July 25, 1950 F. W. SAMPSON 2,516,257

FREEZING TRAY

Filed Feb. 14, 1948 2 Sheets-Sheet 1

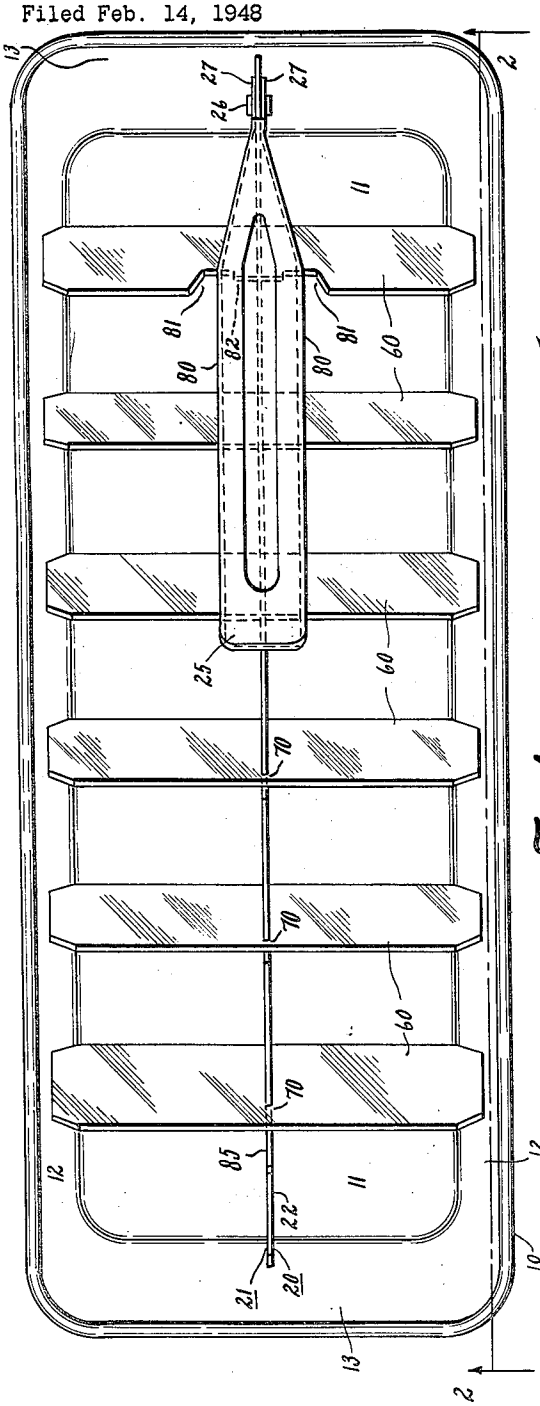


Fig. 1

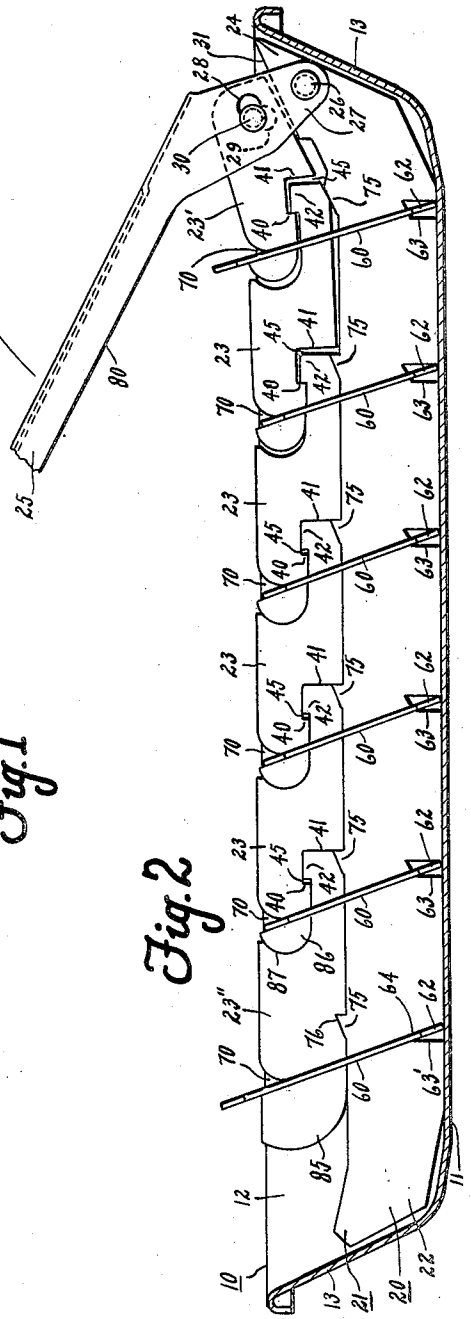


Fig. 2

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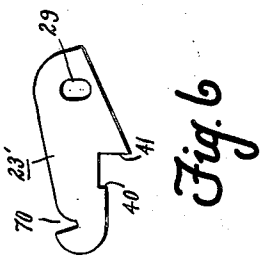


Fig. 6

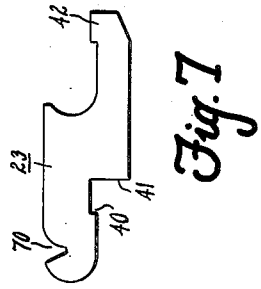


Fig. 7

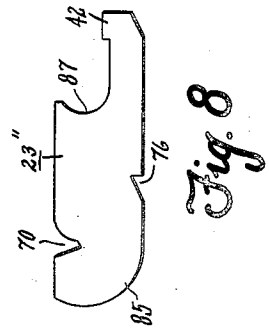


Fig. 8

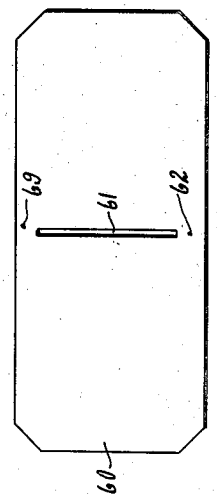


Fig. 4

