

May 7, 1940.

J. W. JACOBS

2,199,798

REFRIGERATING APPARATUS

Original Filed Oct. 13, 1938

3 Sheets-Sheet 1

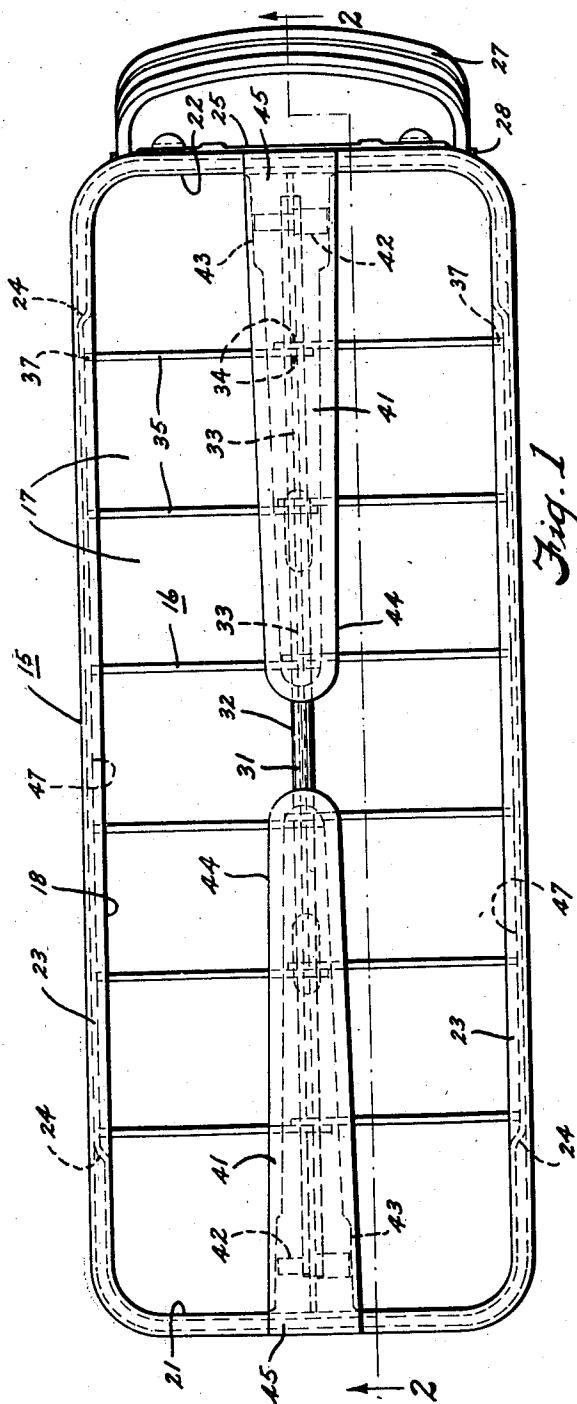


Fig. 1

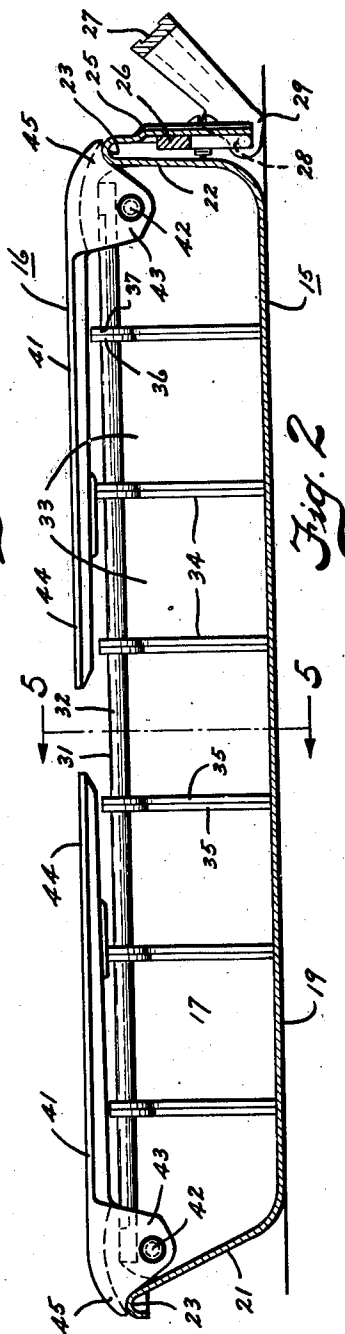


