Dec. 21, 1943. R. H. CHILTON 2,337,451

FREEZING TRAY

Filed May 28, 1937 3 Sheets-Sheet 1

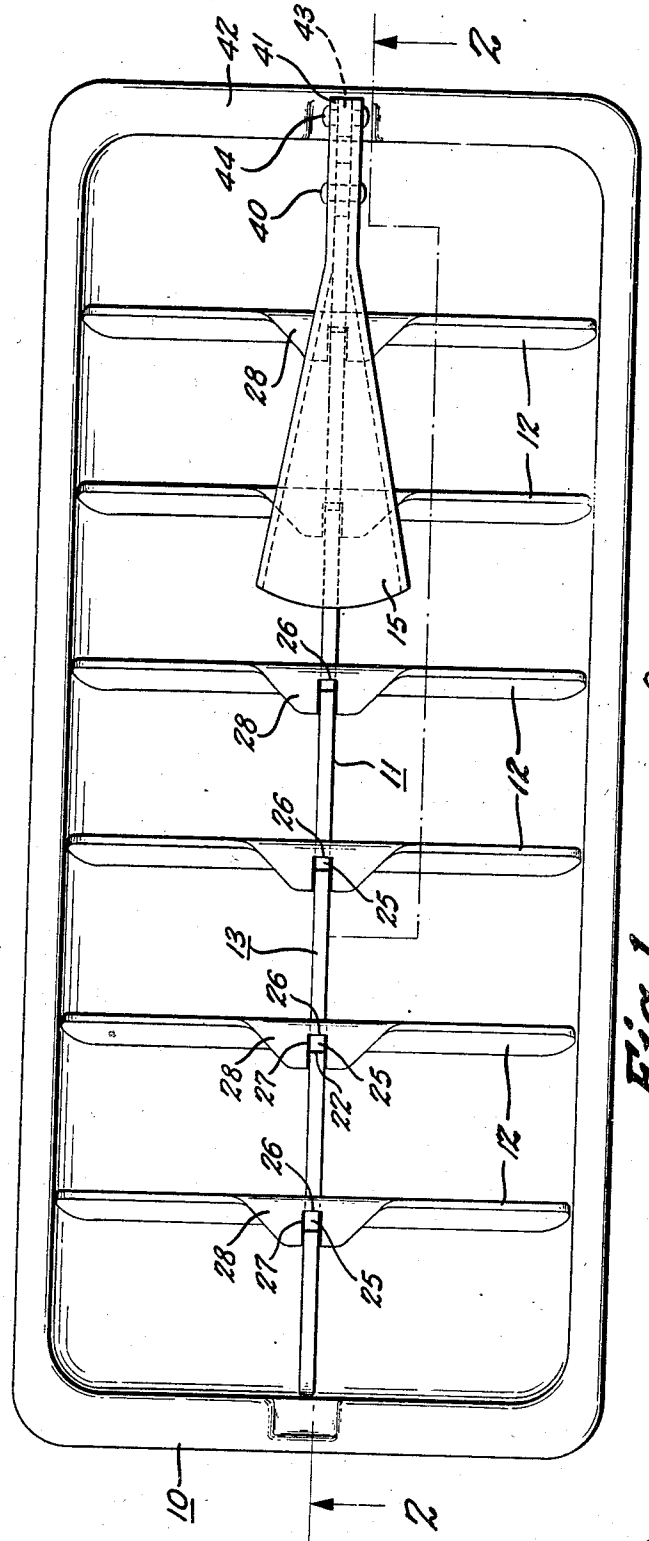


Fig. 1.