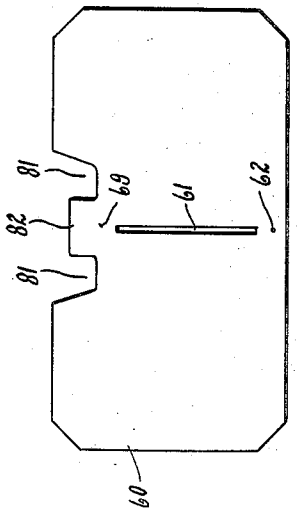


Fig. 5

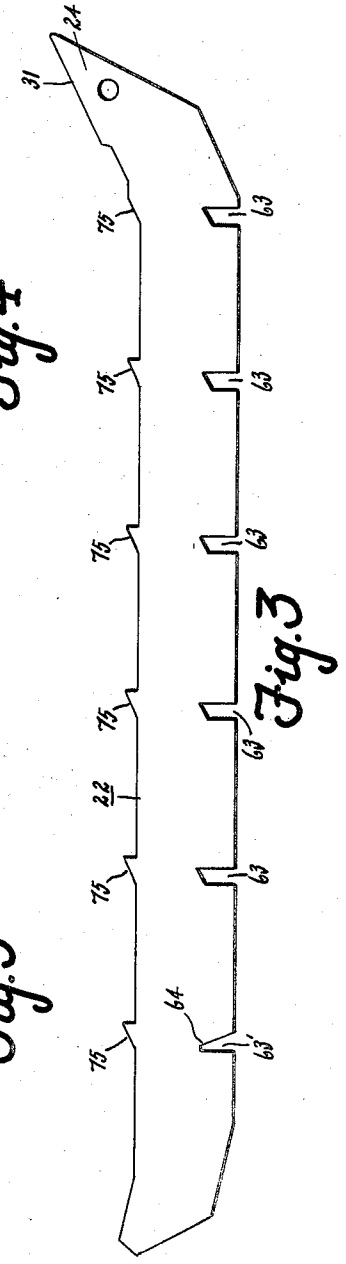


Fig. 3

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UNITED STATES PATENT OFFICE

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FREEZING TRAY

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7 Claims. (Cl. 62—108.5)

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This invention relates to mechanically-ejecting freezing trays suitable for use in household refrigerators.

