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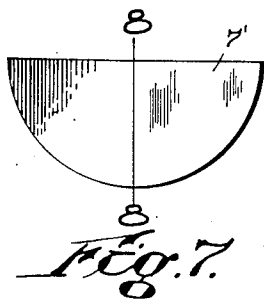
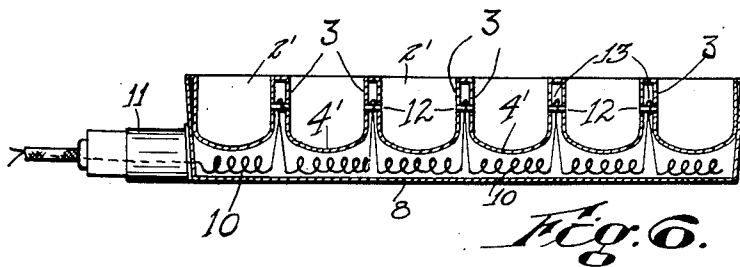
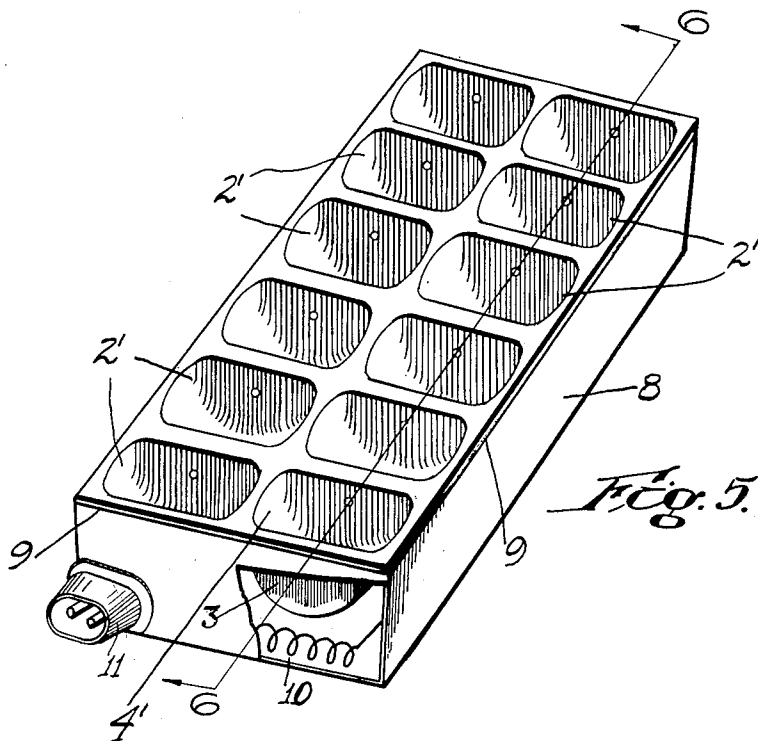
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ICE TRAY FOR MECHANICAL REFRIGERATORS

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ICE TRAY FOR MECHANICAL REFRIGERATORS

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The present invention relates to ice trays, as commonly used in domestic mechanical refrigerators for the production of a multiplicity of ice blocks, and has particular reference to a novel structure which greatly facilitates the removal of the individual ice blocks from the tray.

Practically all domestic mechanical refrigerators provide space in their cooling units for one or more multi-compartment ice containers, commonly called ice cube trays. The removal of the individual ice cubes from such trays as are now in ordinary use is inevitably a disagreeable task, involving not only an excessive wastage of running warm water for thawing purposes, but also, usually, an uncontrolled release of the cubes within the sink or basin over which the thawing operation is carried out,—this release exposing the cubes to possible contamination and also putting the user to the trouble of picking up the cubes and placing them in a dish or pan. These difficulties arise from the fact that the removal of the ice requires the ordinary tray to be inverted, so that its contents can fall out; only by such inversion can a solid of cubical or similar form be removed from a correspondingly shaped space or compartment which is open only at the top.

The present invention provides a tray construction which permits the ready removal or picking out of the individual blocks or pieces of ice, with the tray in its normal or non-inverted position. Other and further objects and advantages of the invention will be apparent from the following detailed description thereof, taken in connection with the accompanying drawings, in which—

Fig. 1 is a perspective view, partly cut away, of an ice tray embodying my invention.

