March 3, 1964 W. G. KNIFFIN 3,122,898

ICE TRAY

Filed Aug. 20, 1962 2 Sheets-Sheet 1

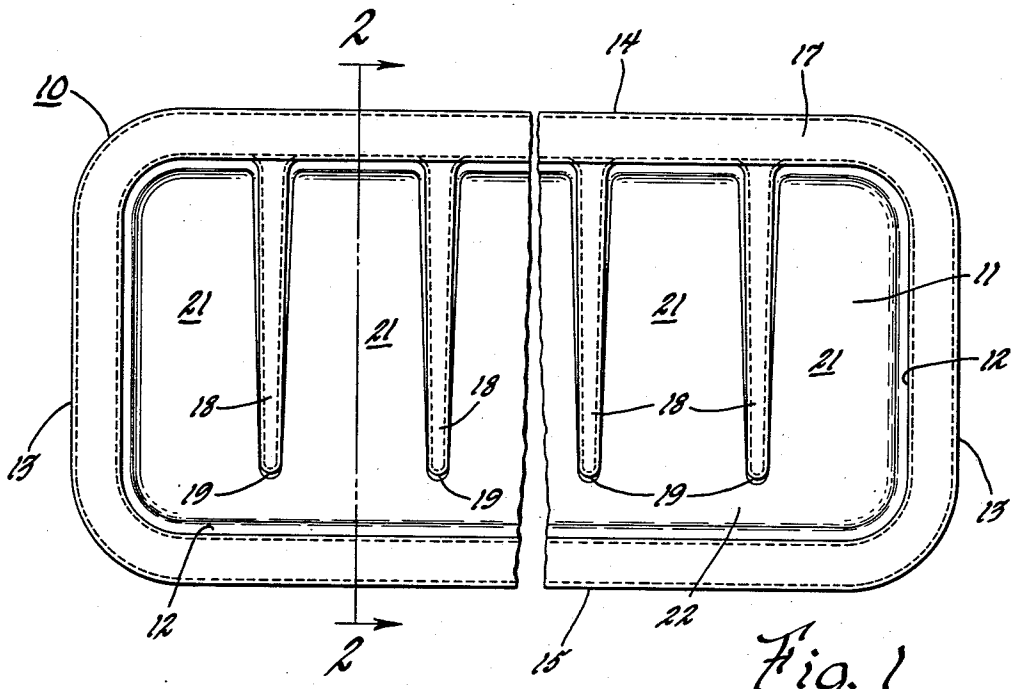


Fig. 1

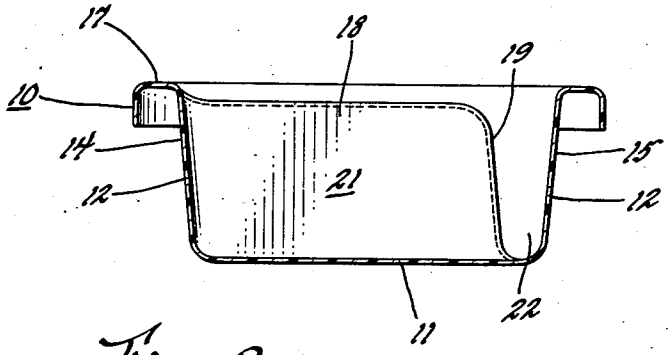


Fig. 2

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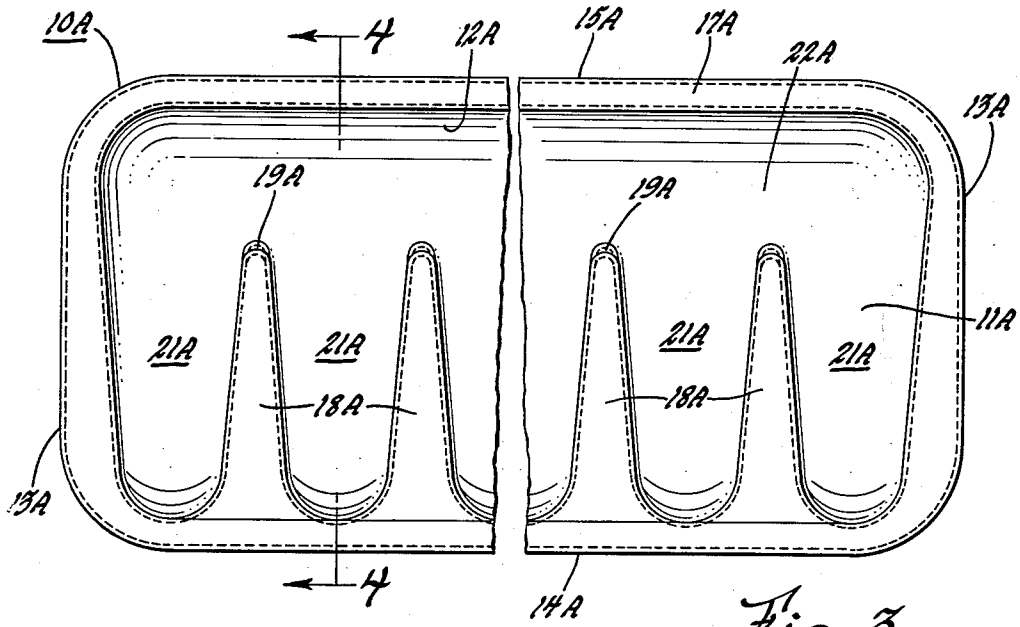


Fig. 3

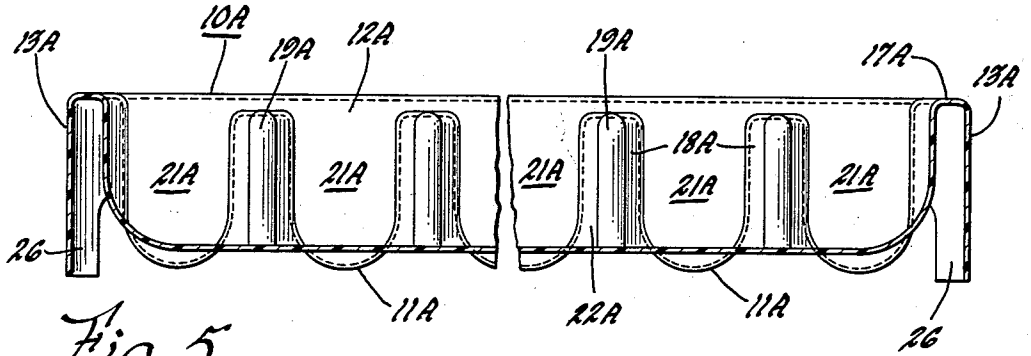


Fig. 5

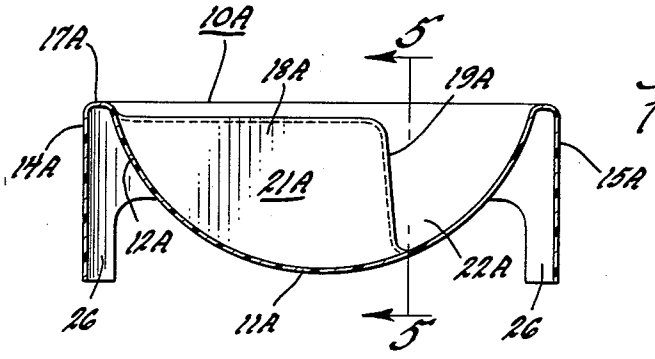


Fig. 4

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ICE TRAY

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This invention relates to refrigeration and particularly to freezing devices employed in household refrigerators and ice making machines or the like.