The general object of this invention is to provide improved mechanisms for the mechanical loosening of the frozen ice blocks from the pan and grid assembly, or from the grid alone if the pan be first removed leaving the ice blocks still bonded to the grid.

Features of the grid of this invention are: its ease of operation to loosen the hard frozen ice blocks bonded thereto; its strength and neatness of design; its economy of manufacture and assembling of the various parts thereof; and the positive and precise location of the cross partitions into correct freezing position by the return movement of the operating links without reliance upon gravity to so locate the cross partitions.

The grid of this invention functions similarly to that disclosed in my prior application Ser. No. 639,530, filed January 7, 1946, in that the cross walls are initially tilted forward one at a time in positively controlled succession so that each cross wall after the first, can be tilted only after the cross wall immediately in front of same has been loosened from the ice and moved out of the way.

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 the grid and pan of this invention, all the parts being in freezing position.

Fig. 2 is a section on line 2—2 of Fig. 1, but shows the first two cross walls having been tilted forward slightly to loosen the first two pairs of ice blocks by the clockwise swinging of the hand lever.

Fig. 3 is a detail of the main or longitudinal partition member.

Fig. 4 is a detail of one of the cross walls.

Fig. 5 shows a modified form of cross wall. Figs. 1 and 2 show such a modified form of cross wall located next adjacent the hand lever.

Fig. 6 is a detail of the first operating link which is connected to the hand lever and which acts directly upon the first cross wall.

Fig. 7 is a detail of any one of the operating links except the first and last.

Fig. 8 is a detail of the last operating link.

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

Numeral 10 designates the container pan, which is preferably drawn in one piece from sheet aluminum alloy and whose bottom side and end walls are preferably somewhat flexible or capable of being sprung slightly out of normal shape to more readily be freed from the frozen contents of the pan upon the ice-ejection operation of the grid. Pan 10 preferably has a substantially flat bottom wall 11, slightly outwardly inclined side walls 12, and end walls 13 outwardly inclined at a greater angle so that the first two ice blocks to be ejected by the mechanism may more readily be cammed upwardly on an end wall 13.

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The removable partitioning grid 20 has a main longitudinal partitioning wall 21 which in turn comprises a continuous lower section 22 and a plurality of relatively movable upper sections 23, 23' and 23'' whose lower portions lie below the normal water level in the pan and hence are normally embedded in the ice to a material extent. That is, these upper sections 23 fit closely together in overlying relationship to lower section 22 when in freezing position and all these parts together form the main partioning wall 21, as clearly indicated in Fig. 2.

A hand lever 25 is pivoted to the upwardly projecting forward end portion 24 of lower section 22 by the pivot pin 26. Preferably hand lever 25 is a pressed metal stamping and has two flat prongs 27 spaced apart sufficiently to receive the thickness of the forward end portion 24 of section 22 therebetween with a close sliding fit. Thus hand lever 25 is suitably guided by said end portion 24 to swing in a vertical plane as it pivots about its pivotal mounting pin 26.

