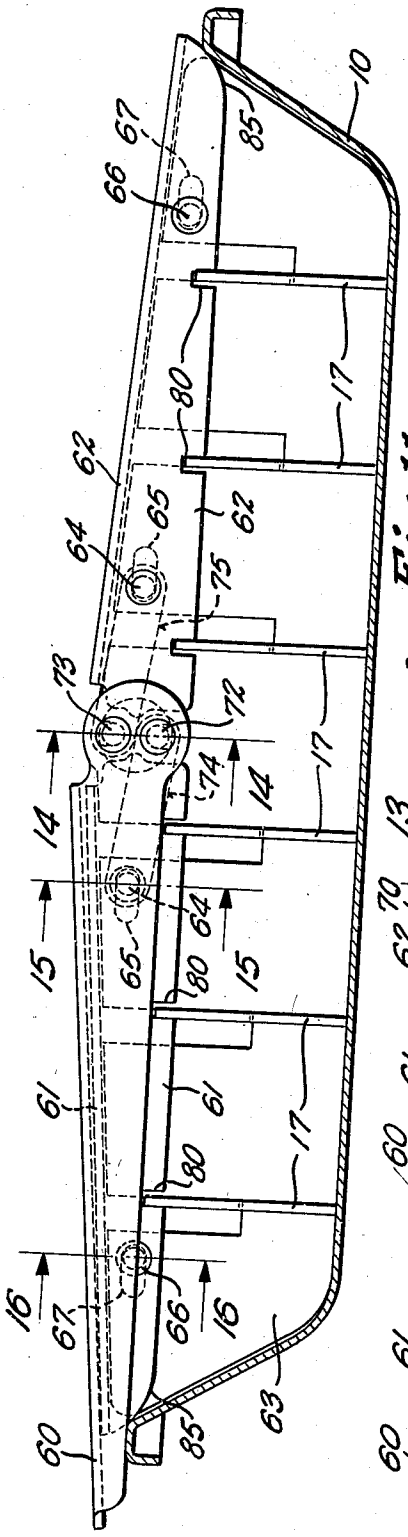


Fig. 11.

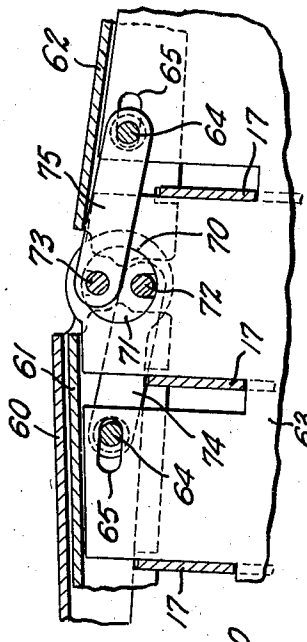


Fig. 13.

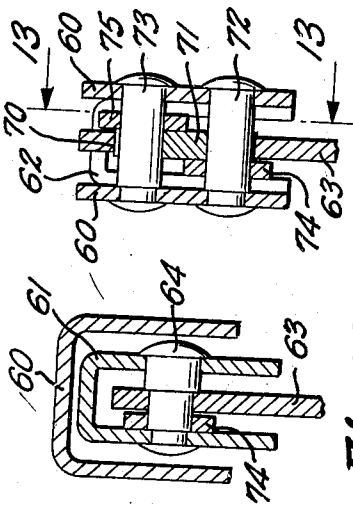


Fig. 14.

Fig. 15.

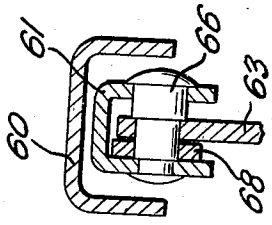


Fig. 16.

