

March 31, 1936.

R. S. GAUGLER

2,035,543

REFRIGERATING APPARATUS

Filed Feb. 27, 1934

3 Sheets-Sheet 1

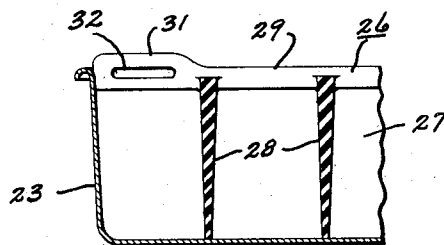
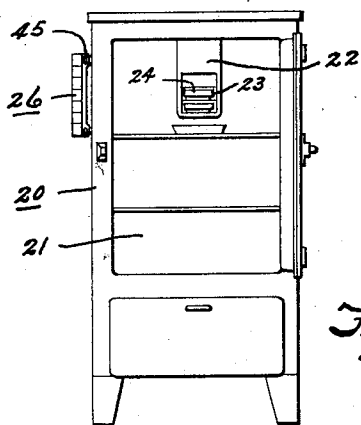


Fig. 1

Fig. 3

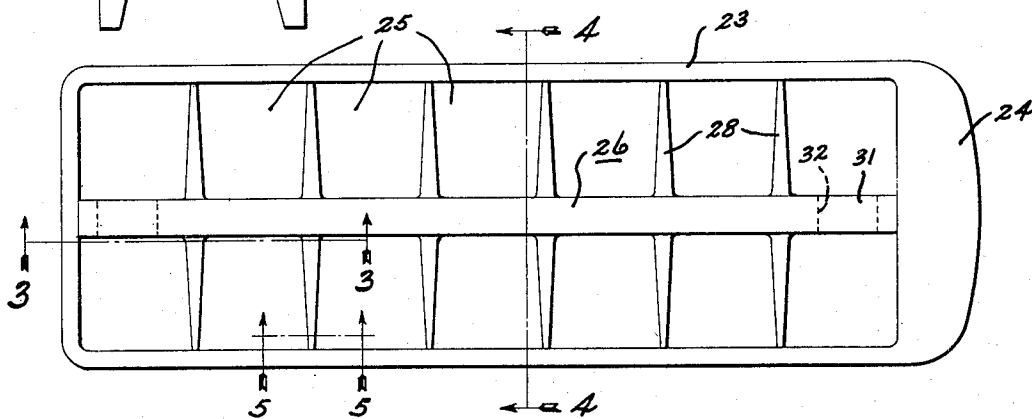


Fig. 2

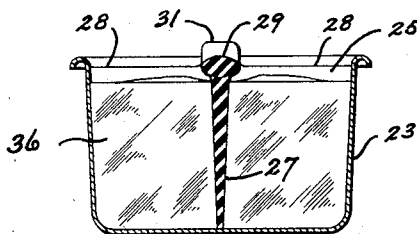


Fig. 4