Fig. 2

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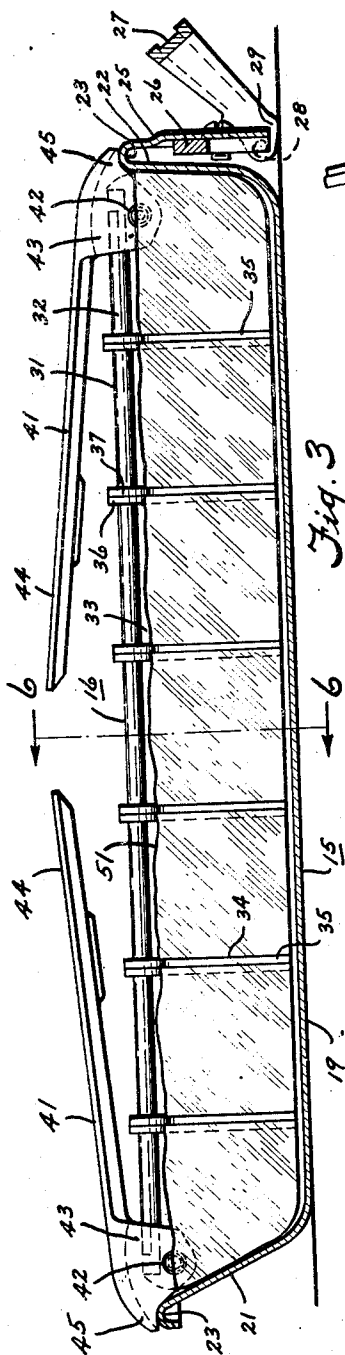


Fig. 3

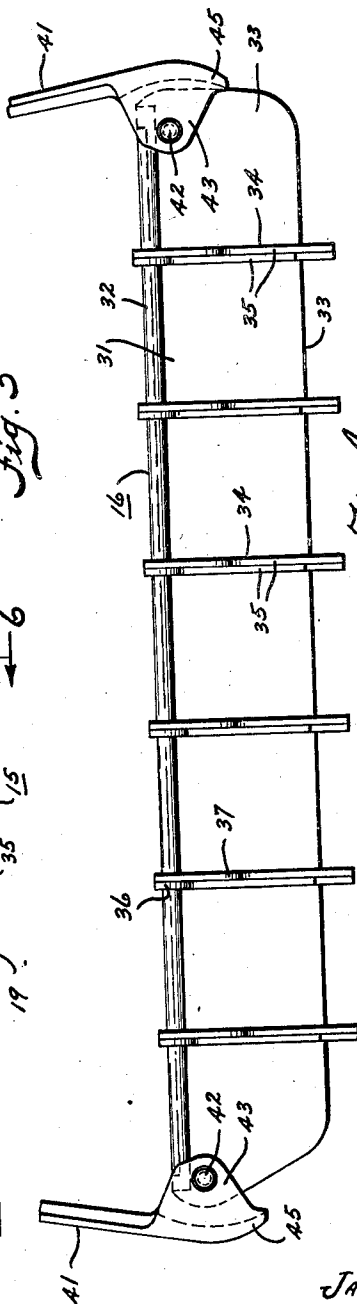
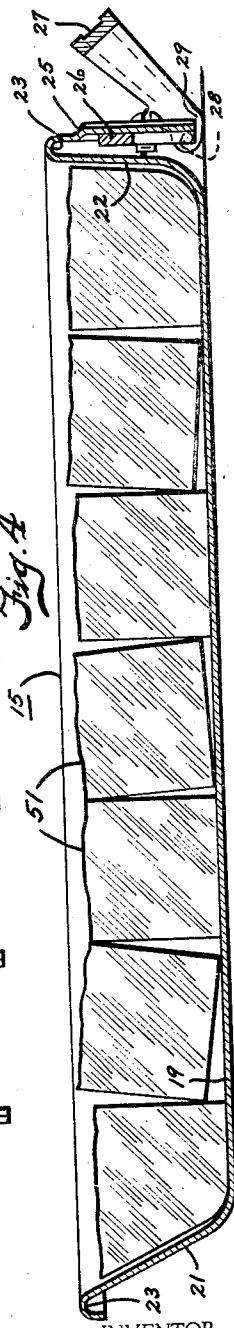