The forwardmost upper section 23', shaped as shown in detail in Fig. 6, also extends with a sliding fit between the two flat prongs 27 of hand lever 25 and preferably has a lost motion connection therewith. Said two prongs 27 each has an arcuate slot 28 therein, and section 23' has a short vertical slot 29 therein. Pin 30 extends loosely thru said slots 28 and 29 and is headed up on opposite sides of prongs 27 so as to be loosely retained in said slots. Now when hand lever 25 is swung in the direction of the arrow in Fig. 2 from its horizontal freezing position, the loose pin 30 at first remains stationary while arcuate slots 28 move relative thereto until the hand lever is raised to a sufficiently high position where it can be readily grasped by hand, say about 15 or 20 degrees from the horizontal. Thereupon pin 30 abuts the bottom of arcuate slots 28 so thereafter pin 30 is carried along with the hand lever in an arc about pivot pin 26 as a center. Since pin 30 extends thru the vertical slot 29 in section 23' any such arcuate movement

of pin 30 about pivot pin 26 will move section 23' to the right (as viewed in Fig. 2) a distance equal to the horizontal travel of pin 30 even though pin 30 can slide vertically in its vertical slot 29 in section 23'. When pin 30 forces section 23' to move to the right (as viewed in Fig. 2) said section slides upwardly on the inclined top edge 31 of the upwardly projecting portion 24 of lower section 22, such upward sliding being permitted without any binding at pin 30 because of the vertical slot 29. Of course during the reverse swinging of hand lever 25 section 23' is forced to slide down the inclined edge 31 while pin 30 rides in slots 28 and 29 in a reverse manner to that described above.

Each of upper sections 23' and 23 has a lost-motion connection with the next succeeding upper section so that after each preceding upper section travels a short predetermined distance it positively engages said next section and thereafter the engaged upper sections travel together. The drawings illustrate the preferred form of such a lost-motion connection. Section 23' has two spaced shoulders 40 and 41 between which the lug 42 of the next section 23 fits but with a small predetermined longitudinal clearance gap 45. Also all the sections 23 have similar lost-motion connections between the adjacent connected sections as indicated by the same reference numerals 40, 41, 42, and 45 in Fig. 2. The rearmost upper section 23'' of course has no succeeding upper section, hence is connected only to its next preceding upper section 23 at its forward end. Fig. 2 shows the first upper section 23' having traveled to the right to abut its shoulder 40 against the lug 42 of the second upper section and having pulled said second section just far enough to the right to abut its shoulder 40 against the rear edge of lug 42 on the third upper section but without having pulled said third section out of its freezing position. The clearance gaps 45 represent the predetermined travel of any one upper section before it engages and moves the next upper section connected therewith. Obviously upon a further clockwise swinging of hand lever 25 from its position shown in Fig. 2, the third upper section will immediately be pulled to the right to close the third clearance gap 45 before the fourth upper section 23 can be pulled to the right thereby, and so on for the fifth and sixth upper sections. It will be noted that when these clearance gaps 45 are closed at the left side of the lugs 42 (as viewed in Fig. 2) the same clearance gaps 45 are opened at the right side of said lugs 42, which provides for a similar successive return movement of the upper sections to the left (as viewed in Fig. 2) when the hand lever 25 is swung in a reverse or counterclockwise direction.

A series of cross walls 60 are loosely mounted at their lower margins upon the lower section 22 and the upper margin of each cross wall engages one of the upper sections 23', 23, and 23'' in such manner as to be positively moved thereby in either direction. In the form illustrated, each cross wall 60 has a central slot 61 thru which passes the lower section 22 and the overlapping portions of the upper sections, as shown in Fig. 2. The lower continuous portions 62 of the cross walls lie loosely within the lower notches 63 or 63' cut in the bottom margin of the lower section 22, said lower notches being of such shape that said cross walls can be readily tilted to a substantially vertical position from their normal inclined freezing positions shown

by the last four cross walls in Fig. 2. The upper continuous portions 69 of cross walls 60 lie within the notches 70 in the upper edges of the upper sections 23', 23 and 23'' so that the upper portion of each of said cross walls will be correspondingly moved with no lost motion by the longitudinal movement of the upper section to which it is connected.