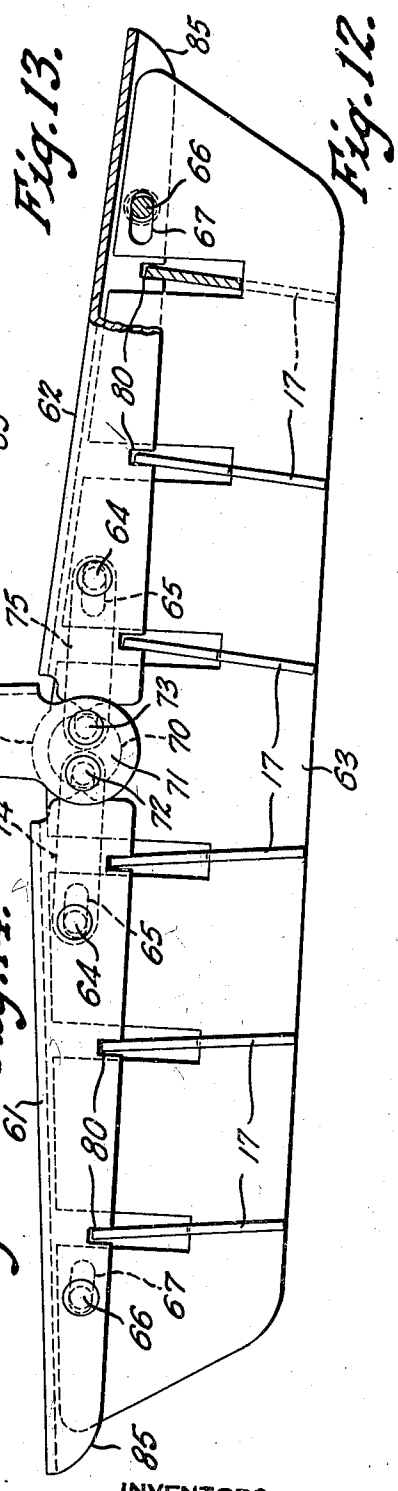


Fig. 12.

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Patented June 9, 1942 2,285,712

UNITED STATES PATENT OFFICE

2,285,712

FREEZING TRAY

Harvey D. Geyer and Frederick W. Sampson, Dayton, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application May 12, 1938, Serial No. 207,437

14 Claims. (Cl. 62—108.5)

This invention relates to freezing trays, especially to portable freezing trays adapted for use in household refrigerators.

An object of this invention is to provide an improved form of mechanically operated tray from which the frozen ice blocks may be readily removed without melting the ice loose from the pan or grid.

One feature of this invention is the actuating hand lever arrangement whereby the hand lever is pivotally mounted upon the grid adjacent the longitudinal center thereof and serves to mutually react upon opposed movable portions of said grid to release the ice cubes therefrom.

Another feature of the invention is the two longitudinally-extending actuating members which are forced in opposite directions to progressively move the movable cross walls of the grid toward opposite ends of the grid.

Another feature of the invention is the simplified arrangement whereby a longitudinally movable actuating member cams upon the lip of the pan to first force the pan from the ice and grid contents, and thereafter serves to move the partition members relative to each other to loosen the ice blocks from the grid.

Another feature of the invention is the simple and efficient force-multiplying mechanism for moving the two longitudinal actuating members in opposite directions.

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 embodiment of the present invention is clearly shown.

In the drawings:

Figs. 1 to 6 show one form of the invention.

Fig. 1 is a plan view of the complete ice tray with the parts in freezing position.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 illustrates how the pan may be broken loose from its frozen bond to its stationary supporting shelf.

Fig. 5 shows the actuation of the hand lever in successively moving one group of cross walls toward the left end of the grid (as viewed in Fig. 5) after the grid is removed from the pan.

Fig. 6 illustrates the maximum movement of the hand lever, and shows all cross walls moved to their ice-ejecting positions.

Figs. 7 to 10 show a second form of the invention.

Fig. 7 shows all the parts in freezing position.

Fig. 8 is a section on line 8—8 of Fig. 7.

Fig. 9 illustrates the maximum movement of the hand lever to eject all the ice cubes after the grid is removed from the pan.

Fig. 10 is a section on line 10—10 of Fig. 8 and shows the maximum movement of the hand lever.

Figs. 11 to 16 show a third form of the invention.

Fig. 11 shows all the parts in freezing position.

Fig. 12 illustrates the maximum movement of the hand lever to eject all the ice cubes after the grid is removed from the pan.

Fig. 13 is a section on line 13—13 of Fig. 14.