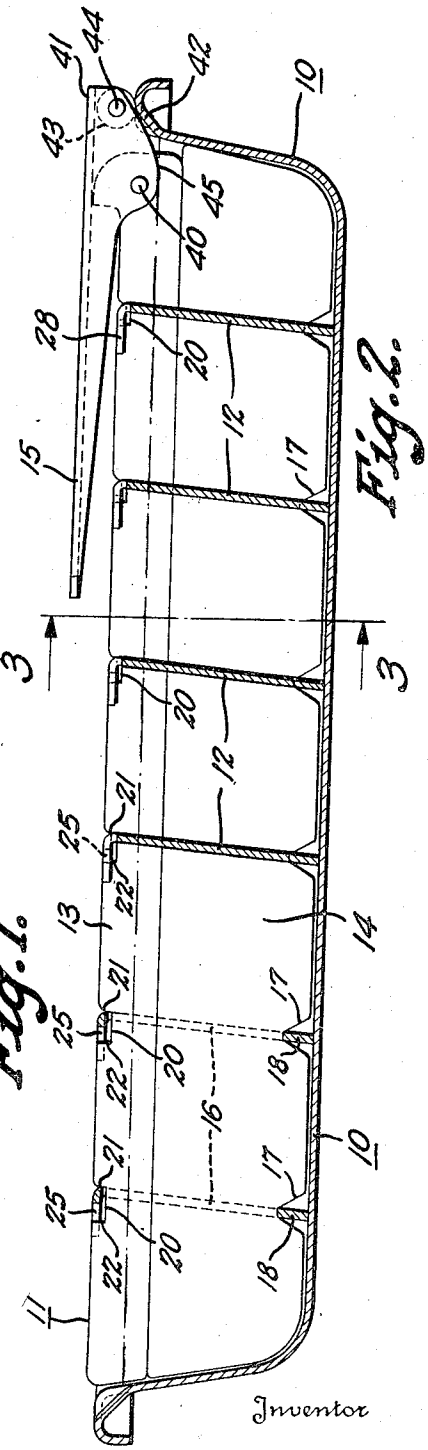


Fig. 2.

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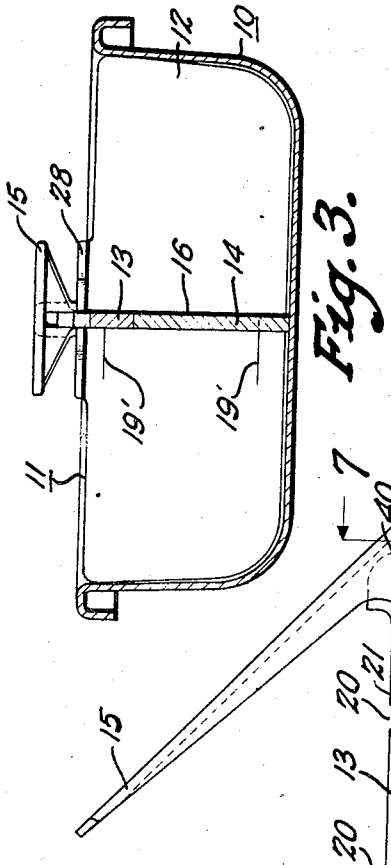


Fig. 3.

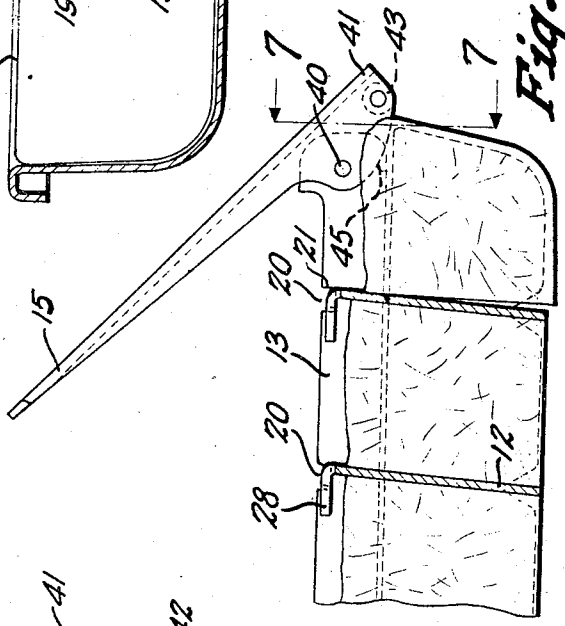


Fig. 5.

