June 9, 1942. H. D. GEYER 2,286,080

FREEZING TRAY

Filed May 22, 1936 3 Sheets-Sheet 1

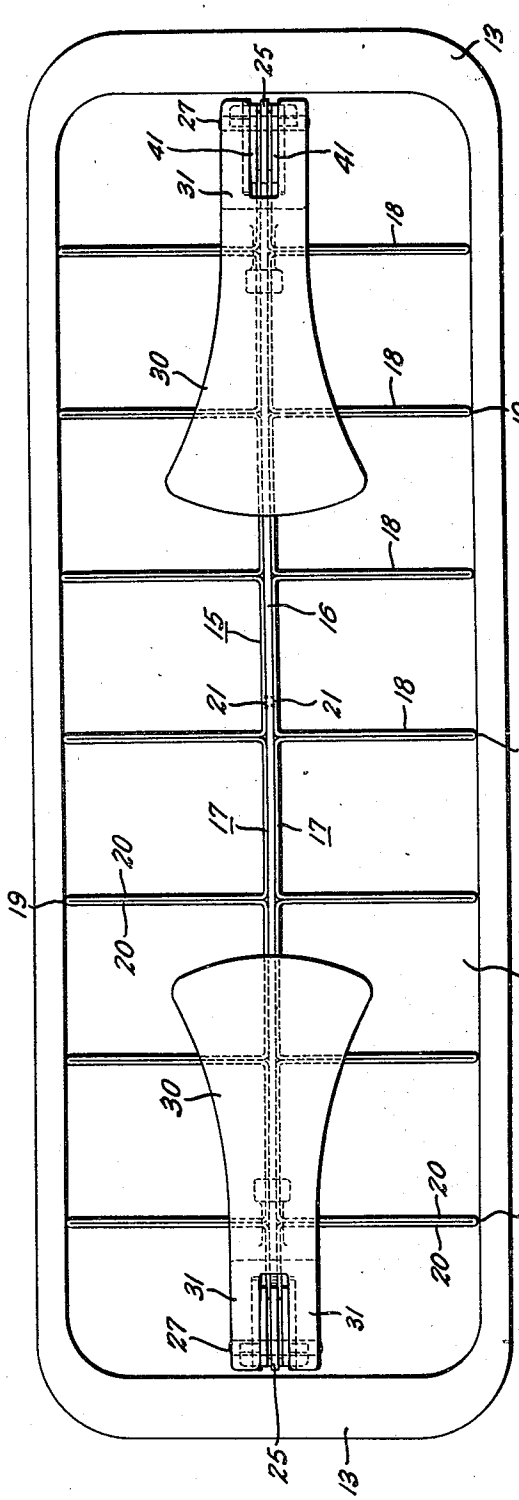


Fig. 1.