It is well known that freezing devices employed in household refrigerator cabinets and many ice making machines for the production and harvesting of ice blocks therefrom of the type including a tray and walls dividing the interior of the tray into ice block pockets, cells or compartments are difficult to fill with water from a single water discharge outlet without overflowing the top of the tray at the point of filling same. Devices of this character furnished with present-day refrigerators and those contained in some ice making machines have walls dividing the interior of a tray or mold into ice block forming pockets or compartments and these walls obstruct or retard water being flowed into the tray and the water is not quickly and uniformly dispersed throughout the length and width of the tray relative to the rapidity in which water is supplied or discharged thereinto at the filling point thereof. Removable freezing devices furnished with household refrigerators are usually held beneath a faucet, connected to a source of water supply under pressure, when filling them with water and rapid discharge of water into the tray causes the water to overflow its rim thus wetting exterior surfaces of the tray and hands of a person filling same. This presents a problem which is not only objectionable to the user of a freezing device but also from the standpoint of placing a wetted tray back into the freezing chamber of a refrigerator. In ice making machines this problem has attempted to have been solved by cascading incoming water to a tray thereof over weirs or the like provided in walls of the tray which partition same into ice block forming pockets or compartments. However, in such machines the rapidity in which a single stream of water enters a filling point of the tray, due to malfunctioning of a water valve or to variations in water pressure at the source of supply thereof, occasionally causes water to overflow the top of the tray particularly at its fill point before the incoming water can be cascaded from one to the other of the pockets or compartments throughout the length and width of the tray. This problem becomes a serious one in ice block making apparatuses incorporated in a frozen food storage chamber of a household refrigerator cabinet because the overflow water runs onto and between packages of frozen foods and immediately freezes thereon or therebetween thus rendering the packages difficult to be separated from each other when they are to be removed from the chamber. I contemplate a solution to the problem described whereby the objections to use of ice trays in conjunction with household refrigerators and difficulties in trays or molds of an ice block making apparatus will be eliminated.

An object of my invention is to provide an improved freezing device of the pocketed or compartmented tray type.

Another object of my invention is to provide an elongated pocketed ice tray freezing device with a channel or canal which is in substantially unrestricted communication with all pockets of the tray to simultaneously distribute an equal amount of water as it is being discharged into the tray to each pocket thereof for quickly and uniformly dispersing the water throughout the entire length and width of the tray from the filling point thereof to prevent overflow of its top rim thereat.

A further object of my invention is to provide a novel method of harvesting ice blocks in separated form from a tray type freezing device in which water is frozen into a solid body of ice integrated throughout pockets and a channel communicating therewith in the tray thereof.

A still further and more specific object of my invention is to provide means in a pocketed or compartmented ice tray which will distribute a predetermined amount of water incoming to the tray in a single stream thereof at a uniform level throughout all areas within the tray as distinguished from cascading water over barriers or dams from one pocket or compartment to another of the tray and flowing the water through restricted passages in walls of the tray to thereby attain a rapid dispersion of the water relative to the rapidity in which water is discharged into the tray whereby to prevent the water from overflowing the tray particularly at the point of filling same.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a broken top plan view of an ice tray freezing device having my invention incorporated therein;

FIGURE 2 is a sectional view taken on the line 2—2 of FIGURE 1 showing partitioning walls dividing the interior of the ice tray into pockets or compartments;

FIGURE 3 is a broken top plan view of a modified form of ice tray freezing device with my invention embodied therein;

FIGURE 4 is a transverse sectional view taken on the line 4—4 of FIGURE 3 showing partitioning walls which divide the interior of the ice tray into pockets or compartments; and

FIGURE 5 is a broken sectional view taken on the line 5—5 of FIGURE 4 through a channel provided in the pocketed tray.

Referring to the drawings, for illustrating my invention, I show in FIGURE 1 thereof a freezing device of the pocketed or compartmented type which comprises an elongated tray 10 provided with a bottom wall portion 11, upstanding outwardly inclined bounding walls 12 forming ends 13 and opposed long sides 14 and 15 of the tray having their upper extremity terminated in a top rim 17 extending around or about the four sides thereof. Tray 10 also comprises upstanding webs or partitioning walls 18 extending laterally from the one long side 14 only thereof with their inner ends terminated as at 19 short of or in spaced relationship to the opposite long side 15 of the tray. The spaced-apart partitioning walls 18 project transversely across the longitudinal center of tray 10 and divide the interior thereof into a row of ice forming pockets or compartments 21 and the spacing of terminus ends 19 of these walls form a channel or canal 22 between their ends and the opposite long side 15 of the tray which channel communicates with all of the pockets 21 in substantially an unrestricted fashion. Webs or upstanding walls 18 are wholly disposed below the plane of the tray top rim 17 and their sides are preferably tapered toward one another in a direction from the bottom to the top and from the juncture thereof with wall 14 to their ends 19. Pockets or compartments 21 are elongated transversely of the long relatively narrow tray 10 and the channel or canal 22 extends at a right angle with respect to the pockets along the opposite tray side 15. Insofar as my invention is concerned tray 10 may be stamped from thin sheet metal or it may be molded of nonmetallic plastic material. If