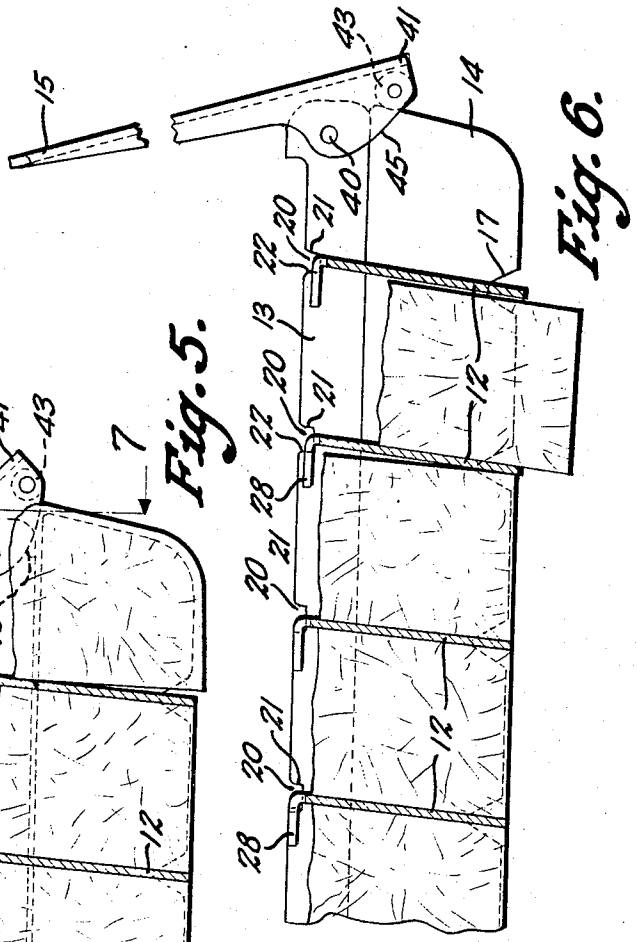


Fig. 6.

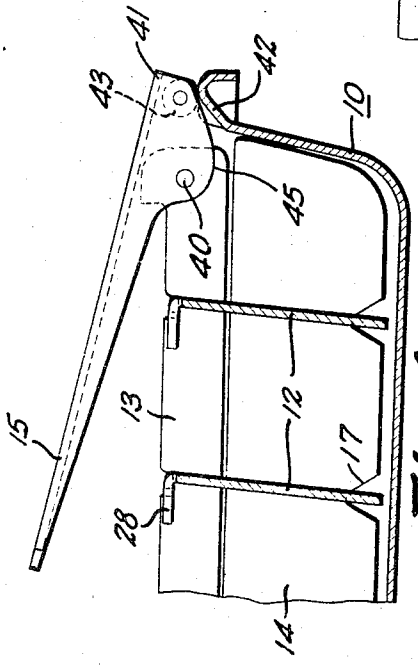


Fig. 4.

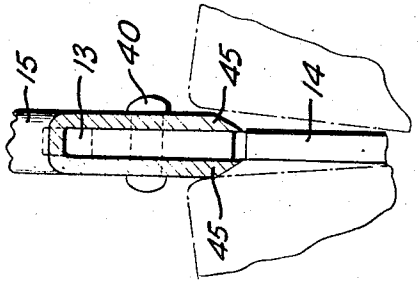


Fig. 7.

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FREEZING TRAY

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3 Sheets-Sheet 3

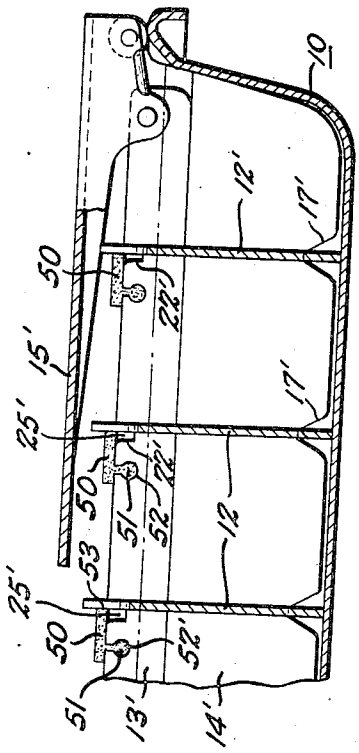


Fig. 8.