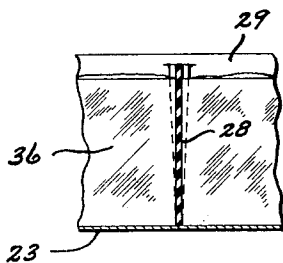


Fig. 5

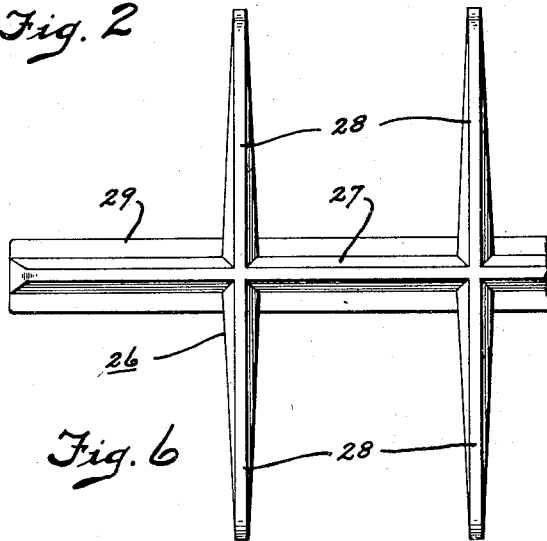


Fig. 6

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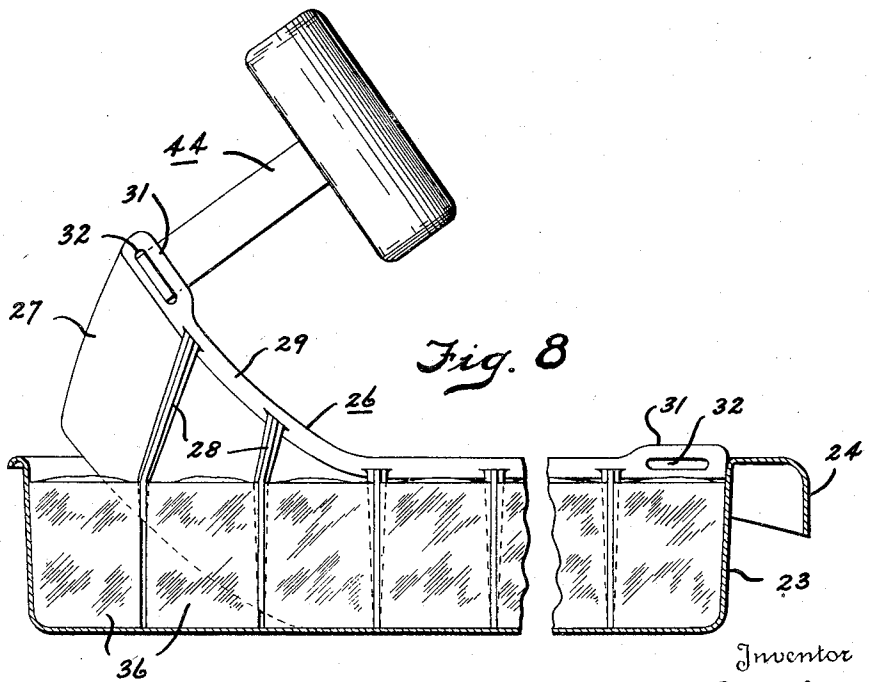
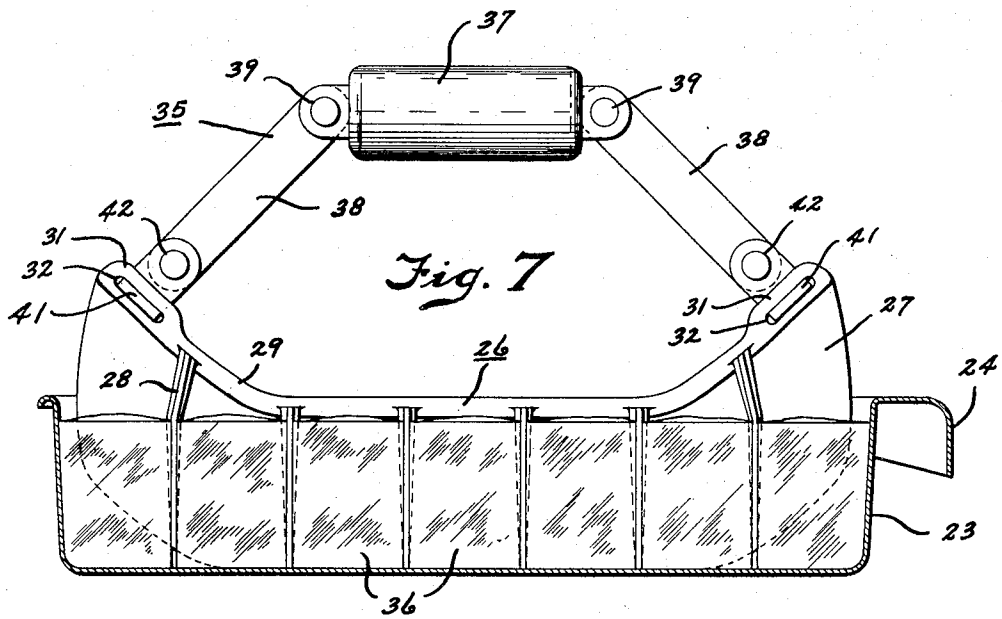
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3 Sheets-Sheet 2