Fig. 4



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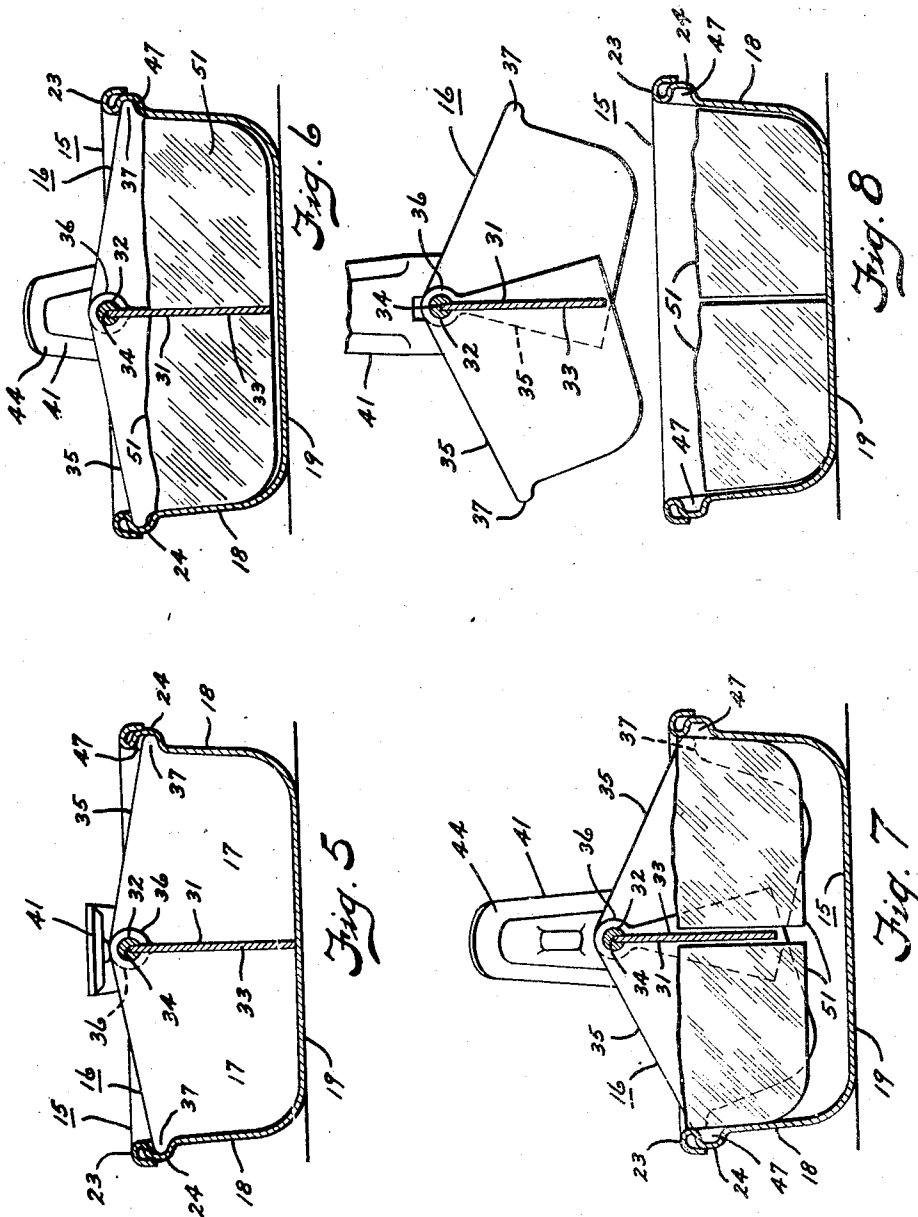
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,199,798

REFRIGERATING APPARATUS

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Application October 13, 1938, Serial No. 234,810
Renewed August 28, 1939

9 Claims. (Cl. 62-108.5)

This invention relates to liquid freezing devices such as an ice tray and grid therefor employed in household refrigerating apparatuses.