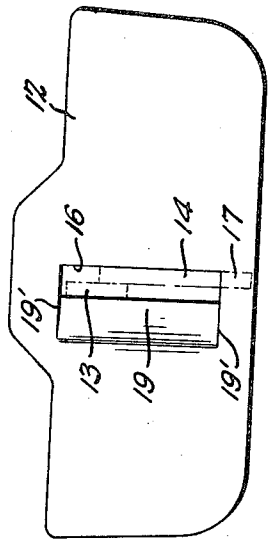


Fig. 12.



Fig. 13.

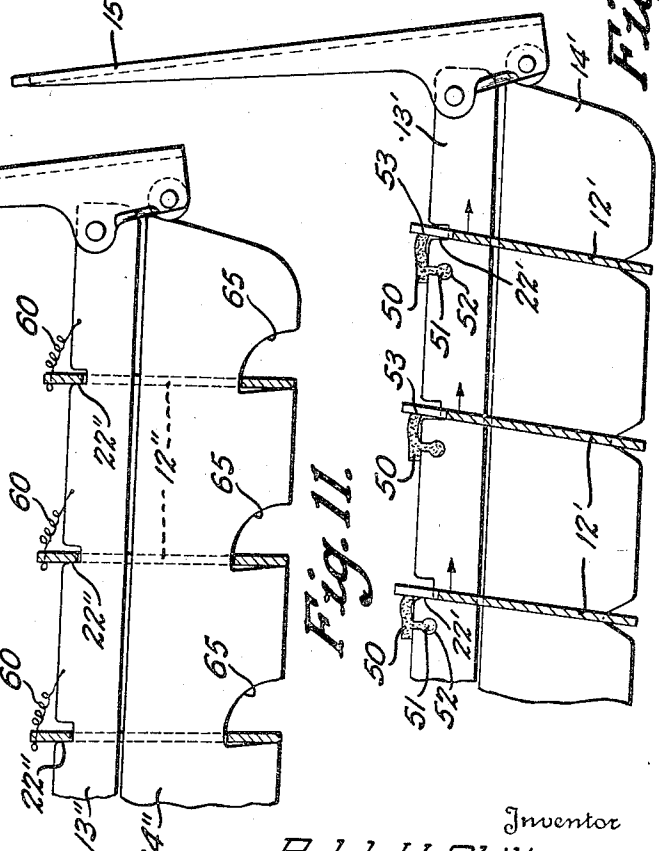


Fig. 9.

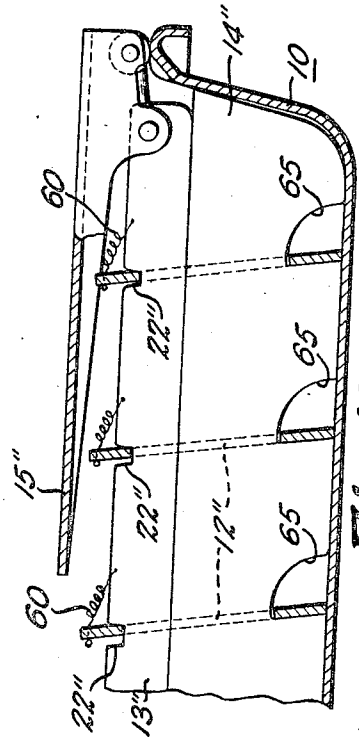


Fig. 10.

Fig. 11.

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UNITED STATES PATENT OFFICE

2,337,451

FREEZING TRAY

Ralph H. Chilton, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich, a corporation of Delaware

Application May 28, 1937, Serial No. 145,261

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 a simple and efficient mechanically operated tray from which the frozen ice blocks may be removed without the necessity of fire melting the ice loose.