Fig. 14 is a section on line 14—14 of Fig. 11.

Fig. 15 is a section on line 15—15 of Fig. 11.

Fig. 16 is a section on line 16—16 of Fig. 11.

Similar reference characters refer to similar parts through the several views.

In the form of Figs. 1 to 6, numeral 10 designates the metal container pan which is preferably a one-piece sheet aluminum stamping which is slightly flexible or distortable to permit it to be more easily loosened from its frozen contents as hereafter described. Pan 10 is shown with an integral depending front flange 11 against which the pan lifter 12 pries to force the pan loose from its frozen bond to its supporting shelf, as shown in Fig. 4.

The removable grid comprises a main center wall 16 and a series of cross walls 17 loosely carried by the main wall and cooperating therewith to form two rows of ice block compartments. Main wall 16 has a series of notches 18 cut therein thru which the continuous upper portion of cross walls 17 extend. The cross walls 17 each has a slot extending up from its bottom edge so that said cross walls 17 will fit loosely within notches 18 and may be either tilted or moved bodily thru the longitudinal width of the notches 18 (see Fig. 6).

Two actuating channel bars 19 and 20 overlie the main wall 16 and are slidably mounted thereupon by the cross pins 21 which slide in opposite directions in the slots 22 in said main wall 16. The two bars 19 and 20 are both pivoted to the hand lever 25 near the center of the grid in such manner as to be forced longitudinally in opposite directions by the actuation of lever 25. In order to provide a simple pivot connection between bars 19 and 20 and lever 25, the bar 19 is made slightly wider than bar 20 to permit overlapping center portions, and the side flanges 26 of lever 25 lie on the outside of the overlapping

portions of bars 19 and 20 (see Fig. 3). Now the bar 19 is pivoted directly to the lever flanges 26 by cross pin 30, and bar 20 is similarly pivoted directly to flanges 26 by cross pin 31. The relative positions of these pins 30 end 31 when the parts are in freezing position are shown in Fig. 2. It will be noted that bar 20 is cut away at 23 in order to clear pin 30, and that bar 19 is cut away at 24 to clear pin 31, when said bars 19 and 20 are moved to and fro from their positions shown in Fig. 2 to their positions shown in Fig. 6. Preferably the portions cut away at 23 and 24 are just sufficient for the proper clearance of pins 30 and 31 in order not to weaken these pivot portions.

Two small swinging links 35 are pivoted to cross pin 31 and also to the short pin 32 extending thru the main wall 16 (see Fig. 3). Thus the path of movement of pin 31 is a small arc with pin 32 as a center. Main wall 16 has an open notch 36 cut therein in order to provide proper clearance for the arcuate movement of pin 31 as it swings from its position in Fig. 2 to its position in Fig. 6. Now it will be clear that when lever 25 is raised from its position in Fig. 2, pin 30 will be forced to travel slightly upward and toward the left and pin 31 will be forced to travel slightly upward and toward the right (as seen in Figs. 2, 5, and 6). Since pins 30 and 31 are pivoted to the inner ends of bars 19 and 20 respectively, the two bars 19 and 20 are forced to travel slightly upwardly at the center of the grid and outwardly in opposite directions toward the two ends of the grid by operation of lever 25. This is the action desired.