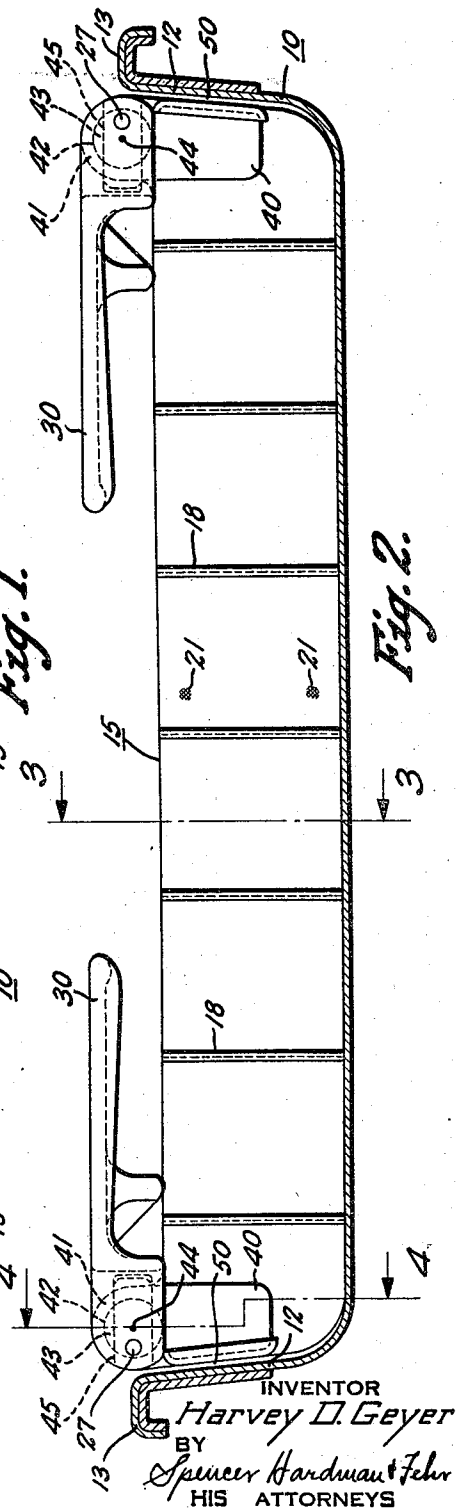


Fig. 2.

INVENTOR
Harvey D. Geyer
BY
Spencer Hardman & Fehr
HIS ATTORNEYS

June 9, 1942. H. D. GEYER 2,286,080

FREEZING TRAY

Filed May 22, 1936 3 Sheets-Sheet 2

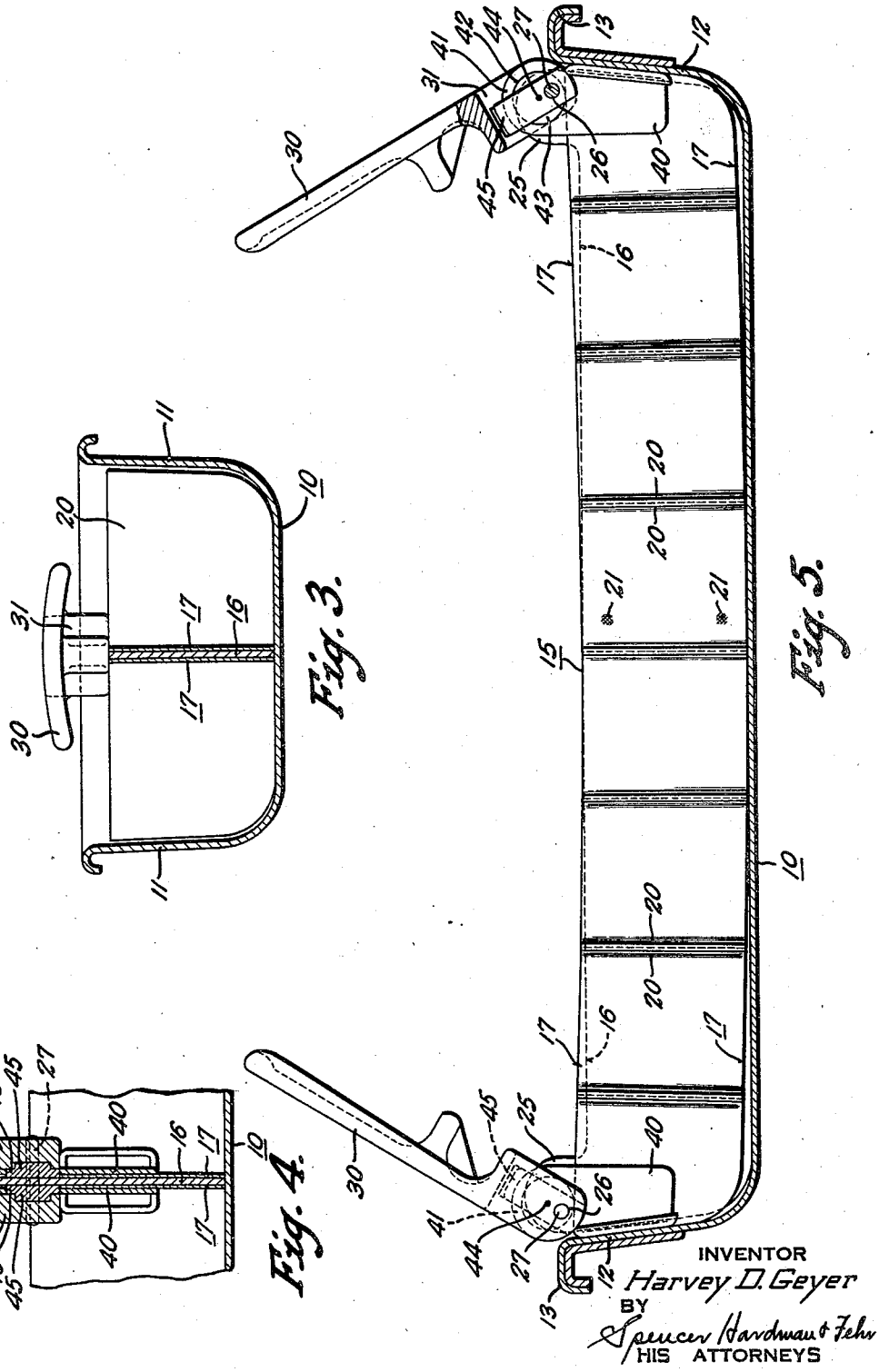


Fig. 5.