A more specific object is to provide improvements over the device disclosed in Serial No. 98,213, filed August 27, 1936, by Donald H. Reeves and assigned to the assignee of this application.

One feature of this invention is the simplified hand lever arrangement whereby the hand lever first serves to force the container pan from its ice and grid contents as a unit and thereafter serves to move the partition members relative to each other to loosen the ice blocks from the grid.

Another feature of this invention is the use of the hand lever itself to directly engage and loosen the first two ice blocks at one end of the grid prior to the relative movement of the transverse partitions, whereby the applied force necessary to loosen the remaining ice blocks is greatly reduced.

Another feature is the structure and method of loosely assembling the cross partitions to the longitudinal partition, whereby the desired relative movement between these parts is readily permitted.

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:

Fig. 1 is a plan view of an ice tray and grid made according to this invention.

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

Fig. 3 is a section on line 3—3 of Fig. 2.

Figs. 4, 5, 6, and 7 illustrate the operation of the device of Figs. 1, 2, and 3. Fig. 4 shows the container pan being first forced from the grid and ice as a unit by the hand lever. Figs. 5 and 7 illustrate how upon further movement the hand lever directly engages and loosens the two endmost ice blocks. Fig. 6 shows the successive tilting of the cross walls upon still further movement of the hand lever.

Figs. 8 and 9 show a modified form of the invention. Fig. 8 being similar to Fig. 2, and Fig. 9 similar to Fig. 6.

Figs. 10 and 11 show another modified form of the invention, Fig. 10 being similar to Fig. 2 and 11 similar to Fig. 6.

Figs. 12 and 13 illustrate the preferred method of permanently assembling the cross partitions loosely upon the two-piece main central partition.

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

10 designates the metal container pan which preferably is slightly flexible or distortable to permit it to be more easily loosened from its frozen contents as hereinafter described.

The removable grid 11 of Figs. 1, 2, and 3 comprises a central main wall composed of an upper section 13 and a lower section 14, and a series of separate cross partition walls 12 which are loosely retained in place upon sections 13 and 14 and are tilted forward (to the right as seen in Fig. 2) when the upper section 13 is slid toward the right by means of the hand lever 15. Sections 13 and 14 are held substantially aligned in a vertical plane by their sliding fit in the aligned slots 16 in the cross walls 12. Section 14 has in its lower edge a series of notches 17 of substantial depth and of triangular or other shape within which the continuous lower portion 18 of cross walls 12 may pivot when walls 12 are tilted. Section 13 has in its upper edge a series of notches 20 of widths progressively increasing from the forward or right end to the rear or left end as seen in Fig. 2. Notches 20 have forward shoulders 21 against which the forwardly tilted cross walls 12 rest when all the parts are in freezing position as shown in Fig. 2. Notches 20 have rear shoulders 22 which provide progressively widening clearances 25 between shoulders 22 and the bottoms 26 of slots 27 in the small top flanges 28 on cross walls 12. Thus it will be seen that when the upper section 13 is slid to the right by the hand lever 15, the shoulders 22 will successively engage the abutments 26 on cross walls 12 and thereby successively tilt them forward one after another beginning at the forward or right end as seen in Fig. 2. This progressive action is caused by the progressively widening clearances 25.

The top flanges 28 provide increased strength and stiffness to the upper portions of cross walls 12 but at the same time do not increase the vertical height or head room required for the grid. Hence, these flanges 28 may be made as wide as may be necessary for proper strength and stiffness, for instance, they may be made twice as wide as shown in Fig. 1 if desired, provided the progressive clearances 25 are maintained in any such change. The slots 27 in flanges 28 loosely engage the sides of section 13 and thereby posi-

tively maintain the cross walls 12 in a directly transverse position in the pan.