A general object of my invention is to provide an improved freezing device for liquids which includes a grid structure removably disposed in an ice tray for dividing the interior of the tray into a plurality of ice block compartments and a novel method of removing ice blocks from the tray and grid without the application of artificial heat thereto.

Another object of my invention is to provide a freezing device wherein a grid structure cooperates with a tray in such manner that movement of the grid outwardly of the tray causes movement of certain of the grid walls to liberate ice blocks from the grid structure prior to complete removal of the grid from the tray.

Another object of my invention is to provide an improved liquid freezing device including a tray having a unitary grid structure removably disposed therein and having certain walls of the grid engaging a means on the tray, which forms an obstruction to movement of the grid outwardly of the tray, to thereby resolve a lifting force applied between the tray and grid into a force acting, through the obstruction formed on the tray, upon certain walls of the grid to move same relative to certain other of the grid walls to break the bond between walls of the grid and ice blocks contacting same for liberating the ice blocks from the unitary grid structure.

It is a further object of my invention to provide in a unitary removable grid structure, of the type which is capable of operation for carrying out the foregoing objects, a plurality of pairs of substantially non-flexible metal walls extending laterally from and pivotally secured to a substantially non-flexible metal longitudinal wall wherein the walls of each pair of lateral walls are disposed side by side and are movable toward one another within suitable slots provided in the longitudinal wall to decrease the over-all width of the grid structure and permit removal thereof from an interlocked position within a tray.

A still further object of my invention is to provide in an improved freezing device of the type described a leverage means which is operable in one direction of motion for elevating the grid together with ice adhering thereto relative to the tray prior to causing movement of the grid walls to liberate ice blocks therefrom to thereby divide and diminish the force required to harvest ice blocks from the device.

More specific objects and further advantages of my invention reside in the construction and operation of my improved freezing device and in novel combinations and arrangements of parts thereof as will more fully appear in the course of the following description.

In the drawings:

Fig. 1 is a top plan view of a freezing device comprising a tray and a grid disposed therein and constructed in accordance with my invention;

Fig. 2 is a side view of the freezing device disclosed in Fig. 1 and is taken on the line 2-2 thereof showing the tray in section;

Fig. 3 is a view similar to Fig. 2 showing ice blocks in the freezing device and disclosing the grid structure and ice blocks therein elevated relative to the tray;

Fig. 4 is a view disclosing the grid removed from the tray and showing walls of the grid moved relative to one another with ice blocks removed therefrom and contained in the tray;

Fig. 5 is a vertical transverse sectional view of the freezing device taken on the line 5-5 of Fig. 2;

Fig. 6 is a vertical transverse sectional view of the device taken on the line 6-6 of Fig. 3 showing the grid and ice blocks adhering thereto elevated relative to the tray;

Fig. 7 is a view similar to Fig. 6 showing the grid released from the tray and disclosing movement of the grid transverse walls to loosen ice blocks therefrom; and

Fig. 8 is a view showing the grid removed from the tray and ice blocks liberated from walls of the grid structure.

In Fig. 1 of the drawings I have illustrated the freezing device as including a metal ice tray 15 having a unitary metal walled grid 16 removably interlocked with the tray 15 and constructed and arranged to divide the interior thereof into longitudinal rows of ice block cells or compartments 17. The tray 15 has side walls 18 (see Figs. 5 to 8), a bottom wall 19 and opposed end walls 21 and 22. The tray side walls 18 and at least one of the end walls thereof diverge outwardly toward the top of the tray to facilitate removal of the grid from the tray. The walls 18, 21 and 22 of tray 15 have their upper edge rolled or bent over, as at 23, to provide a rim which extends continuously around the top of the tray to increase its structural strength. An embossed portion or corrugation 24 is formed in each side wall 18 of tray 15 (see Figs. 1 and 5) to provide a means

for receiving and interlocking walls of grid 16 to the tray 15. The embossed or corrugated portion 24 is located near the top or rim 23 of tray 15 and extends substantially throughout the length of the side walls 18 thereof for a purpose to be hereinafter more specifically described. A portion of the metal tray 15 is extended downwardly from rim 23, as at 25, at the front end 22 thereof (see Fig. 2) and provides a mounting for a heavy metal piece 26 which has a handle 27 pivotally secured thereto as at 28. At least one of the legs of handle 27 is provided with a cam surface 29 which is adapted to engage the tray support to break an ice bond between the tray and its support in or on a cooling element of a household refrigerating system as will hereinafter be more fully described.