The first endwise movement of bars 19 and 20 will cause their inclined cam surfaces 40 and 41 to engage the end lips of the pan 10 and so force the ends of pan 10 outwardly and downwardly, thereby slightly flexing the pan 10 and causing it to be loosened from the grid and ice contents. Upon further outward movement of the channel bars 19 and 20, the notches 42, 43, 44, and 45 in the side flanges thereof will successively engage the cross walls 17 and successively force these cross walls longitudinally in their notches 18 in the main wall 16, and thereby free the ice blocks from their frozen bond to both the main wall 16 and the cross walls 17. Preferably the pan 10 is first separated from the grid and ice contents before the endmost notches 42 force the endmost cross walls 17 outwardly, this in order to make the action more progressive and so reduce the maximum force required to be applied to the lever 25. However if desired, cams 40 and 41 may be omitted, in which case the endmost cross walls 17 will force the endmost ice blocks outwardly against the inclined ends of pan 10 with sufficient force to loosen the entire pan 10 from the entire grid and ice contents. As each cross wall 17 releases the ice block in front of it, such cross wall 17 will then be free to move bodily forward a short distance in its notch 18 and thus will not hamper the releasing movement of the next succeeding ice block. Fig. 5 shows all of the cross walls 17 on the left side of handle 25 released before any of the cross walls on the right side have been released. This may or may not occur and depends only upon which ice block is bonded most tightly in place. That is to say, the force urging bar 19 to the left is substantially equal to the force urging bar 20 to the right at all times during the releasing operation, this because action and reaction of a single force are equal and opposite. This means that if the ice block at one end of the grid is frozen less hard or is more easily released than at the other end, the most easily released ice block will be the first to go. After all the ice blocks at one end are released, pin 21 is stopped by reaching the end of its slot 22 and thereafter all movement of hand lever 25 is applied toward moving the other actuating bar. Fig. 6 shows both actuating bars 19 and 20 at the end of their outward movement. When this occurs the hand lever 25 is substantially vertical and thus forms a convenient balanced handle for handling the grid.

The pan lifter 12, referred to above, comprises a small stamped metal handle having a foot 13 which underlies flange 11 of pan 10 (see Figs. 2 and 4). This handle 12 is flexibly attached to bar 19 by means of a flexible rubber strap 14 which is fixed to bar 19 and handle 12 by any suitable means. In the form shown the rubber strap 14 fits snugly within the pocket-like foot 13 and is retained therein by two bent over ears 15 which are integral with the stamped metal handle. When the grid and pan are in freezing position the pan lifter 12 is in the position shown in Fig. 2. Fig. 4 shows how the lifter handle may be pulled forward to cause the foot 13 to pry upward against the depending flange 11 of pan 10 and thus force pan 10 free from its frozen bond to its supporting shelf. This pan lifter may be omitted from the grid if desired, since it has no function in removing the ice from the pan or grid.

Figs. 7 to 10 show a slightly modified form of the invention whose operation is substantially as above described, the main difference being in the connections between lever 25, actuating bars 19' and 20', and the main center wall 16'. In this form the short links 35 are dispensed with and the cross pin 31' (which moves bar 20') passes loosely thru a horizontal slot 50 in main wall 16'. The upper edge of main wall 16' is cut away at notch 51 to provide clearance for cross pin 30' which moves bar 19' longitudinally. Fig. 7 shows all the parts in freezing position. The first pivotal movement of lever 25 will cause cross pin 30' to move in an arc about pin 31' as a center. This will raise the inner end of bar 19' slightly and urge actuating bar 19' to the left as seen in Figs. 7 and 9 and successively release the ice blocks as above described. As soon as the longitudinal movement of bar 19' is stopped, either by its pin 21' reaching the end of its slot 22' or by the resistance of the ice blocks against cross walls 17, the cross pin 31' will be forced to the right (as viewed in Figs. 7 and 9) thru the slot 50. This will force the actuating bar 20' to the right and thereby successively tilt the cross walls 17 to the right and successively release the ice blocks as above described. It will be noted that in this form, as in the above described form, the actuating force to move one actuating bar reacts upon the other actuating bar to move it in the opposite direction. This simplifies the mechanism and permits the use of a single lever to move the two actuating bars in opposite directions.

In this form the shoulders 52 in bar 19' which successively engage the cross walls 17 are cut on a bias as clearly shown in Figs. 7 and 9. Now when lever 25 raises the inner end of bar 19' slightly it will cause shoulders 52 to successively engage cross walls 17 from the endmost wall 17 back toward the enter of the grid, even tho

all the notches forming the shoulders 62 be of the same dimensions. In other words, this is a very simple and inexpensive way of providing in effect progressively wider notches from the outer end of bar 19' to the inner end thereof.

