Nov. 28, 1939. R. R. FITZSIMMONS 2,181,580

ICE TRAY

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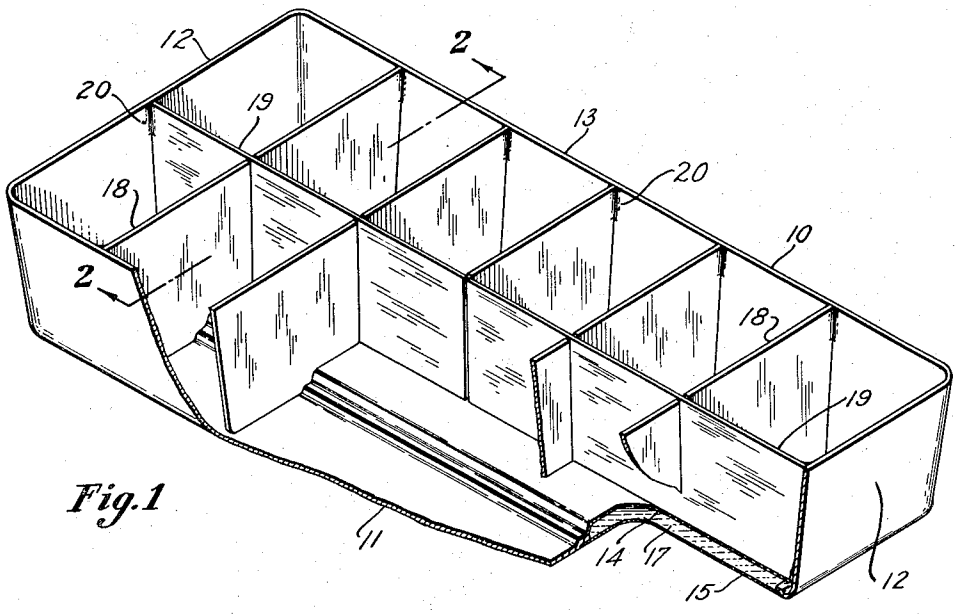


Fig. 1

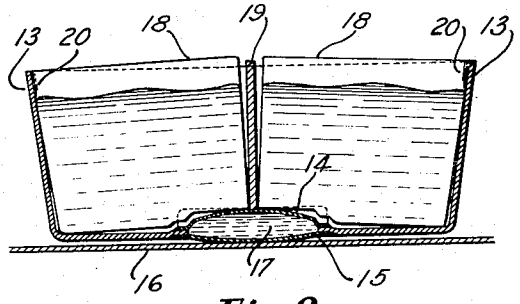


Fig. 2

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ICE TRAY

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8 Claims. (Cl. 62—108.5)

This invention relates to refrigeration and more particularly to an ice freezing tray adapted to be positioned on the evaporator shelf of a domestic refrigerator.

It has been the custom to release ice cubes from the tray of a domestic refrigerator by running hot water over the bottom of the tray to first remove the grid assembly and attached cubes from the tray and then running additional hot water over the grid assembly to remove the individual cubes from the grid assembly.

This method has the disadvantage that the cubes are reduced in size by melting them loose from the grid assembly and tray and the surface of the cubes are wet and slippery and therefore hard to handle. The melting ice also drips water over the place where the cubes are being removed which necessitates wiping up after each removal of the cubes.

It has also been proposed to remove cubes from the freezing tray of the domestic refrigerator by mechanical leverage mechanism, but such devices have not been entirely satisfactory because of the excessive force needed to be applied in releasing the grid assembly and attached cubes from the tray and the later removal of the cubes from the grid assembly.

These mechanical devices are also complicated in operation, difficult and expensive to manufacture and wear out easily so as to necessitate their frequent replacement.

In all the prior methods of releasing cubes from the freezing tray of the domestic refrigerator it is necessary to first release the grid assembly and attached cubes from the tray and to later remove the individual cubes from the grid assembly. This necessitates the double handling of the cold tray and cubes.

When a freezing tray is filled with water and placed on the evaporator shelf of the refrigerator and the water frozen, the tray is also frozen to the evaporator shelf. In prior methods it was necessary to provide some mechanical means for releasing the tray from the evaporator shelf or remove it by hand. The provision of mechanical means to remove the tray from the evaporator shelf added to the cost and complexity of the device and the removal by hand requires the application of considerable force. In some instances it is impossible to remove the tray from the evaporator shelf without the aid of some leverage device.