Fig. 3.



Fig. 4.

INVENTOR
Harvey D. Geyer
BY
Spencer Hardman & Fehr
HIS ATTORNEYS

June 9, 1942. H. D. GEYER 2,286,080

FREEZING TRAY

Filed May 22, 1936 3 Sheets-Sheet 3

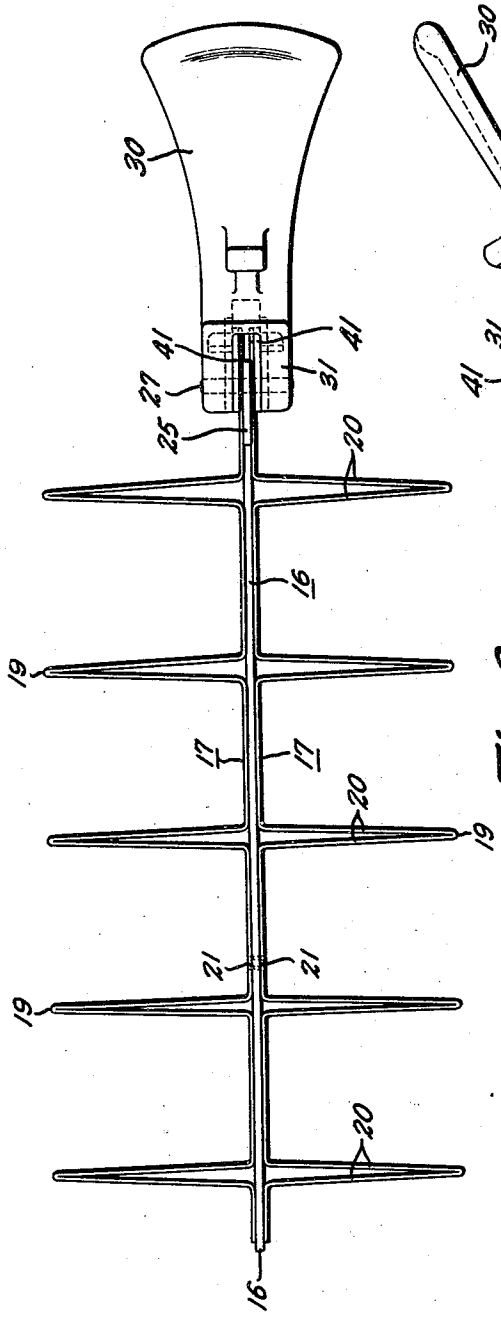



Fig. 6.

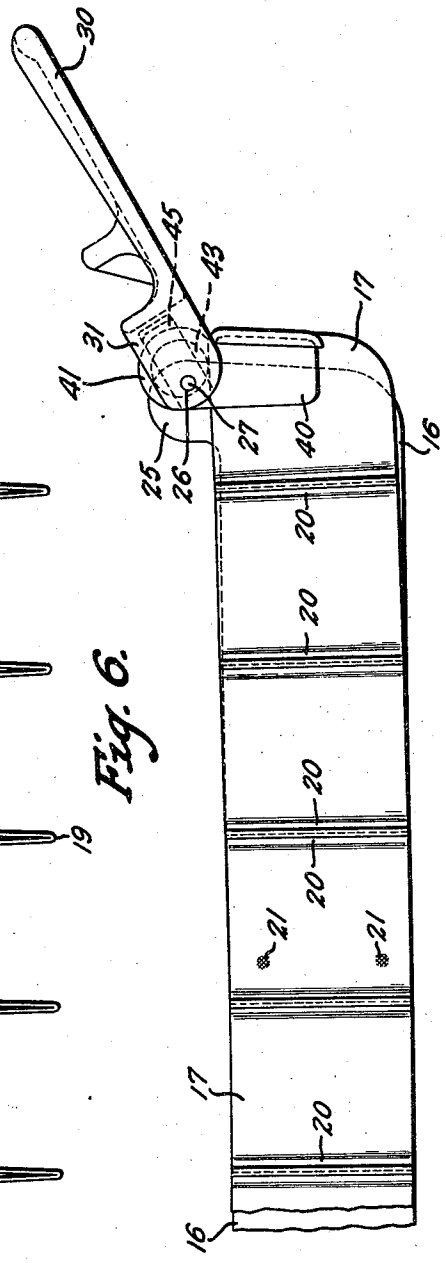



Fig. 7.