It will now be clear that when hand lever 25 is rotated clockwise (as viewed in Fig. 2) the first cross wall 60 will be tilted forward by the forward longitudinal movement of the first upper section 23', and that all remaining cross walls will be successively engaged and initially tilted forward in successive order by the successive longitudinal movements of the remaining upper sections 23 and 23'' as described above. Also it will be clear that all the cross walls beginning with the first cross wall will be successively engaged and positively pushed back to their normal inclined freezing positions by the reverse movements of upper sections 23', 23 and 23'' when hand lever 25 is swung in a counterclockwise direction back to its horizontal freezing position.

Preferably the upper edge of lower section 22 is provided with a series of inclined cam surfaces 75 at the front end of each of the upper sections 23 and 23'' so that as each of said upper sections slides forward from its freezing position it will ride upwardly upon its cam surface 75. Such upward movement of the upper sections 23 and 23'' aids materially in loosening the lower portions of said sections from the ice in which they are embedded, and also gives the advantage that the upper continuous portion 69 of each of the cross walls will retain a substantially unvarying or uniform position within its notch 70 as the cross walls pivot about their bottom edges and swing toward a vertical position. When all cross walls are tilted forward by the upper sections by a uniform engagement therebetween there will be had a more precise timing of the initial tilting movement of the cross walls in accordance with the longitudinal movements of the upper sections. The first upper section 23' is arranged to slide forward along the upwardly inclined edge 31 so that said forward sliding movement will be opposed by very little if any ice lying ahead of the forward end of section 23'. The second upper section also rides upwardly on the first cam 75, and this prevents possibility of its lug 42 becoming disengaged from its engaged shoulder 40 on said first upper section 23'. Likewise the upward movement of the succeeding upper sections prevents possibility of their lugs 42 becoming disengaged from the shoulders 40 which pull them forward during the ice-ejection operation. The rear end of the last upper section 23'' is forced upwardly by the last cam 75 which fits within a correspondingly shaped notch 76 in said section 23''.

In operation, the grid 20 is set loosely within pan 10 with all the parts in freezing positions as shown in Fig. 1. Fig. 2 shows all the parts in freezing position except lever 25, the first two upper sections 23' and 23, and the first two cross walls 60. The pan is filled with water to the desired level, normally about a quarter inch below the top edge of the pan so as to prevent spilling during handling. The assembly is then set within a freezing chamber until the water is hard frozen. Now to harvest the ice blocks the assembly is preferably first removed from the freezing chamber and the hand lever 25 swung upwardly about its pivot pin 26 far enough to

loosen the desired number of ice blocks from both the pan and the grid. The cross walls 60 will be swung forward, pivoting about their bottom edges, by the successive forward movements of the upper sections 23', 23 and 23'' as described in detail above. Fig. 2 shows the lever 25 swung only far enough to loosen the first two pairs of ice blocks from the grid and pan. Only a very slight tilting movement of any one cross wall 60 will flex and peel that cross wall from the ice blocks bonded thereto and thereafter loosen the two ice blocks in front of same from both the pan and the grid. In each case the upper section which forms a portion of the central partition dividing the two ice blocks to be loosened will be directly loosened from said two ice blocks by its forward and upward movement as described above, and this will materially facilitate the further and complete loosening of said two ice blocks from the remaining surfaces to which they are bonded. No cross wall 60 (except the first) can have any of the force of hand lever 25 applied thereto until the cross wall immediately in front of same has first been tilted forward and so moved out of the way, this being due to the positive clearance gaps 45 as described above. Of course the entire leverage of hand lever 25 is first exerted upon the first cross wall 60 to loosen the first pair of ice blocks and cause them to slide upwardly on the inclined end wall 13 of the pan. After the number of ice blocks wanted at any particular time (which may be any number of pairs or all of the ice blocks) have been loosened the swinging motion of the hand lever can be readily stopped, leaving some of the ice blocks still bonded to the grid if so desired. The loosened ice blocks may be then removed with the fingers or ice tongs, but usually it is easier to simply lift the grid together with whatever ice blocks may be still bonded thereto upwardly from the pan, whereupon the loosened blocks will drop by gravity from the grid and remain loose in the pan and ready for use. Whatever blocks that remain bonded to the grid may be set back in the pan with the grid for later use.