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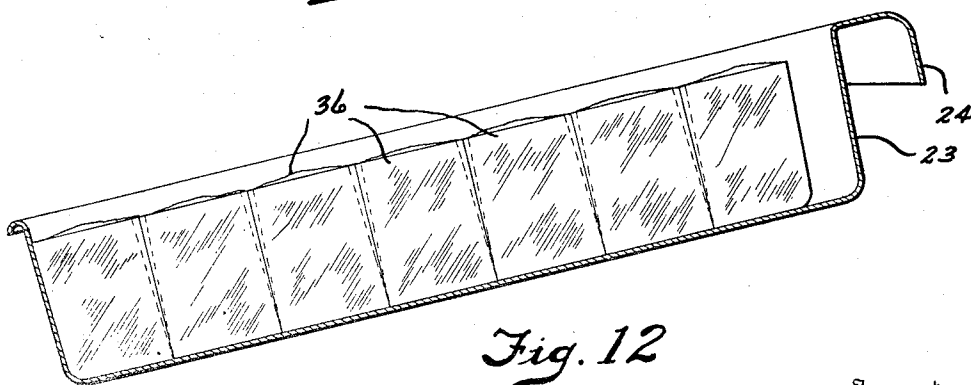
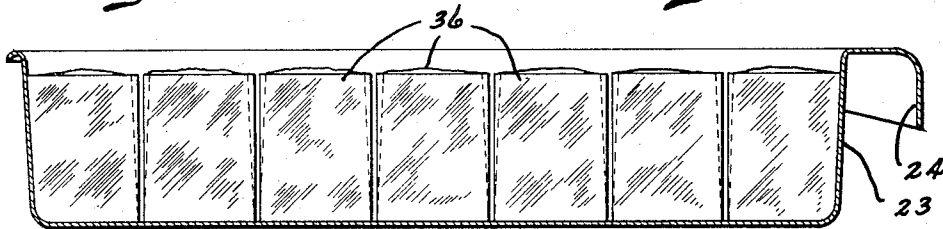
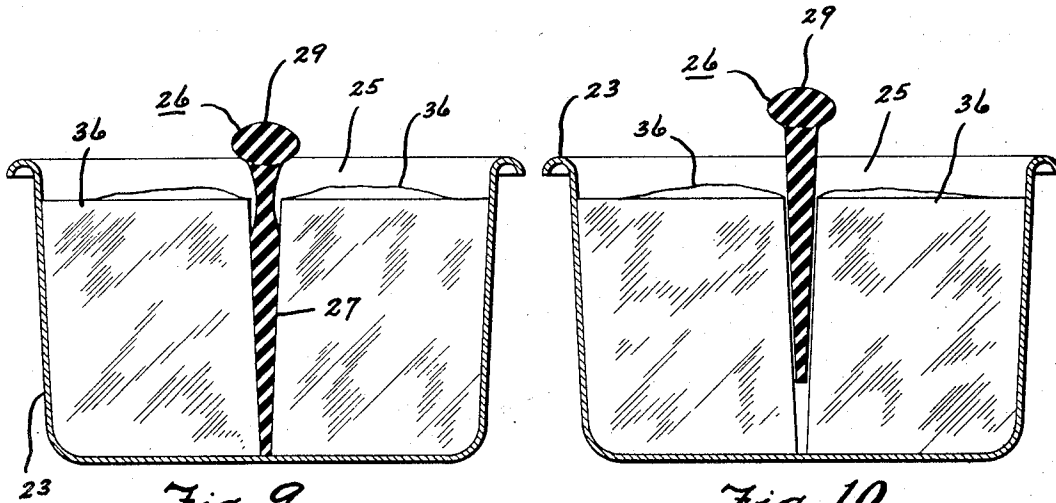
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,035,543

REFRIGERATING APPARATUS

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Application February 27, 1934, Serial No. 713,235

8 Claims. (Cl. 62—108.5)

This invention relates to refrigeration and particularly to harvesting ice blocks from trays commonly employed in refrigerators of the household type.