In order to assemble the cross walls 12 and sections 13 and 14, each cross wall 12 has its central slot 16 cut or punched therein of a sufficient depth to permit the wider of the two sections 13 and 14 to be passed endwise through said slots 16. In addition, each cross wall has a small metal flap 19 sheared at two cuts 19' therein (see Figs. 12 and 13) and then bent out at such an angle as will temporarily provide a slot of sufficient width to permit the two sections 13 and 14 to lie side by side in said temporary slot. The two sections 13 and 14 may then be passed endwise in side by side relation thru these widened slots in cross walls 12. When each cross wall registers with its lower and upper notches 17 and 20 in sections 14 and 13 respectively, said sections 14 and 13 may then be moved vertically so as to cause them to no longer mutually overlap whereupon they are then moved laterally into the same vertical plane. The metal flaps 19 are then bent back into the planes of the cross walls 12, and thus sections 13 and 14 are permanently retained aligned in one plane but relatively slidable endwise in slots 16 in the cross walls 12. This method of assembling the cross walls to the two-piece longitudinal wall is disclosed and claimed in my copending application Serial No. 128,153, filed February 27, 1937.

The actuating handle 15 is pivoted upon the pin 40 adjacent the front end of the top section 13, and has a forwardly extending U-shaped projection 41 overlying the lip 42 of pan 10 which first serves as a cam for forcing the pan 10 loose from its frozen contents and grid as a unit. Preferably projection 41 has a small cam roller 43 mounted on cross pin 44 so that roller 43 swings in the vertical plane of sections 13 and 14.

Figs. 4, 5, 6, and 7 illustrate the operation of the device. When lever 15 is first pulled upwardly (see Fig. 4), cam roller 43 engages lip 42 of pan 10 and forces it outwardly and downwardly and thereby loosens pan 10 from the grid and ice, after which the grid and ice may be removed from the pan as a unit, if so desired. During such initial movement of lever 15 the top section 13 is ordinarily held fixed relative to cross walls 12 by its frozen bond to the ice on each side thereof. However if said top section 13 should be pulled loose from its frozen bond during this operation of forcing pan 10 loose, section 13 will move up freely only a small distance and then be stopped by its abutment with the top of slots 16 in cross walls 12, as shown in Fig. 4.

Further up movement of lever 15 causes the two preferably wedge-shaped sides 45 of the lever projection 41 to directly engage the two end ice blocks and force them downwardly and outwardly and thus free these two ice blocks from the grid (see Figs. 5 and 7). During this portion of the operation the entire work of lever 15 is exerted upon only the two end ice blocks, hence these two ice blocks may be quite easily forced loose by this great leverage action.

After the two end ice blocks have been removed as shown in Fig. 5, lever 15 may then be freely swung to an almost vertical position before cam roller 43 abuts directly against the end of lower section 14, which position is shown in Fig. 6. Thereupon further movement of lever 15 moves upper section 13 to the right with a greatly multiplied force due to the quite short distance between cam roller 43 and pivot 40. This distance is preferably as short as the structural design permits in order to obtain the optimum mechanical advantage for forcing section 13 to the right relative to lower section 14. Thus the cross walls 12 are successively engaged by the shoulders 22 of slots 20 and thereby successively tilted forward as described above. It will be noted that the first cross wall 12 will be quite easily so tilted forward since the two end ice blocks will have been previously removed by the sides 45, as described above. After each cross wall 12 is loosened from the ice it is free to drop down a short distance due to the clearance at the top of slots 16 and then to move bodily forward a small distance so that it will clear the next ice blocks to be removed immediately behind it, as illustrated in Fig. 6.

Thus it will be seen that the following various functions of lever 15 may be, and if necessary are, performed one after another (not simultaneously) and hence the necessary actuating applied force thereupon is greatly reduced: (1) lever 15 first forces pan 10 loose, (2) lever 15 next forces the two end ice blocks loose by direct engagement therewith, (3) lever 15 next loosens upper section 13 from its ice bond before any tilting engagement with the cross walls 12, (4) lever 15 next engages and tilts forward the first cross wall 12, (5) lever 15 then engages and tilts forward the second cross wall 12, then the third cross wall 12, and so on for all the cross walls 12.