INVENTOR
Harvey D. Geyer
BY
Spencer Hardman & Fehr
HIS ATTORNEYS

Patented June 9, 1942

2,286,080

# UNITED STATES PATENT OFFICE

2,286,080

## FREEZING TRAY

Harvey D. Geyer, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application May 22, 1936, Serial No. 81,172

16 Claims. (Cl. 62—108.5)

This invention relates to freezing containers, especially such as are adapted for use in household refrigerators.

An object of this invention is to provide a freezing pan having a flexible metal grid and improved manually actuated means associated with said grid for efficiently loosening the frozen bond of the ice blocks from both the pan and the grid, whereby to facilitate removal of the ice blocks.

Another object is to provide a stretchable flexible metal grid having manually actuatable parts associated therewith for easily stretching said grid by distortion of the metal thereof to facilitate the freeing of the frozen ice blocks therefrom.

One important feature of this invention is the central reaction member which forms a part of the removable grid and remains attached thereto at all times, said reaction member serving to sustain the reaction forces when the grid is stretched by the manually actuated means associated therewith. Another feature of the invention is the use of this reaction member to press down upon the bottom of the container pan when the division-forming portions of the grid are forced upwardly by the manually actuated means. It is thus seen that the reaction member serves two important functions, namely: (1) it serves as a base against which force is applied to force the other portions of the grid and frozen contents upwardly from the pan; and (2) it serves as a base against which force is applied to stretch the stretchable portions of the grid to free the frozen ice blocks therefrom.

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 freezing container with the removable grid therein in normal freezing position.

Fig. 2 is a longitudinal vertical section of Fig. 1 but shows the removable grid in side elevation.

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

Fig. 4 is a section taken on line 4—4 of Fig. 2.

Fig. 5 is similar to Fig. 2 but shows the flexible portions of the grid partially raised from the pan and partially stretched by the illustrated movement of the hand levers.

Fig. 6 is a partial plan view of the grid removed entirely from the pan, the grid being shown stretched longitudinally by the movement of the hand levers to expand the ice pockets.

Fig. 7 is a side elevation of Fig. 6, and illustrates the ice-pocket-forming portions of the grid stretched longitudinally a substantial distance beyond the length of the central reaction member of the grid.

Similar reference characters refer to similar parts throughout.

The container pan 10 is preferably a seamless drawn metal pan having slightly tapered side walls 11 and end walls 12. Pan 10 preferably has integral end flanges 13 which serve as convenient means for grasping the pan with the fingers for handling same.

The removable grid 15 comprises a central reaction plate 16 and two flexible sheet metal division members 17 which lie in close relation to plate 16 on the opposite sides thereof. Each division member 17 is preferably made by folding up a continuous strip of metal, preferably stainless steel, to the form clearly shown in Figs. 1 and 2 so that the transverse partitions 18 thereon are each formed by two metal walls 20 integrally joined together at the folds 19 at their outer edges, but said double walls 20 being separatable by a springing of the metal thereof when the entire division member 17 is stretched longitudinally as shown in Figs. 6 and 7. In other words, the strip metal from which division members 17 are formed should possess a certain degree of resiliency or spring action so that when said division member 17 is stretched from its normal shape shown best in Fig. 1 to its distorted shape shown best in Fig. 6, it will return again substantially to its normal shape by its inherent resiliency. Obviously each pair of walls 20 should not be secured together other than at their outer fold 19 since an important feature of this invention is the separation of the walls 20 by distortion of the metal when the division member 17 is put in tension by means described below.

The reaction plate 16 has an integral ear 25 at each end thereof, each ear 25 having a hole 26 therein to receive the pivot pin 27 by means of which the hand levers 30 are pivoted directly upon the reaction plate 16.