Various devices and many structural combinations of ice trays and grids have been employed to remove or harvest blocks or cubes of ice from a tray in which they have been frozen. I am aware of the use of a rubber grid disposed within a metallic tray and the use of a rubber tray having a rubber grid molded integrally therewith as well as many other metallic tray and grid combinations. In all these prior devices known to me, except the molded unitary tray and grid, ice cubes or blocks cannot be quickly or readily harvested or removed from the device without application of artificial heat, such as water running from a faucet, to either the tray or grid. Removal of ice blocks or cubes from a molded rubber unitary tray and grid has, it is admitted, been somewhat satisfactory but a structure of this type is inherently of poor heat conducting properties and therefore fast freezing of the contents of such a tray cannot be had. This inefficiency of a molded rubber unitary tray and grid structure has been recognized by those skilled in the art by their employment of a metallic tray in combination with a removable rubber grid. However the structures heretofore employed to overcome the inefficiency of a molded rubber unitary tray and grid present certain problems in removing or harvesting ice therefrom. For example in the use of a metallic tray with a removable rubber grid disposed therein it is necessary to apply artificial heat to the metallic tray in order to remove the ice cubes together with the grid forming same from the tray and this application of heat has usually been carried out by holding the tray under running water. Some have eliminated the necessity of holding the tray under running water by devising lever or cam means for raising a grid together with the ice cubes from a tray. However, such structures have not proven satisfactory because after the grid together with the ice cubes, which are bonded thereto, have been removed from the tray the cubes cannot be removed from the grid without permitting exposure of the grid to room temperature over a sufficient period of time to cause release of cubes from the grid, or, without the application of artificial heat to the grid and/or cubes such as by holding same under water running from a faucet. Therefore none of the prior freezing devices or structures known to me have the combined features of fast freezing of the contents of the tray and removal

of the frozen substances without the application of artificial heat thereto.

An object of the present invention is to provide an improved freezing apparatus and method of harvesting a substance frozen therein therefrom.

Another object of the invention is to provide a tray in which fast freezing of the contents thereof can be had, when same is placed in or on a cooling element of a refrigerating apparatus, and from which tray the frozen contents can be quickly and readily harvested without the application of artificial heat to the frozen contents.

A further object of the invention is to provide a rubber grid for dividing the interior of a tray into a plurality of separate or individual molds which grid can be removed from the tray and from the frozen contents thereon without increasing the temperature of the frozen contents.

Other and further objections and advantages of the present invention will be apparent from the following description reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front elevational view of a refrigerator cabinet of the household type in which the present invention may be incorporated;

Fig. 2 is top plan view of an ice freezing tray employed in the refrigerating apparatus disclosed in Fig. 1;

Fig. 3 is a fragmentary vertical sectional view of a portion of a grid disposed within the tray and taken on line 3—3 of Fig. 2;

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 2 showing blocks of ice disposed within the tray and separated from one another by the grid;

Fig. 5 is a vertical sectional view of a portion of the grid taken on the line 5—5 of Fig. 2;

Fig. 6 is a bottom plan view of a portion of the grid illustrating the tapered walls thereof;

Fig. 7 is a view showing both ends of the grid being simultaneously removed from the tray and the frozen contents thereof;

Fig. 8 is a view similar to Fig. 7 but shows the grid being removed from the tray and its frozen contents by elevating one end only of the grid;

Fig. 9 is an illustrative view showing a portion of the grid being peeled away from the frozen contents of the tray;

Fig. 10 is a view similar to Fig. 9 illustrating a portion of the grid in a position after being loosened from the tray and its frozen contents and moved upwardly relatively thereto;

Fig. 11 shows the ice cubes positioned in the tray after removal of the grid therefrom; and

Fig. 12 is a view similar to Fig. 11 but shows the ice cubes moved into abutting relation toward one end of the tray.

My invention relates to a flexible grid capable of being stretched and peeled away from ice cubes or blocks formed by the grid in a tray and having a stiff but bendable upper portion which permits one end of the grid to be elevated to cause the grid to be progressively removed from the tray without tearing or damaging the grid.

Referring to the drawings, for the purpose of illustrating my invention, I have shown in Fig. 1 thereof a refrigerating apparatus of household type including a refrigerator cabinet 20. The cabinet 20 includes the usual insulated food storage compartment 21 in which is disposed a cooling element or evaporator 22 of a closed refrigerating system (not shown). The cooling element or evaporator 22 may be of any suitable or conventional structure and may include supports or shelves for supporting ice trays or receptacles 23 within a freezing compartment 25 formed by walls of the evaporator. The trays 23 are adapted to contain a substance to be congealed or frozen by the cooling effect produced by the evaporator during its removal of heat from the food storage compartment 21. Each tray 23 is provided with a handle position 24 for facilitating removal of the tray from the cooling unit 22 and this handle may be of any suitable or desired shape and construction. It is to be understood that the trays 23 in the present invention are constructed of metallic material of good heat conducting properties such, for example as plated copper, so as to permit rapid transfer of heat from the contents of the tray to the cooling unit or evaporator 22 in order to obtain fast freezing of the contents.