The unitary grid structure, generally represented by the reference character 16, of the freezing device is removably disposed within tray 15 and comprises a plurality of inflexible metal members which cooperate to form a plurality of walls dividing the interior of the tray into the longitudinal rows of cells or compartments 17. The grid structure 16 includes a longitudinal member or partition 31 comprising a rod 32 having a plurality of metal segments 33 mounted therein by being welded or otherwise suitably secured thereto within grooves 34 provided therein (see Fig. 5). The segments 33 of longitudinal partition 31 are vertically disposed and arranged in spaced apart aligned relation along the length of rod 32 to provide or form a plurality of slots 34 in the partition 31 between the segments. Prior to securing the segments 33 to rod 32 to provide the longitudinal partition 31, I place a pair of members or walls 35, in opposed relation to one another, upon rod 32 and between each of the segments 33 so that these walls 35 will be located within the slots 34 provided in partition 31. Each member 35 of the plurality of pairs thereof has an opening provided in an ear 36 formed thereon and which opening receives the rod 32. Each member 35 also has a finger part 37 extending outwardly beyond the main body portion thereof and adapted to engage the tray 15 in a manner and for a purpose to be presently described. The unitary grid structure 16 also includes a pair of levers 41, one of which is pivotally mounted by a pin or shaft 42 upon each end of the structure 16 by passing the pin or shaft 42 through the legs 43 of levers 41 and through a suitable opening provided in the end segments 33 of partition 31 and includes a handle end 44 and a short tray engaging cam end portion 45. It will be seen that the pairs of laterally extending members or walls 35 are pivotally mounted upon the longitudinal partition 31 for swinging movement in the spaces between the segments 33 which provides slots in the partition 31. The mounting of levers 41 upon the partition 31 and the securing of members or walls 33 and 35 together forms a unitary grid structure which is adapted to be normally interlocked with tray 15 but removable therefrom as a unit. The grid structure 16 is placed in tray 15 by moving the members 35 of each pair thereof toward one another out of their normal ice freezing position about their pivotal mounting on rod 32. The width of the grid structure is thereby reduced to permit the fingers 37 on members 35 to move into the tray 15 between the side walls 18 thereof. The bottom edges of members 35 will strike the bottom

wall 18 of tray 15, upon movement of grid 16 into the tray, and members 35 will again be moved outwardly into their normal ice freezing position within the tray. This outward movement of members 35 increases the over-all width of the grid structure and causes the fingers 37 on members 35 to move into the grooves 47 formed by the corrugation or embossed parts 24 of tray 15. Thus, grid structure 16 is removably interlocked within tray 15 with its walls in a normal ice freezing position. Grooves 47 provided in tray 15 by the corrugations 24 formed therein are of greater height than the outwardly extending finger portions 37 formed on members 35, and this difference therebetween is for the purpose of permitting elevation of grid structure 16 together with ice blocks adhering thereto relative to tray 15 prior to moving walls of the grid relative to one another so as to permit the ice bond between ice blocks within the grid structure and the tray to be broken.

Assume that grid structure 16 is interlocked within tray 15 in the position shown in Figs. 1, 2 and 5 of the drawings and water has been frozen in the freezing device in the form of ice blocks or cubes 51 (see Figs. 3, 4, 6, 7 and 8) in compartments 17, by the cooling effect produced by an evaporator of a refrigerating system, and removal or harvesting of these ice blocks is desired. The tray handle 27 is grasped by the hand and pulled outwardly, thus causing same to pivot about its pivotal mounting 28 and move downwardly. This initial downward movement of handle 27 causes the cam surface or surfaces 29 thereon to bear against the evaporator to break the ice bond between the freezing device and the evaporator. The freezing device can thereafter be readily removed from its support in or on the evaporator. After removal of the freezing device from the evaporator of the refrigerating system the handle ends 44 of levers 41 on grid 16 are grasped by the hand and elevated to cause the levers to rotate about their pivotal mounting shafts or pins 42. This initial movement of levers 41 causes the short cam ends 45 thereof to engage rim 23 on tray 15 and apply force to the tray to elevate the unitary grid structure 16 and the ice blocks 51 adhering thereto relative to the tray. This initial elevation of grid 16 is shown in Figs. 3 and 6 of the drawings and it is to be noted that the outwardly extending finger portions 37 on the laterally extending members or walls 35 have been moved upwardly within the grooves 47 provided in the upper part of the tray side walls. No movement of the grid walls relative to one another has occurred as yet, and it will be understood that the force thus far applied to levers 41 only breaks the bond between the ice blocks 51 and walls of tray 15. However, after the levers 41 are elevated slightly into the position shown in Figs. 3 and 6, they may be more firmly grasped by the hands for exerting additional force thereto for application to the tray. Therefore, further upward movement of levers 41 about their pivotal mountings into a position approximating that disclosed in Fig. 7 of the drawings binds the finger portions 37 of walls 35 against the upper walls of the grooves 47 in tray 15. The upper walls of grooves 47 form obstructions to the elevation of grid 16, and this further elevation of the grid relative to the tray causes the grid walls 35 to move or swing toward one another within the slots in the longitudinal grid wall or partition 31 provided between the segments 33 thereof.