Fig. 2 is a larger scale sectional view, on the plane of the line 2—2, Fig. 1, and showing the operation of removing one of the individual ice blocks.

Fig. 3 is a perspective view of one of said individual ice blocks.

Fig. 4 is a diagrammatic view illustrating the principle of the invention.

Fig. 5 is a perspective view, partly cut

away, illustrating the adaptability of my invention to the freeing of the ice blocks by electrical thawing means.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Fig. 7 is a view in side elevation of one of the ice blocks from the tray of Figs. 5 and 6.

Fig. 8 is a sectional view on the line 8—8 of Fig. 7.

Like reference characters refer to like parts in the different figures.

My improved tray may be of any suitable material, such, for example, as thin cast or pressed metal; it is characterized by its presentation of an ice cavity or cavities wherein the ice block, formed by the freezing of the water with which the cavity is filled, is turnable,—the turning movement effecting an elevation of a portion of the block above the top edge of the cavity, whereby the block may be grasped in one's fingers and removed from the cavity. That is to say, in the tray 1 of Figs. 1 and 2, each compartment or ice-space 2, open, of course, at the top, is defined by only three walls or surfaces; these are a pair of spaced substantially vertical side walls 3, 3, of an outline corresponding substantially to the lower half of a circle, and a single concave bottom wall 4, connecting the side walls 3, 3 and constituting a surface of revolution as generated by a substantially straight line on the same radius as the curved edges of the side walls 3, 3.

Instead of the true cylindric surfaces 4, 4, as shown in Fig. 1, for the bottoms of the ice cavities, the tray, according to my invention, may have ice cavities 2', as shown in Figs. 5 and 6, where the substantially vertical side walls 3, 3 merge by an easy curvature into the bottom surface 4',—the latter, of course, being of the same characteristic as the surface 4 of Fig. 1, namely a surface of revolution which is generated in this instance by a curved line of large radius, which at its ends merges by sharper curves into the planes of the side walls 3, 3.

The freezing compartments or ice-spaces 2 or 2' are preferably provided in a plurality of rows, running either lengthwise or

crosswise of the tray, as desired. Thus the total tray area at the top is divided, by the upper flat edges of the partitions or walls 3, 3 and by the meeting edges 5, 5 of adjacent curved bottom surfaces 4 or 4', into a plurality of substantially rectangular areas, each of which is the open top of one of the freezing compartments 2 or 2'.

In the use of such a tray, as shown in Fig. 1, the several compartments 2, 2 are filled, in the usual way, with water; if desired, provision may be made for the seepage of water between adjacent compartments, to equalize the water level, by means of shallow notches 6, 6 in the lower edges of the partitions 3, 3. When the tray, with its contents changed to ice, is removed from the cooling unit of the refrigerator, it is not necessary to invert the same, in order to remove the individual blocks of ice. Instead, the tray is kept right side up, for the selective and separate removal therefrom, in the manner illustrated by Fig. 2, of any individual ice block or blocks 7, 7,—this turning movement, to permit any of the blocks 7 to be seized in the fingers, being possible as soon as the slight thawing necessary to loosen the surface engagement of a block with the three walls of its space or cavity has ensued (for example, by placing the tray, or holding a portion thereof, right side up, in a shallow pan or dish of water, or by applying a wet rag to the under side of the tray). Or, even in the absence of thawing as above described, any adhesive tendency between the blocks 7, 7 and their respective cavities can be quickly and completely overcome simply by slightly warping or twisting the tray as it is held by its ends in the two hands of the user, this causing a slight momentary distortion of the thin walls of each cavity that is sufficient to loosen the adhesion to said walls of the non-yielding ice blocks. With the several blocks 7, 7 thus freed, either by thawing or by momentary slight distortion of the tray, it is only necessary to exert a light downward pressure with the finger against one end of a block 7 to cause its other end to tip up above the level of the tray 1, in position to be grasped and lifted out of the compartment 2,—the turning being analogous to that of a cylindrical shaft in its bearing. The same action, of course, is possible with the ice blocks 7', of the slightly different form shown in Figs. 7 and 8 that are formed in the ice cavities 2' of the tray of Figs. 5 and 6.