Referring to Fig. 2 of the drawings it will be apparent that I have provided means disposed within and dividing the interior of the tray 23 into a plurality of separated or individual open top molds 25. For this purpose I utilized a member which is constructed of a flexible material preferably of poor heat conducting properties, such, for example, as the molded rubber grid 26. The grid 26 comprises a vertically disposed partitioning member or web 27 extending longitudinally with the length of tray 23 and a plurality of vertically disposed partitioning members or webs 28 extending laterally from the web 27. Grid 26 is removably placed within tray 23 and this grid divides the interior of the tray into the open top molds 25. The partitioning members or webs 27 and 28 are preferably all tapered (see Figs. 4, 5 and 6) or in other words are of a gradually increasing thickness toward the top of the grid. A longitudinally extending head or bead 29, somewhat wider than the top or thickest portion of the webs 27 and 28, is formed or molded integral with the top portion of the longitudinal web 27. An elevated portion 31 is formed integral with the head or bead 29 at each end of grid 26. Each of the elevated portions 31 have an opening 32 provided therein for the reception of a hook or tongs to be hereinafter more fully described. It is to be understood that the partitioning members or webs 27 and 28 of grid 26 are all of a rubber composition which is rich in pure rubber content so as to be extremely flexible while the head position 29 is "loaded" or impregnated with inert substances, well known to those skilled in the rubber mixing and molding art, so as to be

somewhat stiff or rigid relative to the webs 27 and 28 while at the same time being capable of being bent. Instead of integrally molding a "loaded" portion to the flexible webs, to stiffen the top of the grid, and to prevent tearing of the grid during removal thereof from the tray, a bendable metal insert such as a chain or the like may be located in the bead or head 29 and associated with the opening 32 therein.

Having thus described the preferable construction of the tray and the grid adapted to be positioned in the tray, I will proceed with a description of the method of harvesting ice blocks frozen in the device. Assuming that the tray has been filled with water and positioned in the cooling unit 22 a sufficient length of time to freeze the water, due to the cooling effect produced by the evaporator, and it is desired to harvest or remove several or all of the cubes or blocks formed by the grid from the tray. The tray 23 is first removed from the evaporator or cooling unit 22 and thereafter any suitable instrument such as the tongs 35 (see Fig. 7) may be employed for removing the grid 26 from the tray 23 and from the blocks of ice 36 contained in the tray. Tongs 35 include a handle portion 37 and two arms 38 pivotally secured to the handle portion 37, in any suitable manner such, as at 39. A hook or finger 41 is pivotally secured as at 42 to each of the arms 38. The hooks or fingers 41 are inserted in the opening 32 provided in the elevated portion 31 formed on the longitudinal head 29 of grid 26. Movement of the tongs 35, after insertion of the hooks 41 into openings 32, upward relative to tray 23 causes both ends of the grid 26 to be elevated. The upward movement of the grid 26 relative to the tray causes the tapered partition members or webs 27 and 28 to peel away from the ice cubes or blocks 36. This peeling action of the webs 27 and 28 from the ice cubes 36 is caused by stretching the portion of the webs located above the top of the ice blocks upon bending and moving the head portion 29 of grid 26 upwardly by the tongs 35. Stretching of the flexible rubber webs upwardly above the top of the cubes 36 causes the width of the tapered webs adjacent cubes 36 to diminish (see Fig. 9) and this diminution of the width of the webs 27 and 28 occurs progressively toward the bottom thereof to virtually peel the webs from the ice blocks. This peeling action progresses to or near the bottom of the webs 27 and 28 at which point the webs are loosened from the ice cubes 36 and are freed therefrom throughout their entire height and the webs thereupon assume or return to their original tapered formation (see Fig. 10). Obviously this peeling action of the grid 26 from the ice blocks 36 progresses from each end of the tray 23 toward the center thereof by continued movement of the tongs 35 upwardly to remove the entire grid from the tray and its frozen contents (see Fig. 11).