Obviously, movement of the plurality of pairs of walls 35 of grid 16 relative to and toward one another by the camming arrangement of fingers 37 and the obstructing top walls of grooves 47 shifts the walls 35 out of their normal ice freezing position to break the bond between the ice blocks 51 and walls 31 and 35 of the unitary grid structure 16. This releases ice blocks 51 from the grid 16 and also permits grid 16 to be completely removed from tray 15 as a unit as shown in Fig. 8 of the drawings due to the overall width of the grid being decreased by movement of its walls 35 inwardly toward the longitudinal partition 31 as disclosed in Fig. 7. The ice blocks 51 are thereafter liberated from walls of grid 16 before the grid is removed from tray 15, and these ice blocks freely fall back into the tray from which they may be readily harvested. Any desired number of the ice blocks 51 may be removed from tray 15 and the tray together with ice blocks 51 remaining therein can be replaced on its refrigerated support to maintain the remaining ice blocks in a frozen condition until their harvesting and use is required.

From the foregoing it will be seen that I have provided an improved freezing device wherein a unitary grid structure is removably interlocked within a tray to maintain walls of the grid in a normal ice block freezing position and wherein removal of the grid from the tray releases ice blocks from the grid walls. I have divided the forces acting to elevate the grid and ice blocks relative to the tray to break the bond therebetween and the forces acting to dislodge ice blocks to render the improved device capable of manipulation with a minimum of effort on the part of the operator. The scissor-like action of the plurality of pairs of grid walls moving toward one another in the device disclosed breaks the bond between the outwardly extending walls and the longitudinal wall or partition of the grid in an improved manner to thereby prevent shattering of the ice blocks. My improved freezing device is constructed entirely of metal to thereby retain the fast freezing characteristics of metal tray and grid combinations and the rigid wall construction of the grid provides a structure which is of low cost, strong and durable, and yet operable by moving each of the levers in one direction of rotation to elevate the ice relative to the tray and for liberating ice blocks from the grid.

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

What is claimed is as follows:

1. A freezing unit adapted to be placed in or on a cooling element of a refrigerating system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a longitudinal member and a plurality of pairs of members extending laterally therefrom, said pairs of members being spaced apart along the length of said longitudinal member and forming therewith a plurality of walls dividing the interior of said tray into longitudinal rows of ice block compartments, each member of said plurality of pairs thereof being mounted upon said longitudinal member for movement relative thereto and relative to one another, each member of said plurality of pairs thereof having a portion extending outwardly beyond its main body portion and adapted to engage said tray, means on said tray for receiving

said outwardly extending portions of said plurality of members for maintaining said members of said unitary removable grid structure in a normal ice block-forming position within the tray, means for applying force between said tray and said unitary grid structure to elevate the grid together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said outwardly extending portions of said plurality of members cooperating with said means on said tray to provide an obstruction to elevation of said grid structure beyond said ice bond breaking position of elevation thereof to thereby resolve the first mentioned force into a force acting upon each of the members of said pairs thereof to move same relative to one another out of their normal ice block-forming position for liberating ice blocks from the ice compartment walls of said unitary grid structure.