When the rearmost cross wall 60 is tilted forward it is constrained to pivot about the raised point 64 on lower section 22 rather than about its lower edge, this being due to the shape of the last lower notch 63' (see Fig. 3). Hence when said last cross wall is tilted forward its lower portion (below pivot point 64) will kick back and thereby insure the loosening of the rearmost pair of ice blocks from the rear end of the lower member 22.

If so desired, the first and last cross walls may have a greater height than the remaining similar cross walls so as to extend upwardly to a sufficient height when in freezing position to cause their top edges to lie in substantially the same plane with or slightly above the top surface of hand lever 25 when in its horizontal freezing position, as shown in Fig. 1. The purpose of this is to provide a level support for the suitable stacking of another tray thereupon. Often it is desirable to stack several trays one upon the other in a freezing chamber for more fully utilizing the space therein. Fig. 5 illustrates how the upper margin of the first cross wall may be cut away to provide clearance for the hand lever 25 when in its horizontal freezing position. The two down-turned side flanges 80 of hand lever 25 will come to rest within the notches 81 cut in the upper margin of the cross wall. The tongue 82 will fall within the open channel between side flanges 80, and may be

shaped to fit neatly within said open channel to provide a suitable guiding rest for said hand lever. Of course all of the cross walls may be made with the same dimensions if so desired.

The assembling of the various parts of this grid may be quickly and efficiently done as follows: The cross walls 60 can be located in their notches 63 and 63' on lower partition 22 by threading partition 22 thru the slots 61 in the cross walls one after another. Beginning with the rearmost cross wall 60, said cross wall is held up in its lower notch 63' as far as it will go. When in this position its central slot 61 extends far enough above the top edge of lower partition 22 as to permit passing the rear curved end 85 of the rearmost upper section 23'' thru said slot 61 by first tilting said section 23'' and then swinging it to a horizontal position while simultaneously slipping its rear curved end into slot 61 until the upper continuous portion of the cross wall falls into position within its notch 70. Said rear curved end 85 and notch 70 are shaped and dimensioned to permit this method of assembling. Then the next to the last cross wall 60 is slipped over the front end of the rear upper section 23'' and held up in its lower notch 63 as far as it will go. In this position its central slot 61 extends far enough above the top edge of the front end of rear upper section 23'' as to permit passing the smaller rear curved end 86 of the next to the last upper section 23 thru said slot 61 by first tilting said section 23 and then swinging it to a horizontal position while simultaneously slipping said curved end 86 into its nested position against the concave surface 87 of said rear upper section 23''. All the remaining cross walls 60 and upper sections 23 and 23' are similarly assembled together one at a time from the rear to the front of the grid. After the front upper section 23' has been so assembled to the other grid walls, the hand lever 25 is slipped into place and the two pins 26 and 30 properly inserted in their corresponding hole and slots 28 and 29 in an obvious manner and retained therein in any suitable manner, as by expanding heads on said pins 26 and 30. All the grid parts will then be retained in assembled relationship by said pins 26 and 30.

It will be seen that when hand lever 25 is returned to its horizontal freezing position the central force-engaging portion of each cross wall is forced to return to its precise predetermined freezing position by its notch 70 independent of any accidental distortion of the cross walls. For this reason the lost-motion gaps 45 may be quite small and still the successiveness of the forward tilting of the cross walls be insured even though the cross walls have been materially bent out of shape after a period of use.

All the partition walls of the grid may be suitably made of anodized aluminum or aluminum alloy. Such anodized surfaces are preferably treated with a hard wax or other water-repellant coating which will adhere strongly to the metal surfaces and be as permanent as possible. However other suitable materials may be used for the partition walls, particularly the cross walls 60 may be suitably made from a water-repellant plastic material, such as polystyrene for example.