Each division member 17 has fixed to each end thereof, preferably by spot welding a bearing member 40 having an upwardly projecting lug 41. The two lugs 41 at each end of the grid lie on opposite sides of the ear 25 (see Fig. 4), and each lug 41 has an eccentric bearing 42 therein to receive the actuating eccentrics 43 which are

fixed to the hub 31 of hand lever 30. It will now be seen that the pivot pin 27 serves as a stationary pivot relative to the reaction plate 16 for the lever 30 and the actuating eccentrics 43 secured thereto. Fig. 2 shows the preferred relative potions of the eccentrics 43 and pivot pin 27 when levers 30 are in their normal down or freezing position. As shown in Fig. 2, the center 44 of eccentrics 43 lies at the same horizontal level with the pivot 27, hence when lever 30 is swung about pivot 27 the eccentrics 43 are also swung about pivot 27 and this causes the lugs 41 on grid members 17 to move in an arc about pivot pin 27 as a center. Since lugs 41 are fixed to the ends of the flexible metal grid members 17, the ends of grid members 17 are first moved upwardly and then outwardly relative to reaction plate 16, according to the movement of the center 44 of eccentrics 43 about the pivot 27. Obviously if both levers 30 are actuated at the same time the grid members 17 will be simultaneously raised a short distance relative to reaction plate 16 and elongated by the above-described separation of the two metal walls 20 comprising each of the transverse partitions 18. Fig. 5 shows the end portions of grid members 17 raised and the grid members 17 elongated or stretched according to the illustrated position of levers 30.

Preferably, but not necessarily, the opposed grid members 17 are suitably fixed near their longitudinal center to the reaction plate 16, such as by the spot welds 21. These spot welds 21 will prevent only the central portion of the grid members 17 from being raised by the actuation of levers 30 as above described, the raising of the end portions of grid members 17 being readily permitted by the easy vertical flexibility of said grid members after the double transverse walls 20 have been only slightly separated by the stretching of said grid members.

These spot welds 21 near the longitudinal center of the grid perform two desirable functions.

(1) They require that the total elongation of grid members 17 by the levers 30 be divided approximately equally between the two longitudinal halves of grid members 17; that is to say, the stretching action accomplished by each lever 30 is applied entirely to that half of the grid members 17 nearest said lever 30, and hence the grid members 17 will be stretched more uniformly throughout their length than they would be if spot welds 21 were omitted.

(2) The central spot welds 21 retain the two grid members 17 closely positioned against the reaction plate 16 at all times to form a compact grid unit, yet permit the desired free relative raising and stretching movement of said grid members 17 by the hand levers 30. For instance, Fig. 5 shows a short central portion of grid members 17 held down by the spot welds 21 but this does not prevent a free and easy raising and stretching of all other portions of grid members 17 by distortion thereof, which raising and stretching is sufficient to break the ice bond between all of the ice cubes and the bottom and side walls of pan 10. Fig. 6 shows the empty grid unit completely removed from the pan 10 and illustrates how the flexible grid members 17 are retained closely adjacent the reaction plate 16 by the spot welds 21 at such a time.

In operation, the compact grid unit is set within pan 10 as shown in Fig. 2, either before or after pan 10 has been filled with water to the desired level. The water level may be at the top edge of grid members 17 since all the actuating mechanism is above this level and hence will not become embedded in the ice at that level. As will be noted in Fig. 2, there is provided a sufficient end clearance 50 between the ends of grid members 17 and the end wall of pan to permit a very considerable raising and elongation of grid members 17 by levers 30 and a resultant loosening of the ice blocks before said members 17 contact the end walls of pan 10. In fact it is preferred that clearance 50 be made sufficient to prevent any pressure contact of the ends of grid members 17 upon the end walls of pan 10, this because any such pressure contact will obviously oppose the free elongation of grid members 17 by the actuation of levers 30.

After the ice is entirely frozen, to remove the frozen ice cubes the tray is removed from the freezing chamber and both hand levers 30 are pulled upwardly, preferably at the same time. When hand levers 30 reach the approximate position shown in Fig. 5 the two grid members 17 will have been raised and stretched a sufficient distance to free the ice cubes from their frozen bond with pan 10 and hence the entire grid and ice contents may be then lifted from pan 10. Any further turning movement of levers 30 from their position shown in Fig. 5, without lifting the grid and ice from the pan by hand as described above, will cause the ends of grid members 17 to cam upwardly on an inclined ice film (or on the inclined end wall of pan 10 as the case may be) and thus cam the entire grid and ice contents at least partially up out of pan 10.