tray 10 is constructed of metal inner walls thereof, contacted by water placed therein, are preferably provided with reoccurring macroscopic depressions imparting a roughened or patterned surface thereto which is coated with a coextensive layer or film of nonmetallic water repellent material, as disclosed in the R. E. Davis Patent No. 3,033,008 dated May 8, 1962, so as to reduce adherence of ice to the tray and reduce force required for effecting twisting of the tray and freeing of ice blocks therefrom. Tray 10 may be molded as a one-piece element from any suitable nonmetallic plastic water repellent material, such, for example, as high density polyethylene whereby all walls 11, 12 and 18 thereof are flexible. Irrespective of the material from which tray 10 is constructed its unique structure or design renders same resilient and sufficiently flexible, particularly when water contained therein is frozen into a solid body of ice integrated or continuous throughout pockets or compartments 21 and channel 22, as to be twisted longitudinally from end to end thereof for harvesting ice blocks therefrom in a manner to be hereinafter described.

In the modified illustration of my improved freezing device as shown in FIGURES 3 to 5 of the drawings bottom wall portions 11A of the pockets or compartments 21A and a wall of channel or canal 22A, opposite long side 15A, or tray 10A are continuously rounded intermediate bordering rim 17A or are curvilinear throughout their length. This bottom wall curvature 11A may be formed by a single radius or it may be formed of different radii as shown and fully described in my copending application Serial No. 136,459 filed September 7, 1961, now Patent No. 3,075,364, entitled "Freezing Device" and assigned to the assignee of the present application. The modified pocketed or compartmented tray 10A is provided at each of its four corners with legs 26 formed integrally therewith and depending from rim 17A for supporting the tray on a flat support within a freezing chamber of a refrigerator cabinet. Tray 10A like tray 10 is preferably, although not necessarily, formed of molded plastic material as is common and well known to those skilled in the molding art. Walls 18A are integrally formed with the upstanding bounding walls 12A on the one long side 14A of tray 10A and bottom wall portions 11A, at the pockets 21A are spaced apart by the hollow webs 18A while the upstanding bounding wall 12A is continuous and unobstructed throughout the length of channel 22A (see FIGURE 5). It is to be noted that in each form of the tray type freezing devices herein disclosed webs or upstanding walls 18 or 18A extend laterally from upstanding bounding walls 12 or 12A and project laterally from the one long side 14 or 14A of tray 10 or 10A transversely across the longitudinal center of the elongated tray and are united with bottom wall portions 11 or 11A beyond the central part thereof. Channels 22A depend substantially to the lowermost part of bottom wall portions 11 or 11A or trays 10 and 10A and therefore establish a free passage from one end 13 or 13A to the other end of the trays. In the presently disclosed freezing devices or trays a bottom wall portion 11 or 11A and three adjacent upstanding walls 12 or 12A and 18 or 18A of each pocket 21 or 21A are contiguous or closed with the open end of the pocket facing the opposite long side 15 or 15A of the trays and opening into the channel 22 or 22A adjacent this long side thereof. The ends 19 or 19A of walls 18 or 18A serve to substantially score ice when frozen in a tray 10 or 10A across the channel 22 or 22A at a plurality of spaced-apart points throughout the length of a channel.