Figs. 8 and 9 show a modified form of the invention, Fig. 8 showing the parts in freezing position. The vertical cross walls 12' are held spaced from the actuating shoulders 22' of the actuating section 13' by separate small resilient rubber compression springs 50, and thus the progressively increasing clearances 25' are more positively maintained prior to the water being frozen. In other words, gravity or friction is not relied upon to hold the cross walls in their correct freezing position. The operation of this form by hand lever 15' is substantially the same as above described for the first form. When upper section 13' is moved to the right by lever 15' the rubber springs 50 readily yield to permit the shoulders 22' to successively engage and tilt forward the cross walls 12'.

These rubber springs 50 are preferably suitably retained upon section 13' by each having a depending portion 51 which is pressed down into a necked slot 52 in section 13', as clearly shown in Figs. 8 and 9. The horizontal transverse width of the contacting edge 53 of the rubber springs is preferably made about half an inch so that this transverse edge 53 will substantially hold the cross walls 12' in their correct transverse position in the pan.

Figs. 10 and 11 show still other alternative modifications, Fig. 10 showing the parts, in freezing position. In this form the backwardly tilted cross walls 12'' are held spaced from the actuating shoulders 22'' by the separate small coil tension springs 60 which perform the same function as the rubber springs 50 do in the second form described above, as will be clear from the drawings.

Also in this form, the lower notches 65 in the lower section 14'' are shaped somewhat as clearly shown. The shape of these notches 65 permits the cross walls 12'' to pivot freely through a wide angle about their bottom edges as a fulcrum

when they are tilted forward by lever 15''. The substantial necks of ice which fill the open portions of notches 65 must be broken in two by the tilting movement of the cross walls. Since these necks of ice lie closely adjacent the bottom edge or fulcrum of the cross walls while they are being tilted, the ice necks are more easily broken in two.

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. A partitioning grid for a freezing tray, said grid comprising: a main partition wall comprising separate longitudinally movable upper and lower sections, a series of transverse partition walls each loosely retained upon said main wall and capable of individual relative movement, an actuating lever pivoted upon said upper section and arranged to react against said lower section to cause relative longitudinal movement between said sections, and means on said upper section for successively positively engaging and moving said transverse walls upon relative movement between said upper and lower sections.

2. A partitioning grid for a freezing tray, said grid comprising: a main partition wall comprising separate longitudinailly movable upper and lower sections, each having a series of marginal notches along its upper and lower margins respectively, a series of transverse walls each loosely retained upon said main wall by portions thereof lying within a pair of said notches, an actuating lever pivoted upon said upper section and operable to engage said lower section and cause relative longitudinal movement between said sections, said marginal notches on said upper section progressively varying in width and serving to successively positively engage and move said transverse walls upon relative longitudinal movement between said upper and lower sections.

3. A partitioning grid for a freezing tray, said grid comprising: a main partition wall comprising separate longitudinally movable upper and lower sections, each having a series of marginal notches along its upper and lower margins respectively, a series of transverse walls each loosely retained upon said main wall by portions thereof lying within a pair of said notches, and actuating means for moving said upper section longitudinally along said lower section, said marginal notches on said upper section being arranged to successively positively engage and move said transverse walls upon longitudinal movement of said upper section.

4. A partitioning grid for a freezing tray, said grid comprising: a main partition wall comprising separate longitudinally movable upper and lower sections, each having a series of marginal notches along its upper and lower margins respectively, a series of transverse walls each loosely retained upon said main wall by portions thereof lying within a pair of said notches, and actuating means for moving said upper section longitudinally along said lower section and thereby cause a tilting movement of said transverse walls.

5. A freezing tray having a removable grid therein, said grid comprising: a main longitudinal partition wall, a series of transverse partition walls loosely associated with said main wall and movable relative thereto, an actuating longitudinally movable member overlying said main wall, a hand lever pivoted upon one end of said actuating member and arranged so that its outer end may be swung down into engagement with and react against the end surface of said main wall after the grid is removed from its container pan for moving said actuating member longitudinally along said main wall, and means on said actuating member for moving said transverse walls upon such longitudinal movement thereof.