Either of the above described methods of removing the grid and ice contents from pan 10 may be used as desired.

If it be necessary in order to entirely free the ice cubes from the grid, the grid members 17 may be further stretched or elongated after complete removal of the grid from pan 10 simply by moving the hand levers 30 to their maximum open position shown in Figs. 6 and 7. These Figs. 6 and 7 show the grid member 17 stretched to their maximum length and consequently show the double metal walls 20 of the transverse partitions 18 distorted their maximum degree by the levers 30. This distortion of the metal walls 20 so expands each of the ice pockets as to free the bond of the ice cubes to the grid members 17 so as to cause them either to fall out or to permit their easy removal with the fingers.

The relative degree and timing of the lifting and stretching of grid members 17 by levers 30 may be changed if desired simply by changing the relative positions of pivot pin 27 and the center 44 of the eccentric discs 43, as will be obvious.

The assembling of the various parts of the grid is as follows. The two grid members 17 with the lugs 41 fixed thereto are properly placed on each side of the central reaction plate 16 so that the lugs 41 substantially coincide with the ears 25 on plate 16 (as shown in Fig. 2). The separately made small eccentric discs 43 are then separately inserted laterally into their eccentric bearings 42 in lugs 41. Each of the eccentric discs 43 has an integral rectangular portion 45 which fits within a corresponding recess in the hub 31 of lever 30 and so retains the eccentrics 43 against relative rotation with hub 31. Hence after a pair of discs 43 are in place with their integral rectangular portions 45 arranged parallel to each other, the hub 31 of lever

30 is slipped endwise into place (see Fig. 4) so that the rectangular portions 45 slide into their corresponding recesses in hub 31. Next the holes for pin 27 in the lever hub 31, the eccentrics 43, and the ear 25 are all lined up and the pivot pin 27 inserted therein and retained in place by a drive fit in hub 31. Of course other specific arrangements for fixing the eccentrics 43 to the lever 30 may be used if desired, for instance the lever hub 31 may be made in two halves, each half having a laterally projecting eccentric disc 43 integral therewith. However it is important that these eccentric discs be made of steel or other metal capable of withstanding the high bearing pressure and wear imposed thereupon. For this reason, in the form specifically illustrated in the drawings, the eccentrics 43 are separately made of steel and inserted into recesses in the die-cast lever 30.

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 freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central reaction member, a stretchable grid portion disposed upon each side of said reaction member and at least partially movable relative thereto, and a lever pivoted upon said reaction member and having an eccentric pivot upon at least one of said grid portions and actuable to stretch said grid portion relative to said reaction member.

2. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central reaction member, a metal grid portion disposed upon each side of said reaction member and at least partially movable relative thereto, and a lever pivoted upon said reaction member and having an eccentric pivot upon at least one of said grid portions and actuable to urge said grid portion upwardly relative to said reaction member.

3. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central reaction member, a stretchable grid portion disposed upon each side of said reaction member and at least partially movable relative thereto, and a lever pivoted upon said reaction member and having an eccentric pivot upon both of said opposed grid portions and actuable to stretch both of said grid portions relative to said reaction member.

4. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a substantially, vertically disposed reaction plate, a flexible metal grid portion disposed upon each side of said reaction plate and at least partially movable relative thereto, and a lever pivoted upon said reaction plate as a base and having an eccentric pivot upon both of said opposed grid portions and actuable to flex both of said grid portions relative to said reaction member.

5. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central substantially vertically extending reaction plate, a flexible metal ice-pocket forming division member disposed upon each side of said reaction plate and at least partially movable relative thereto, said division members each being stretchable in length for increasing the size of the ice-pockets formed thereby, and actuating means reacting upon said reaction plate as a base and actuable to urge said division members upwardly and stretch same relative to said reaction plate.

6. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central substantially vertically extending reaction plate, a flexible metal ice-pocket forming division member diposed upon each side of said reaction plate and at least partially movable relative thereto, said division members each being stretchable in length for increasing the size of the ice-pockets formed thereby, and a lever pivoted upon said reaction plate and having an eccentric pivot upon each of said division members and serving to partially raise said division member from said pan and thereafter stretch same, whereby to facilitate removal of the frozen ice blocks.

7. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central substantially vertically extending reaction plate, a flexible metal ice-pocket forming division member disposed upon each side of said reaction plate and at least partially movable relative thereto, said division members each being stretchable in length for increasing the size of the ice-pockets formed thereby, and levers pivoted upon the opposite ends of said reaction plate respectively, said levers having mechanical connection to opposed ends of said division members for distorting said division members by flexure of the metal thereof whereby to facilitate the removal of the frozen ice blocks.

8. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a central relatively rigid reaction member, a stretchable grid portion disposed upon each side of said reaction member and stretchable relative thereto, and grid-stretching means located adjacent one end portion of said grid and reacting upon said reaction member as a base for stretching said grid portions relative to said reaction member.

9. A freezing tray comprising a container pan and a unitary grid within said pan removable from said pan as a unit, said grid comprising: a substantially vertically disposed reaction plate, a metal grid portion loosely carried by and disposed adjacent said reaction plate and longitudinally movable relative thereto, and grid-actuating means located adjacent one end portion of said grid and reacting upon said reaction plate as a base for moving said grid portion longitudinally relative to said reaction plate.

10. A freezing tray comprising a container pan and a grid within said pan, said grid comprising: a relatively non-stretchable reaction member, a stretchable grid portion disposed adjacent said reaction member and at least partially longitudinally movable relative thereto, and a lever pivoted upon said reaction member as a base for mechanically engaging and stretching said grid portion relative to said reaction member.

11. A freezing tray comprising a container pan and a removable grid insertable within said pan, said grid comprising: a central longitudinally extending substantially vertically disposed reaction plate, a hand lever pivotally mounted upon said plate adjacent one end thereof so as to swing substantially in the plane of said plate, transverse partitions loosely associated with said reaction plate and movable relative thereto, and means connecting said relatively movable transverse partitions to said hand lever for moving

said transverse partition relative to said reaction plate whereby to facilitate the removal of the frozen ice blocks.

12. A freezing tray comprising a container pan and a removable grid insertable within said pan, said grid comprising: a central longitudinally extending substantially vertically disposed reaction plate, a hand lever pivotally mounted upon said plate adjacent one end thereof so as to swing substantially in the plane of said plate, transverse partitions loosely associated with said reaction plate to form a unitary grid structure but relatively movable therewith, and a force-multiplying crank mechanism connecting said lever to said relatively movable transverse partitions for moving said transverse partitions longitudinally relative to said reaction plate.

13. A freezing tray comprising a container pan and a removable grid insertable within said pan, said grid comprising: a central longitudinally extending substantially vertically disposed reaction plate, a hand lever pivotally mounted upon said plate adjacent one end thereof so as to swing substantially in the plane of said plate, a series of transverse partitions loosely associated with said reaction plate and longitudinally movable relative thereto, and force-multiplying actuating linkage connecting said lever to said transverse partitions for moving said transverse partitions longitudinally relative to said reaction plate when said lever is swung upon its pivot on said plate.

14. A freezing tray comprising a container pan and a removable unitary grid structure insertable as a unit in said pan, said grid comprising: a substantially vertically disposed reaction plate serving as a relatively rigid back-bone for said grid, a hand lever pivotally mounted upon said reaction plate adjacent one end thereof, transverse partitions loosely associated with said plate so as to be relatively movable therewith but not separable therefrom, and mechanical linkage connecting said lever to said transverse partitions for moving said transverse partitions longitudinally relative to said reaction plate when said lever is swung upon its pivotal mounting on said plate.

15. A freezing tray comprising a container pan and a unitary grid within said pan removable from said pan as a unit, said grid comprising: a substantially vertically disposed longitudinally extending reaction plate, a metal cross partition loosely carried by and extending transversely to said reaction plate and longitudinally movable relative thereto, and a lever pivoted upon said reaction plate as a base and actuatable to move said cross partition longitudinally relative to said reaction plate.

16. A freezing tray comprising a container pan and a unitary grid within said pan removable from said pan as a unit, said grid comprising: a central longitudinally extending reaction member, a series of cross partitions disposed adjacent said reaction member and longitudinally movable relative to each other and relative to said member, and a lever pivoted upon said reaction member as a base and actuatable to move said cross partitions longitudinally relative to each other and to said reaction member, whereby to facilitate the removal of the frozen ice blocks.

HARVEY D. GEYER.