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 wall comprising a lower section and a plurality of relatively movable upper sections, force-multiplying means reacting upon said lower section for pulling said upper sections longitudinally relative to said lower section, one of said upper sections having a mutual lost-motion interconnection with the next succeeding upper section pulled thereby such that said succeeding section is moved only after such movement of its preceding upper section as to take up the lost motion in the interconnection therebetween, and a plurality of cross partitions each having its lower portion retained in a notch in said lower section and having its upper portion retained in a notch in one of said upper sections so as to be moved thereby.

2. A partitioning grid for a freezing tray, said grid comprising: a main partition member, a plurality of relatively movable upper links substantially aligned with said main partition so as to also serve as partitioning members; force-multiplying means reacting upon said main partition member for pulling said links longitudinally relative to said main member, said links having lost-motion interconnections therebetween such that each link except the first link to be moved will be moved only after its preceding link has been moved a predetermined distance, and a plurality of cross partitions each loosely retained in a notch in said main member and each engaging one of said links so as to be moved thereby.

3. A partitioning grid for a freezing tray, said grid comprising: a main partitioning wall comprising a lower section and a plurality of relatively movable individual upper sections, said upper sections having mutual lost-motion interconnections such that longitudinal movement of a forward section of said upper sections will initiate longitudinal movement of other of said upper sections in successive order, a series of individual cross walls each extending from side to side of the grid thru the plane of said main wall and each having its lower portion loosely retained upon said main wall, said cross walls each having its upper portion contacting one of said individual upper sections in such manner as to be moved thereby upon longitudinal movement thereof, and force-multiplying means for moving said forward section in a longitudinal direction relative to said lower section.

4. A partitioning grid for a freezing tray, said grid comprising a main partitioning wall comprising an elongated lower section and a plurality of relative short longitudinally movable individual upper sections lying in substantially the same plane with said lower section, said upper sections having mutual lost-motion interconnections, force-multiplying means for moving said upper sections longitudinally in successive order relative to said lower section, and a plurality of individually tiltable cross walls each loosely retained upon said main wall so as to be tiltable relative thereto, said cross walls each having its upper portion individually contacting one of said upper sections so as to be tilted thereby upon longitudinal movement thereof.

5. A partitioning grid for a freezing tray, said grid comprising: a main partitioning wall comprising an elongated lower section and a plurality of relatively short longitudinally movable upper sections lying in substantially the same plane with said lower section, a hand lever pivoted to said lower section for moving said upper sections longitudinally, said upper sections having mutual lost-motion interconnections such that each subsequent upper section is moved longitudinally after such movement of its preceding upper section as to take up the lost-motion in the interconnection therebetween, and a plurality of individual cross walls each extending thru the plane of said main wall and each having its lower portion loosely retained upon said main wall, said cross walls each individually contacting one of said upper sections so as to be moved thereby by a longitudinal movement thereof.

6. A partitioning grid for a freezing tray, said grid comprising: a main wall comprising an elongated lower section and a plurality of interconnected relatively short longitudinally movable upper sections substantially overlying said lower section, force-multiplying means reacting upon said lower section for pulling said upper sections longitudinally relative to said lower section, one of said upper sections having a mutual lost-motion interconnection with the next succeeding upper section pulled thereby such that said succeeding section is moved only after such movement of its preceding upper section as to take up the lost motion in the interconnection therebetween, and a plurality of individually tiltable cross partitions each loosely retained upon said main wall and each contacting one of said upper sections so as to be tilted thereby upon longitudinal movement thereof.

7. A partitioning grid for a freezing tray, said grid comprising: a main wall comprising an elongated lower section and a plurality of interconnected relatively short longitudinally movable upper sections, force-multiplying means reacting upon said lower section for pulling said upper sections longitudinally relative to said lower section, one of said upper sections having a mutual lost-motion interconnection with the next succeeding upper section pulled thereby such that said succeeding section is moved only after such movement of its preceding upper section as to take up the lost motion in the interconnection therebetween, and a plurality of individually movable cross walls each having its lower portion loosely retained upon said main wall, said cross walls each contacting one of said upper sections so as to be moved thereby upon longitudinal movement thereof.

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The following references are of record in the file of this patent:

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