No more than the actual number of ice blocks 7 or 7' that are wanted, need to be removed from the tray 1 of my improved construction, a characteristic which distinguishes it radically from the ice trays heretofore in use, in one type of which, employing a grid or multiple-partition member, separable from the tray proper, the entire ice

mass, with such grid imbedded in it must be first dumped out of the tray, before the operation of thawing off the individual cubes can be proceeded with; and in another type of which, where the tray is divided into cubical spaces by integral partitions, there is invariably an uncontrolled spilling of the ice cubes from the inverted tray into the sink.

My invention, obviously, is not limited to a tray whose ice-spaces are of the exact semi-cylindric form shown in Fig. 2, where the greatest depth of the ice-space is the radius of the concave wall 4. Ice-spaces of lesser or greater depth may be provided, without departure from the underlying principle of my invention; for example, as shown diagrammatically in Fig. 4, the characteristic tipping or turning movement of the ice block, to permit of its being lifted out of the ice space, is obtainable, even though the depth of the ice-space be very measurably increased over that shown in Fig. 2.—As shown by Fig. 4, the limit of depth is reached when the chord $a-a$ (corresponding to the flat upper edge of side wall 3) is shortened to the extent that it no longer exceeds the length of its perpendicular bisector $b-b$ that passes through the center of curvature c . Thus the maximum ice-space depth which is permissible according to the invention is more than fifty per cent in excess of the radius of curvature of the concave bottom surface 4.

On the account of the ability to discharge ice blocks from my improved tray construction without inverting the tray, it lends itself more advantageously than the previously-known types of trays to the use of a thawing agent incorporated in the tray itself, as distinguished from the use of an extraneous thawing medium, such as running warm water. That is to say, a tray of the ordinary construction from which the ice blocks must be spilled out more or less indiscriminately into a receiving vessel, or the like, would derive no particular advantage from a thawing or freeing operation obtained without resort to extraneous thawing, since the same exposure of the ice blocks to contamination, and the same inevitable individual rehandling of the blocks, to replace those not used in the spaces of the tray, would still be required. On the contrary, a tray such as contemplated by my invention lends itself peculiarly, both in construction and in operation, to the advantages of thawing or freeing the ice blocks by self-contained means constituting a part of the tray, and adapted, for example, to the production of electrical heat. As shown in Figs. 5 and 6, such a tray, providing the ice cavities 2' of my invention, may be disposed within and in covering relation to a container 8 of the same rectangular form, but of slightly greater depth, the several ice cavities 2', 2' thus occupying the major portion of the space inclosed by the walls and bottom of the con-

tainer 8. By means of a sealed joint, as shown at 9, between the recessed member and the rim of container 8, the interior of the latter is made inaccessible to the entrance of water, and thus is adapted to contain a suitable arrangement of electric heating elements 10, 10 of the same general character as those found in electric flat-irons and like articles. Electric current for said elements 10, 10 to supply the necessary heat for loosening the ice blocks in the cavities 2', 2' may be supplied through a suitable connection plug 11 carried by the front wall of the container 8 and adapted to be connected, momentarily, in the usual way, to a convenience outlet or lighting socket, not shown.

In this last-described form of my invention, the substantially vertical side walls 3, 3 of adjacent ice cavities 2' may be spaced apart, as shown in Fig. 6, instead of being of the single-thickness construction shown in Fig. 1; under these conditions, to obtain seepage of water between adjacent cavities 2', 2' and equalization of the water level in a row of such cavities, tubular connecting members 12, 12 may be employed. With such a construction, the freeing of the ice blocks by the application of electric heat is promoted and hastened by the use of additional heating elements 13, 13, whose effect is concentrated on the relatively small ice content of each tubular member 12. Almost immediately, upon the flow of current through the heating elements 13, 13, the contents of each tubular member 12 is liquefied, expanded, and warmed, and because of its free access to the ice blocks in the adjacent cavities 2', 2', its effect is to very promptly and effectively destroy the adhesion of the ice surfaces to the three walls of each such cavity.

I claim:

1. As a new article of manufacture, an ice tray or receptacle for use in mechanical refrigerators, and formed with an ice space or cavity having substantially vertical sides, connected by a concave bottom in the form of a surface of revolution of sufficient angular extent to permit turning or rocking movement of the ice block formed in said space or cavity.