2. A freezing unit adapted to be placed in or on a cooling element of a refrigerating system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a longitudinal member and a plurality of pairs of members extending laterally therefrom, said pairs of members being spaced apart along the length of said longitudinal member and forming therewith a plurality of walls dividing the interior of said tray into longitudinal rows of ice block compartments, each member of said plurality of pairs thereof being mounted upon said longitudinal member for movement relative thereto and relative to one another, each member of said plurality of pairs thereof having a portion extending outwardly beyond its main body portion and adapted to engage said tray, means on said tray for receiving said outwardly extending portions of said plurality of members for maintaining said members of said unitary removable grid structure in a normal ice block-forming position within the tray, leverage mechanism pivotally mounted upon said grid for applying force between said tray and said unitary grid structure to elevate the grid together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said outwardly extending portions of said plurality of members cooperating with said means on said tray to provide an obstruction to elevation of said unitary grid structure beyond said ice bond breaking position of elevation thereof to thereby resolve the first mentioned force into a force acting upon the outer extremity of each of the members of said pairs thereof to move same toward one another out of their normal ice block-forming position for liberating ice blocks from the ice compartment walls of said unitary grid structure.

3. A freezing unit adapted to be placed in or on a cooling element of a refrigerating system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a substantially non-flexible metal longitudinal member and a plurality of pairs of substantially non-flexible metal members extending laterally therefrom, said pairs of metal members being spaced apart along the length of said longitudinal metal member and forming therewith a plurality of walls dividing the interior of said tray into longitudinal rows of ice block compartments, each member of said plurality of pairs thereof being mounted upon said longitudinal member for movement relative thereto and relative to one another, each mem-

ber of said plurality of pairs thereof having a portion extending outwardly beyond its main body portion and adapted to engage said tray, means on said tray for receiving said outwardly extending portions of said plurality of members for maintaining said members of said unitary removable grid structure in a normal ice block-forming position within the tray; a lever pivotally mounted upon said grid at each end thereof for applying force to the ends of said tray to elevate said unitary grid structure together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said outwardly extending portions of said plurality of metal members cooperating with said means on said tray to provide an obstruction to elevation of said unitary grid structure beyond said ice bond breaking position of elevation thereof to thereby resolve the first mentioned force into a force acting upon the outer extremity of each of the metal members of said pairs thereof to move same toward one another out of their normal ice block-forming position for liberating ice blocks from the ice compartment walls of said unitary grid structure.

4. A freezing unit adapted to be placed in or on a cooling element of a refrigerating system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a longitudinal member and a plurality of pairs of members extending laterally therefrom, said longitudinal member having spaced apart vertical slots therein extending upwardly from its bottom edge, each member of said pairs of members being pivotally mounted upon said longitudinal member and said pairs of members forming therewith a plurality of walls dividing the interior of said tray into longitudinal rows of ice block compartments, the one member of each pair of members being located adjacent the other member thereof for swinging movement relative to one another within a slot provided in said longitudinal member, each member of said plurality of pairs thereof having a portion extending outwardly beyond its main body portion and adapted to engage said tray, means on said tray for receiving said outwardly extending portions of said plurality of members to maintain said members of said unitary removable grid structure in a normal ice block-forming position within the tray, means for applying force between said tray and said unitary grid structure to elevate the grid together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said outwardly extending portions of said plurality of members cooperating with said means on said tray to provide an obstruction to elevation of said grid structure beyond said ice bond breaking position of elevation thereof to thereby resolve the first mentioned force into a force acting upon each of the members of said pairs thereof to swing same within said slots in said longitudinal member out of their normal ice block-forming position for liberating ice blocks from the ice compartment walls of said unitary grid structure.

5. A freezing unit adapted to be placed in or on a cooling element of a refrigerating system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a longitudinal member and a plurality of pairs of members extending laterally therefrom, said longitudinal member having spaced apart vertical slots therein extending upwardly from its bottom edge, each

member of said pairs of members being pivotally mounted upon said longitudinal member and said pairs of members forming therewith a plurality of walls dividing the interior of said tray into longitudinal rows of ice block compartments, the one member of each pair of members being located adjacent the other member thereof for swinging movement relative to one another within a slot provided in said longitudinal member, each member of said plurality of pairs thereof having a portion extending outwardly beyond its main body portion and adapted to engage said tray, means on said tray for receiving said outwardly extending portions of said plurality of members to maintain said members of said unitary removable grid structure in a normal ice block-forming position within the tray, leverage mechanism pivotally mounted upon said grid for applying force between said tray and said unitary grid structure to elevate the grid together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said outwardly extending portions of said plurality of members cooperating with said means on said tray to provide an obstruction to elevation of said grid structure beyond said ice bond breaking position of elevation thereof to thereby resolve the first mentioned force into a force acting upon the outer extremity of each of the members of said pairs thereof to swing same within said slots in said longitudinal member out of their normal ice block-forming position for liberating ice blocks from the ice compartment walls of said unitary grid structure.