Having described the structure of freezing devices incorporating my invention therein the feature of construction thereof will now be explained. When a tray 10 or 10A is a freezing device or mold part of an automatically operated ice block making machine, the legs 26 will of course be omitted from tray 10A since they have no utility in the machine, and containing a frozen body of ice integrated throughout its pockets and channel the tray may be twisted from end to end thereof and rotated into substantially an inverted position to carry out an ice block harvesting operation. The twisting of either tray 10 or 10A fractures the integrated solid body of ice along spaced-apart lines across channels 22 or 22A between terminus parts, ends 19 or 19A, of laterally extending webs or walls 18 or 18A and the long side 15 or 15A of the tray opposite the side 14 or 14A into a plurality of separated ice blocks. The fracturing of the body of ice simultaneously breaks it free of the tray and loosens the separated ice blocks from walls thereof whereby they are removed from the device when the twisting force applied to the tray is released and while the tray is still in a partially inverted position. The automatic operation of the ice machine returns the tray to an upright position and initiates discharge of refill water, from a source of supply thereof, thereinto at a single point, preferably channel 22 or 22A, for refilling the tray. Channel 22 or 22A distributes along the length thereof an equal amount of water, incoming to the tray in a single stream thereof during filling of same simultaneously in unrestricted fashion into each pocket 21 or 21A and thereby quickly disperses the water at a uniform level throughout all of the pockets. This dispersing of water throughout areas of the tray is accomplished without cascading the water over dams or through restricted passages and weirs intermediate the pockets 21 or 21A and at such speed relative to a rate or rapidity in which water is discharged into the tray as to prevent overflow of the top rim 17 or 17A of the tray at its fill point. The feature of the substantially unobstructed distributing channel 22 or 22A incorporated in tray 10 or 10A when same is employed in automatically operated ice block making machines, wherein malfunctioning of the water inlet valve thereof may at times admit too much refill water or water at too fast a speed, prevents overflow of the tray and consequently eliminates presence of ice on packages of frozen foods stored in the frozen food storage or freezing chamber of a refrigerator cabinet which houses the freezing device tray portion of the ice machine.

When a tray 10 or 10A is used as a manually removable freezing device in a freezing chamber of a household refrigerator cabinet and is substantially filled with water by holding it beneath a faucet connected to a source of water supply under pressure, as has been common practice for many years, the feature of the distributing channel 22 or 22A in the tray should become apparent. For example, the channel 22 or 22A upon receiving water from the faucet will, during filling of a tray, immediately and simultaneously distribute an equal amount of the water incoming to the tray in substantially unrestricted fashion into each pocket 21 or 21A of the row of pockets thereof in a uniform level throughout the entire length of the elongated tray. With this rapid and uniform distribution of water flowing into a tray 10 or 10A, particularly without necessity of cascading water over obstructions such as dams or grid walls in the tray, a person filling the tray soon becomes familiar with the position at which the faucet should be set to control the rate of flow or discharge of water therefrom into the tray for preventing the water from overflowing its rim 17 or 17A. A tray 10 or 10A constructed in accordance with my invention and receiving water in the usual manner from a faucet at a kitchen sink or the like can, after a few practice fillings thereof, be filled to a desired level without overflowing water therefrom, without wetting the user's fingers or hands and the tray may be readily carried or transported to the refrigerator cabinet and placed in the freezing chamber thereof without its outer surfaces being wetted. After water contained in a tray 10 or 10A has been frozen

into a solid continuous body of ice integrated throughout pockets and the channel thereof, 21 or 21A and 22 or 22A respectively, construction of the tray is such as to permit harvesting of individual separated ice blocks therefrom. Regardless of the material from which a tray 10 or 10A is formed or fabricated it will, due to its elongation, be inherently resilient at least from end to end thereof and capable of being longitudinally twisted whereby manual ejection of ice blocks thereof is entirely feasible and may be carried as will now be described. A tray 10 or 10A with a solid continuous body of ice frozen therein throughout its pockets and channel is removed from the freezing chamber of a refrigerator cabinet and is twisted in one direction from end 13 or 13A to its other end and preferably twisted in two different directions from end to end thereof. This twisting of a tray fractures the continuous or integrated body of ice therein along spaced-apart lines across the channel 22 or 22A, between the free ends or terminus parts 19 and 19A of upstanding laterally extending walls 18 or 18A and opposite side 15 or 15A thereof, into a plurality of separated ice pieces or blocks and substantially simultaneously therewith breaks the blocks loose from walls of the tray. The separated ice blocks may be removed from a tray 10 or 10A after releasing the twisting force applied thereto by rotating the tray into a substantially inverted position whereby all of the ice blocks will freely fall out of the freezing device or tray. Curvilinear wall portions 11A and 12A of tray 10A provide this tray with the additional feature that all separated and loosened ice blocks need not be simultaneously removed therefrom. For example, less than all, a single or a few, ice blocks can be removed as desired from tray 10A by pushing downwardly on the top surface of a selected ice block at the side or end thereof adjacent side 14A of the tray and rotating the block upwardly out of a pocket 21A at the tray opposite side 15A.