2. A receptacle or tray for the freezing of ice blocks in mechanical refrigerators, and having a freezing cavity which presents a surface of revolution to an ice block formed by freezing, when said cavity is filled with water, said surface of revolution being of sufficient angular extent to permit said block, by pressure applied to its exposed surface along one edge, to be turned, to project a portion thereof above the opposite edge of said cavity.

3. In a tray or receptacle for the freezing of ice blocks in mechanical refrigerators, a freezing cavity having an extension of relatively small ice capacity, and means for con-

centrating on said extension the heat employed to free the ice block contained in said cavity.

4. In a tray or receptacle for the freezing of ice blocks in mechanical refrigerators, a pair of freezing cavities joined by a passage of relatively small ice capacity, and means for concentrating on said passage the heat employed to free the ice blocks contained in said cavities.

5. As a new article of manufacture, an ice tray for mechanical refrigerators, providing a row of independent cavities separated from each other, when the tray is filled with water, by substantially vertical walls, the other walls of said cavities occupying a common surface of revolution of sufficient angular extent to permit independent turning or rocking movement of each of the ice blocks in its cavity.

6. As a new article of manufacture, an ice tray for mechanical refrigerators, the top area of said tray having, coterminous with its side edges, the edges of a plurality of substantially vertical partitions, and the bottom of said tray being constituted by revolution surfaces generated on axes substantially at right angles to the planes of said partitions.

7. As a new article of manufacture, an ice tray providing a plurality of independent cavities, each having substantially vertical walls that rise to the same height as the walls of said tray, the latter having a concave bottom in the form of a surface of revolution of sufficient angular extent to permit turning or rocking movement of the ice block formed in each cavity, in combination with means incorporated in said tray for freeing said blocks for such movements by electric heat.

8. As a new article of manufacture, an ice tray providing a plurality of independent cavities, each cavity having a pair of opposite substantially vertical walls that rise to the same height as the walls of said tray, the latter having a concave bottom in the form of a surface of revolution of sufficient angular extent to permit independent turning or rocking movement of each ice block in its cavity.

9. An ice receptacle or tray for use with mechanical refrigerators, providing a plurality of independent cavities which segregate the blocks of ice formed by freezing, when said tray is substantially filled with water, each cavity being open at the top in opposition to a confining surface in the form of a surface of revolution of sufficient angular extent to permit turning or rocking movement of the ice block formed in said cavity, whereby said block, by pressure applied at one edge, may have its opposite edge moved upwardly, for seizure and removal from the cavity.

10. An ice tray for use with mechanical refrigerators, providing a plurality of independent cavities which segregate the blocks of ice formed by freezing, when said tray is

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substantially filled with water, each of which cavities presents to its contained ice block a surface of revolution having an angular extent of more than 90° , whereby said block is turnable, by pressure against one edge, to project a portion thereof above the opposite edge of said cavity.

11. A receptacle or tray for the freezing of ice blocks in mechanical refrigerators, and having a plurality of independent cavities securing segregation of their contents when said tray is substantially filled with water, each of said cavities being open at the top and presenting opposite substantially parallel limiting top edges, the contained ice block being therein turnable by downward pressure thereon adjacent one of the limiting edges of said cavity to permit removal of said block from the cavity without inverting the tray.

12. A receptacle or tray for the freezing of ice blocks in mechanical refrigerators, and having a plurality of independent cavities securing segregation of their contents when said tray is substantially filled with water, each ice block being turnable in its cavity by downward pressure thereon adjacent one of the limiting edges of said cavity, to permit removal of said block from the cavity without inverting the tray, and means for freeing said block for such turning by electric heat.

13. As a new article of manufacture, an ice tray for mechanical refrigerators, said tray having a plurality of independent cavities securing segregation of their contents when said tray is substantially filled with water, each of said cavities having an interior concave bottom surface of substantially cylindric form, and of sufficient angular extent to permit turning or rocking movement thereon of the ice block formed in said cavity.

14. As a new article of manufacture, an ice tray for mechanical refrigerators, said tray having a plurality of independent cavities securing segregation of their contents when said tray is substantially filled with water, each of said cavities having an interior concave bottom surface of substantially semi-cylindric form, whereby an ice block formed in said cavity may be rocked or turned by pressure applied thereto adjacent one upper edge of said concave bottom surface.

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