6. A freezing tray having a removable grid therein, said grid comprising: a main longitudinal partition wall, a series of transverse partition walls loosely associated with said main wall and movable relative thereto, an actuating longitudinally movable member overlying said main wall, a hand lever pivoted upon one end of said actuating member and arranged so that its outer end first reacts downwardly against the container pan to facilitate the removal of the pan from its contents as a unit and thereafter may be swung down into engagement with and react against the end of said main wall for moving said actuating member longitudinally along said main wall, and means on said actuating member for moving said transverse walls relative to said main wall.

7. The combination of a freezing tray and a removable grid disposed therein, said grid comprising a main partition wall formed of separate longitudinally movable upper and lower sections, a series of transverse partition walls each loosely retained upon said main wall and capable of a tilting movement relative thereto, an actuating lever pivoted upon one of said main wall sections and arranged to react against the other of said main wall sections to cause relative longitudinal movement between said sections after the grid has been at least partially removed from the tray, and means on one of said main wall sections for successively positively engaging and tilting said transverse walls upon relative longitudinal movement between said upper and lower sections.

8. In a device of the character described, a mold element comprising an end-wall element formed of two contiguous members and a plurality of side-wall members loosely supported on the end-wall element, and a lever operatively connected with the side-wall members by means of one of the contiguous members to impart an ice-dislodging movement to the side wall members, or through said contiguous members to hold the side-wall members against relative movement in its inactive position.

9. In liquid congealing apparatus, the combination of an ice pan, a grid member removably disposed therein for dividing the ice pan into a plurality of ice cube forming cells, said grid member comprising a central longitudinal wall member formed of two superposed parts both of which divide the pan longitudinally thereof and one of which is movable lengthwise relative to the other, a plurality of transverse wall members movably attached to said longitudinal wall member, said longitudinal wall member provided with vertically extending slots for receiving the transverse wall members, said slots being of greater width than the section of the transverse wall members so that the transverse wall members are movable angularly with respect to the longitudinal wall member, means for raising the grid member from the ice pan with the ice cubes adhering to said grid member and means for thereafter imparting movement to said movable longitudinal wall portion to move said transverse wall members angularly with respect to said longitudinal wall member.

10. In combination, a tray having a unitary metallic grid structure removably disposed therein, said grid structure comprising a rigid wall member extending longitudinally of the tray and a plurality of rigid wall members loosely held in spaced relation along said longitudinal wall member and extending transversely thereto to divide the interior of the tray into a plurality of ice block compartments, said transverse members being normally inclined with respect to the bottom of the tray to provide said ice compartments with a parallelogram form in at least one direction of cross-section therethrough, means for elevating said unitary grid structure and ice blocks bonded thereto relative to the tray, and means for moving said transverse wall members relative to said longitudinal wall member and out of said inclined position to enlarge said compartments and release ice blocks therefrom.

11. A device of the character described comprising a tray, and a grid assembly in the tray, inclusive of a plurality of walls normally inclined from the tray bottom and mounted for angular movement relative thereto, a member connecting said walls and mounted for movement laterally thereof, there being notches of different widths in the connecting member, providing shoulders for successively engaging said walls, and a lever acting on the connecting member to progressively rotate the walls through the intermediary of the connecting member and to raise the grid assembly from the tray.

12. A freezing mold of the character described comprising a tray, and a grid assembly in the tray, inclusive of a plurality of walls normally inclined from the tray bottom and mounted for angular movement relative thereto, a member connecting said walls and mounted for movement laterally thereof, and having a series of notches of different size providing shoulders for engaging successive walls members, and a lever for actuating the connecting member to rotate different wall members at predetermined moments in the movement of the lever.

13. A grid for an ice tray comprising a notched longitudinal member, a plurality of transverse members loosely held in spaced relation in the notches, in normally inclined relation to the longitudinal member, and mechanism for moving the inclined members to a substantially upright position.

14. In a partitioning grid for a freezing tray, a mold element comprising an end-wall element formed of two relatively movable contiguous members and a plurality of side-wall members loosely supported on both of said contiguous members of the end-wall element, and a lever operatively connected with the side-wall members by means of one of the contiguous members to impart an ice-dislodging movement to the side wall members.

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