It is to be understood that the bond between ice cubes or blocks 36 and the tray 23 is left unbroken by the foregoing described operation of removing the grid from the tray. It is therefore necessary to break the bond between the cubes 36 and the tray 23 in order to permit harvesting or removal of the cubes from the tray. Ice trays as herein disclosed and as are commonly employed in household refrigerators are, as a general rule, constructed of thin metal and are of sufficient length to permit same to be slightly flexed or twisted out of their original formation. Therefor, in order to break the ice bond between

the ice cubes 36 and the walls of tray 23, after the grid 26 has been removed, the operator grasps each end of the tray and twists the ends in opposite directions. This twist of one end of the tray relative to the other end, thereof causes the ice cubes 36 to be broken away from walls of the tray. Freeing of the ice cubes 36 from the walls of the tray 23 permits movement thereof within the tray and by elevating one end of the tray 23, as shown in Fig. 12, the cubes 36 are caused to slide or move into abutting relation with one another at the lower end of the tray thus providing a space at the elevated end of the tray to enable the cubes to be removed or harvested from the tray by hand or by serving tongs.

I have found, however, that to accomplish the objects of my invention it is not necessary to simultaneously elevate both ends of the grid relative to the tray. For example, a hook or tool 44 (see Fig. 8) may be inserted in the opening 32 provided in the raised portion 31 at one end of the grid 26 and movement of this tool 44 upwardly relative to the tray 23 will move the webs or partition members 27 and 28 progressively outwardly of the tray from one end thereof to the other to cause the grid to be peeled away from the ice cubes in the tray. After the method of removing grid 26 from trays 23 with the aid of tool 44, as described, has been carried out it is obvious that the ice blocks or cubes 36 may be loosened from walls of the tray in the manner previously described and thereafter harvested from the tray.

If desired a hook or hooks 45 may be mounted on a wall of the refrigerator cabinet 20 (see Fig. 1) and one or both of the openings 32 in grid 26 may be received by the hook or hooks 45. In removing the grid 26 from the tray 23 with the aid of hook or hooks 45, secured to the cabinet 20, it is to be understood that the tray 23 is pulled away from the cabinet and consequently the grid is virtually peeled out of the tray. It is obvious that the peeling action of the webs 27 and 28 away from the ice cubes 36 will occur irrespective of whether the tray is moved relative to the grid or whether the grid is moved relative to the tray.

My selection of a gradually tapered grid for illustrating the principle of the invention is in no way to be construed as a limitation to the appended claims. Other structures, may be adopted for accomplishing the objects of my invention because it is not absolutely essential that the webs or partitioning members of the grid need be of a gradually increasing thickness toward the top of the grid so long as the upper portion of the grid is of greater thickness and of sufficient rigidity or stiffness, relative to those portions of the grid which divide the interior of the tray into molds, to permit progressive stretching and peeling of the grid from the ice blocks. For example, a modified structure having the webs or partitioning members stepped, in cross section, or provided with a plurality of horizontally extending shoulders to provide a greater thickness at the top of the webs than at the bottom thereof may be employed to successfully carry out the principle of the invention.

From the foregoing it will be apparent that I have provided an improved freezing apparatus or device and method of harvesting ice blocks therefrom. My invention eliminates the application of artificial heat to the tray or to the grid disposed therein and consequently the temperature of the ice cubes or blocks are not materially

increased during harvesting thereof. By eliminating the application of artificial heat to the frozen contents of the tray the ice cubes or blocks will remain at a sub-freezing temperature or at substantially the same temperature of the evaporator or cooling unit. Therefore, if the ice cubes are immediately placed in thermal association with the substance to be cooled thereby, the specific heat required to bring the cubes up to 32° F., may be utilized for cooling the substance to be cooled by the cubes. The cubes are therefore rendered more efficient for cooling a substance since the cubes are not pre-warmed and since the substance to be cooled thereby must supply the specific heat as well as the latent heat to cause melting of the cubes.