From the foregoing it should be apparent that an improvement is hereby made in the freezing device or mold art and by my innovation I not only solve a perplexing problem existing in some types of ice making machines but also overcome objections in the manual handling of tray and grid type freezing devices of conventional construction. My improvement is applicable to the art in general and may be incorporated in freezing devices to replace those now widely used in conjunction with household refrigerator cabinets while at the same time retaining a practical method of harvesting separated ice blocks therefrom. The ice trays herein disclosed are of a simplified construction, are of low manufacturing costs and their construction lends them to a method of fracturing a continuous body of ice in a tray into a plurality of separated ice blocks to be harvested from the tray. My invention eliminates the necessity of cascading water from a single stream thereof incoming to a tray throughout the length and width thereof and insures a uniform level of water in all pockets or compartments of trays to be frozen therein.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adapted.

What is claimed is as follows:

1. A freezing device adapted to receive water to be frozen therein comprising:

(*a*) an elongated tray having ends, long sides, corners and provided with an upper bounding rim having straight parts extending contiguously around corners of said tray substantially at right angles to one another along the ends and long sides thereof, bottom wall portions, walls upstanding from said bottom wall portions to said rim and upright walls spaced apart throughout the length of the tray,

(*b*) said spaced-apart upright walls projecting laterally from one long side only of said tray beyond its longitudinal center and terminated in spaced relation to the opposite long side of the tray,

(*c*) the top of said spaced-apart upright walls of said tray disposed below said upper bounding rim,

(*d*) said bottom wall portions, said upstanding walls, said spaced-apart upright walls and said rim being formed integral with one another,

(*e*) said upright laterally projecting walls and bottom wall portions therebetween together with a side and the upstanding walls of said tray defining a row of pockets therein along said one long side thereof, and

(*f*) other bottom wall portions and the upstanding wall at said opposite side of the tray defining a long relatively narrow channel within said tray offset laterally from the longitudinal center thereof and communicating with each of said pockets.

2. A freezing device adapted to receive water to be frozen therein comprising:

(*a*) an elongated distortable tray having all portions thereof formed integral from resilient material,

(*b*) said tray having ends, long sides, corners and being provided with an upper bounding rim having straight parts extending substantially at right angles to one another along the ends and long sides of the tray, bottom wall portions, walls upstanding from said bottom wall portions to said rim and upright walls spaced apart throughout the length of said elongated tray,

(*c*) said spaced-apart upright walls projecting laterally from one long side only of said tray beyond its longitudinal center and terminated in spaced relation to the opposite long side of the tray,

(*d*) said upright laterally projecting walls and bottom wall portions therebetween together with a side and the upstanding walls of said tray defining a row of pockets therein adjacent said one long side thereof,

(*e*) other bottom wall portions and the upstanding wall at said opposite side of the tray defining a long relatively narrow channel within said tray offset laterally from the longitudinal center thereof and communicating with each of said pockets,

(*f*) said laterally projecting upright walls of the tray being hollow to increase the resilience of said tray along its length after water is frozen therein,

(*g*) said elongated tray being adapted to be twisted from end to end thereof subsequent to freezing its water content into a solid body of ice integrated throughout said pockets and said channel,

(*h*) twisting of said tray moving the laterally projecting pocket defining walls thereof relative to one another to fracture the ice body along lines across said channel between the terminus of said upright laterally projecting walls and said opposite long side of the tray into a plurality of separated ice blocks and to simultaneously loosen the plurality of ice blocks from all walls of said tray and

(*i*) the separated loosened ice blocks being removable from said tray upon releasing the twisting force applied thereto and rotating the tray into substantially an inverted position.

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