Figs. 11 to 16 show a third form of the invention which differs from the other forms mainly in the connecting mechanism between lever 60, actuating bars 61 and 62, and main center wall 63. In this form the two oppositely-movable actuating channel bars 61 and 62 are each slidably mounted upon main wall 63 by means of two cross pins and slots therefor. These cross pins 64 and 66 slide horizontally in slots 65 and 67 respectively in the main wall 63 and so permit only a horizontal sliding motion of bars 61 and 62. Main wall 63 has a circular hole 70 therein which forms a bearing for the small crank disc 71. Crank disc 71 has two crank pins 72 and 73 extending therethru and riveted to the two side flanges of lever 60 (see Fig. 14). Thus disk 71 forms a pivotal bearing for lever 60 on the main wall 63. The actuating bars 61 and 62 are connected to the two crank pins 72 and 73 by means of two small links 74 and 75 respective which lie on opposite sides of main wall 63. Link 74 is connected at its outer end to the guide pin 64 for bar 61 (see Fig. 15), and link 75 is similarly connected to guide pin 64 for bar 62. Preferably small spacer washers 68 are provided at the outer guide pins 66.

It will now be clear that when lever 60 is rotated upwardly from its freezing position of Fig. 11, the crank pins 72 and 73 will be rotated to their positions shown in Fig. 12, and the connecting links 74 and 75 will force the two guide pins 64 outwardly toward the opposite ends of the grid. Since these two guide pins 64 are fixed to bars 61 and 62 respectively, these actuating bars 61 and 62 will be correspondingly forced outwardly toward the opposite ends of the grid. This movement of bars 61 and 62 may successively engage and move the cross walls 17 by means of the notches 80 therein in the manner described above. Preferably said notches 80 are made of progressively greater width from the endmost notches toward the center, however this is not necessary to provide an operative device. In any case the endmost cross walls 17 are the first to be moved forward sufficiently to release the ice blocks. In this form of the invention the outer ends of bars 61 and 62 have curved cam surfaces 85 which engage the end lips of pan 10 and separate pan 10 from its grid and ice contents during the initial longitudinal movement of bars 61 and 62. This is an optional feature and may be omitted if desired.

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

What is claimed is as follows:

1. In a freezing tray, a container pan, and a partitioning grid within said pan, said grid comprising: a longitudinal partitioning wall, a series of cross walls extending from side to side of said grid and cooperating with said longitudinal wall to form ice block compartments, said cross walls being movable relative to said longitudinal wall, and force-multiplying means for moving some of said cross walls from their freezing position toward one end and some of said cross walls from their freezing position toward the opposite end of said grid to facilitate the removal of the frozen ice blocks from said grid.

2. In a freezing tray, a container pan, and a partitioning grid within said pan, said grid comprising: a longitudinal partitioning wall, a series of cross walls extending from side to side of said grid and cooperating with said longitudinal wall to form ice block compartments, said cross walls being bodily longitudinally movable relative to said longitudinal wall, two longitudinally movable actuating members each mechanically associated with a group of said cross walls so as to move the cross walls of its group longitudinally therewith, and force-multiplying means for moving said two actuating members longitudinally in opposite directions.

3. In a freezing tray, a container pan, and a partitioning grid within said pan, said grid comprising: a longitudinal partitioning wall, a series of cross walls extending from side to side of said grid and cooperating with said longitudinal wall to form ice block compartments, said cross walls being bodily longitudinally movable relative to said longitudinal wall, two longitudinally movable actuating members each mechanically associated with a group of said cross walls so as to move the cross walls of its group longitudinally therewith, and a single hand lever serving to mutually react upon both of said two actuating members to move said two members longitudinally in opposite directions.

4. In a freezing tray, a container pan, and a partitioning grid within said pan, said grid comprising: a longitudinal partitioning wall, a series of cross walls cooperating with said longitudinal wall to form ice block compartments, said cross walls being bodily longitudinally movable relative to said longitudinal wall, two longitudinally movabe actuating members each mechanically associated with a group of said cross walls so as to move the cross walls of its group longitudinally therewith, and a hand lever pivotally mounted upon said grid adjacent the longitudinal center of said grid and serving to force said two actuating members in opposite directions whereby to move said cross walls longitudinally relative to said longitudinal wall.