My improved device permits several ice cubes to be removed or harvested from the tray without applying artificial heat thereto or to other cubes not removed from the tray. Thus the tray, containing the remaining cubes, which are at a sub-freezing temperature can be placed in or repositioned on the cooling unit and maintained at a sub-freezing temperature without again forming an ice bond with walls of the tray. Any or all of the remaining cubes in the tray can therefore be readily harvested without breaking an ice bond between them and the tray. Ice cubes left in a tray and permitted to increase in temperature to 32° F. will melt slightly and upon replacing the tray in the cooling unit these cubes will freeze and become bonded to the walls of the tray. However, if it is desired to harvest some of these cubes which become bonded to the tray, the tray may be removed from the cooling unit and twisted or flexed as previously explained to break the ice bond between the cubes and the tray in order to permit removal thereof from the tray without application of artificial heat thereto.

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. The combination with a tray for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating apparatus, of a removable grid including a single longitudinal web and a plurality of integral webs extending laterally from each side of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open top molds, said grid being formed entirely of a flexible material and the webs thereof being of a greater thickness at the top than at the bottom of the grid, and said grid being bendable upwardly of the tray from an end thereof away from substance congealed or frozen in said molds.

2. The combination with a metallic tray for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating apparatus, of a removable grid including a single longitudinal web and a plurality of integral webs extending laterally from each side of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open top molds, said grid being formed entirely of a flexible molded rubber material and the webs thereof being of a greater thickness at the top than at the bottom of the grid, and said grid being bendable upwardly of the tray from an end

thereof away from substance congealed or frozen in said molds.

3. The combination with a tray of good heat conducting properties for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating apparatus, of a removable grid including a single longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open top molds, said grid being formed entirely of flexible material having poor heat conducting properties and the webs thereof being of a greater thickness at the top than at the bottom of the grid, and said grid being bendable upwardly of the tray from an end thereof away from substance congealed or frozen in said molds.

4. The combination with a tray for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating apparatus, of a removable grid including a single longitudinal web and a plurality of integral webs extending laterally from each side of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open top molds, said grid being formed entirely of a flexible material and at least the plurality of laterally extending webs thereof being of gradually increasing thickness toward the top of said grid, and said grid being bendable upwardly of the tray from an end thereof away from substance congealed or frozen in said molds.

5. The combination with a metallic tray for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating apparatus, of a removable grid including a single longitudinal web and a plurality of integral webs extending laterally from each side of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open top molds, said grid being formed entirely of a flexible molded rubber material and the plurality of laterally extending webs thereof being of gradually increasing thickness toward the top of said grid, and said grid being bendable upwardly of the tray from an end thereof away from substance congealed or frozen in said molds.

6. The combination with a tray of good heat conducting properties for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating apparatus, of a removable grid including a single longitudinal web and a plurality of integral

webs extending laterally from each side of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open top molds, said grid being formed entirely of flexible material having poor heat conducting properties and the plurality of laterally extending webs thereof being of gradually increasing thickness toward the top of said grid, and said grid being bendable upwardly of the tray from an end thereof away from substance congealed or frozen in said molds.

7. The combination with a tray for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating system, of a removable grid including a longitudinal web and a plurality of integral webs extending laterally from the sides of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open-top molds, said grid being formed entirely of a flexible material and the webs thereof being of a greater thickness at the top than at the bottom of the grid, the free ends of the laterally extending webs terminating adjacent the inner surface of the walls of said tray whereby said grid forms three side walls and said tray forms the bottom and one side wall of the open-top compartments along the upright walls of said tray, and said grid being bendable upwardly of the tray from an end thereof away from substance congealed or frozen in said molds.

8. The combination with a metallic tray for containing a substance to be congealed or frozen and adapted to be placed in or on a cooling element of a refrigerating system, of a removable grid including a single longitudinal web and a plurality of integral webs extending laterally from the sides of said longitudinal web along the length thereof disposed within said tray and dividing the interior thereof into a plurality of open-top molds, said grid being formed entirely of a flexible molded rubber material and the plurality of laterally extending webs thereof being of gradually increasing thickness toward the top of said grid, said grid having a relatively stiff enlarged portion formed integrally with and at the top of said longitudinal web, means at the top of said grid adapted to receive an implement for bending the grid upwardly of the tray from an end thereof away from substance congealed or frozen in said molds, and said metallic tray being sufficiently resilient to permit twisting thereof to break the bond between the frozen substance and the tray walls.

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