6. A freezing unit adapted to be placed in or on a cooling element of a refrigeration system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a substantially non-flexible metal longitudinal member and a plurality of pairs of substantially non-flexible metal members extending laterally therefrom, said metal longitudinal member having spaced apart vertical slots therein extending upwardly from its bottom edge, each metal member of said pairs of members being pivotally mounted upon said longitudinal metal member and said pairs of members forming therewith a plurality of walls dividing the interior of said tray into longitudinal rows of ice block compartments, the one member of each pair of metal members being located adjacent the other member thereof for swinging movement relative to one another within a slot provided in said longitudinal member, each member of said plurality of pairs thereof having a portion extending outwardly beyond its main body portion and adapted to engage said tray, means on said tray for receiving said outwardly extending portions of said plurality of metal members to maintain said members of said unitary removable grid structure in a normal ice block-forming position within the tray, a lever pivotally mounted upon each end of said grid and the levers being adapted to apply force to the ends of said tray to elevate said unitary grid structure together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said outwardly extending portions of said plurality of members cooperating with said means on said tray to provide an obstruction to elevation of said grid structure beyond said ice bond breaking position of elevation thereof to thereby resolve the first mentioned force into a force acting upon each of the metal members of said pairs thereof to swing same

within said slots in said longitudinal metal member out of their normal ice block-forming position for liberating ice blocks from the ice compartment walls of said unitary grid structure.

- 5 7. A freezing unit adapted to be placed in or on a cooling element of a refrigerating system comprising in combination, a tray, a unitary grid structure removably disposed in said tray, said grid structure including a plurality of
10 rigid walls dividing the interior of said tray into a plurality of ice block compartments, said rigid walls of said unitary grid structure being interlocked together in movable relation to one another, means on said tray for receiving a portion
15 of certain of said walls of said unitary removable grid structure to maintain same in a normal ice block forming position within said tray, means for applying force between said tray and said unitary grid structure to elevate the structure
20 together with ice blocks adhering thereto relative to the tray to break an ice bond therebetween, and said portion of said certain grid walls cooperating with said means on said tray to provide an obstruction to elevation of said grid
25 structure beyond said ice bond breaking position of elevation thereof whereby said obstruction causes the first mentioned force, upon further elevation of said grid structure relative to said tray, to be resolved into a force acting upon each
30 of said certain rigid grid walls to move same out of their normal ice block forming position for liberating ice blocks from the ice compartment walls of said unitary removable grid structure.

8. A freezing device comprising, a tray, a

unitary removable grid structure disposed in said tray, said grid structure comprising a plurality of relatively movable partitions cooperating to form walls of ice block compartments, means on
5 said tray normally forming an obstruction to removal of said grid therefrom, force multiplying mechanism for elevating said grid structure relative to said tray to remove same therefrom as a unit, and certain of said grid walls engaging said
10 obstructing means on said tray during removal of the unitary grid structure therefrom whereby the force of said mechanism acts upon said certain grid walls to move same relative to others thereof for liberating ice blocks from said compartments.

15 9. A freezing device comprising, a tray, a unitary removable grid structure disposed in said tray, said grid structure comprising a plurality of relatively movable partitions cooperating to form walls of ice block compartments, means on said
20 tray disposed over a portion of certain walls of said grid and normally forming an obstruction to removal of the grid from the tray, a lever carried by said grid structure and adapted to apply force to said tray for elevating the grid structure rela-
25 tive to the tray to remove same therefrom as a unit, and said certain grid walls engaging said obstructing means on said tray during removal of the unitary grid structure therefrom whereby
30 the force of said lever acts upon said certain grid walls to move same relative to others thereof for liberating ice blocks from said compartments.

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