5. In a freezing tray, a container pan, and a partitioning grid for dividing the frozen contents into a plurality of ice blocks, said grid comprising: a series of relatively movable cross walls extending from side to side of said grid and each bodily tiltable out of its normal freezing-position plane, and force-multiplying means for bodily tilting some of said cross walls out of their freezing position toward one end of said grid and for bodily tilting some of said cross walls out of their freezing position toward the opposite end of said grid, to facilitate the removal of the frozen ice blocks.

6. In a freezing tray, a container pan, and partitioning grid for dividing the frozen contents, into a plurality of ice blocks, said grid comprising: a series of relatively movable cross walls extending from side to side of said grid and each bodily tiltable out of its normal freezing-position plane, two oppositely movable actuating members each mechanically associated with a group of said cross walls so as to bodily tilt the cross walls of its group, and force-multiplying means for moving said two actuating members in opposite directions.

7. In a freezing tray, a container pan, and a partitioning grid for dividing the frozen contents into a plurality of ice blocks, said grid com-

prising: a series of relatively movable cross walls extending from side to side of said grid and each tiltable out of its normal freezing-position plane, and a hand lever and mechanism actuated thereby arranged to bodily tilt some of said cross walls from their freezing position toward one end of said grid and to bodily tilt some of said cross walls from their freezing position toward the other end of said grid, whereby to facilitate the removal of the frozen ice blocks.

8. In a freezing tray, a container pan, and a partitioning grid for dividing the frozen contents into a plurality of ice blocks, said grid comprising: a series of relatively movable cross walls extending from side to side of said grid and each bodily tiltable out of its normal freezing-position plane, and force-multiplying means actuatable to bodily tilt approximately half of said cross walls from their freezing position toward one end of said grid and the other half of said cross walls from their freezing position toward the opposite end of said grid.

9. In a freezing tray, a container pan having outwardly flexible opposite end walls, a grid within said pan having a plurality of partition walls, two longitudinally movable actuating members mounted on said grid and having portions which press downwardly and outwardly upon said opposite end walls of said pan when said members move longitudinally relative to said pan, and force-multiplying means for moving said two members longitudinally to cause same to press downwardly upon and outwardly flex said opposite end walls of said pan whereby to free said pan from its frozen contents.

10. In a freezing tray, a container pan, a grid within said pan having a plurality of partition walls, two longitudinally movable actuating members mounted on said grid and having portions which press downwardly upon opposite ends of said pan when said members move longitudinally relative to said pan, and force-multiplying means for moving said two members longitudinally to cause same to press downwardly upon opposite ends of said pan whereby to free said pan from its frozen contents, said actuating members being also actuatable to move some of the walls of said grid relative to another wall thereof.

11. In a freezing tray, a container pan, a grid within said pan having a plurality of partition walls, two longitudinally movable actuating members mounted on said grid and having portions which press downwardly upon opposite ends of said pan when said members move longitudinally relative to said pan, and a hand lever mutually reacting upon said two actuating members for moving said two actuating members longitudinally in opposite directions.

12. In a freezing tray, a container pan, and a partitioning grid for said pan, said grid comprising: a longitudinal main wall, a series of longitudinally spaced cross walls each movable longitudinally relative to said main wall, and force-multiplying means for successively moving the individual walls of one group of said cross walls toward one end of said grid and for successively moving the individual walls of another group of said cross walls toward the other end of said grid.

13. In a freezing tray, a container pan; a partitioning grid within said pan having a plurality of relatively movable partition walls so arranged as to provide ice block compartments for the contents of said pan, and means for forcing two groups of said partition walls to move from their normal freezing position toward opposite ends of said grid to facilitate the removal of the frozen ice blocks from said grid, said means comprising a force-multiplying upwardly swingable hand lever pivotally mounted upon the grid at the longitudinal central portion thereof.

14. In a freezing tray, a container pan; a partitioning grid within said pan having a plurality of relatively movable partition walls so arranged as to provide ice block compartments for the contents of said pan, and means for forcing some of said partition walls to tilt toward one end of said grid and some of said partition walls to tilt toward the other end of said grid to facilitate the removal of the frozen ice blocks from said grid, said means comprising a force-multiplying mechanism having a hand-lever permanently pivotally mounted upon said grid adjacent the central portion thereof.

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