It is necessary in prior devices to remove the tray from the evaporator shelf in order to see whether or not the cubes have been frozen. This breaks the bond between the tray and the evaporator shelf resulting in a less efficient heat transfer between the water in the tray and the evaporator shelf.

It is accordingly an object of this invention to provide an ice tray for a domestic refrigerator which eliminates the disadvantages of prior constructions.

It is another object of this invention to provide an ice tray for a domestic refrigerator in which it is unnecessary to first remove the grid assembly and attached cubes from the tray and then to later remove the individual cubes from the grid assembly.

It is another object of this invention to provide an ice tray for a domestic refrigerator in which means are permanently associated with the tray for releasing the tray from the evaporator shelf and also the individual cubes from the tray without the necessity of removing a grid assembly from the tray and to accomplish this result automatically after the ice has become frozen.

It is another object of this invention to provide an ice tray for domestic refrigerators in which it is unnecessary to remove the tray from the evaporator shelf in order to determine whether or not the ice has become frozen.

It is another object of this invention to provide an ice tray for domestic refrigerators in which it is unnecessary to apply manual force in removing the tray from the evaporator shelf or the individual cubes from the tray.

More paraticularly it is an object of this invention to provide an ice tray for domestic refrigerators in which a flexible partition provides a space in the bottom of the tray, in which the bottom of the tray beneath this space is also made of flexible material and in which this space is filled with a liquid which freezes after the water has frozen, to first release the tray from the evaporator shelf and thereafter the individual cubes from the tray.

It is another object of this invention to provide an ice cube tray for a domestic refrigerator which is automatic in operation, needing no attention by the user, which is easy and economical to manufacture and which does not get out of order.

Other objects and advantages of the invention will become apparent as the description proceeds when taken in connection with the accompanying drawing in which:

Figure 1 is a perspective view of the invention

partly broken away to show the interior of the tray.

Figure 2 is a cross-sectional view on line 2—2 of Figure 1 showing the tray being released from an evaporator shelf and the cubes being released from the tray.

Referring to the drawing the numeral 10 generally indicates an ice cube tray adapted to be positioned on an evaporator shelf 16 of a domestic refrigerator. The tray is made of thin flexible metal and has a bottom 11, and walls 12 and side walls 13. A thin metallic partition member 14 is welded or otherwise secured to the bottom 11 of the tray to hermetically seal off a space 17 in the central portion of the tray and extends the full length thereof. The bottom of the tray beneath the hermetically sealed space comprises a thin section 15 welded to the side portions of the bottom 11. The hermetically sealed space 17 is filled with a low freezing point liquid such as brine, which freezes at a temperature slightly below that of water. The interior of the tray is divided into a plurality of cube departments by lateral grid members 18 and two longitudinal grid members 19, it being noted in Figure 1 that the longitudinal grid member is separated at its central portion so as to divide it into two sections. The lateral grid members 18 and the longitudinal grid members 19 are welded to the inner walls of the tray, only at the upper edge thereof as shown at 20. The lateral grid members 18 are spaced slightly from the longitudinal grid members 19 as shown in Figure 2 and the side wall of the partition 14 is tapered downwardly to provide for movement of the lateral grid members 18.

In operation the tray is filled with water and placed on the evaporator shelf of a domestic refrigerator and the water allowed to freeze. While the water is freezing the tray may freeze to the evaporator shelf. After the water has frozen the brine solution in the space 17 will freeze and bulge the portion 15 of the bottom 11 downwardly so as to force the tray 10 away from the evaporator shelf 16 and then bulge the partition 14 upwardly to force the frozen cubes upwardly as shown in Figure 2. The tray being made of thin flexible metal will permit its side and end walls to flex slightly and allow the grid members 18 and 19 to move upwardly also.

When the partition member is bulged upwardly the ice cubes will be torn loose from the bottom and walls of the tray and since the cubes are dry at this time they will not freeze fast again even though the tray is not immediately removed from the evaporator shelf. The cubes being released from the compartment walls they can easily be removed from the tray by turning it upside down and tapping it on a solid surface.

It sometimes happens that ice cubes are desired before they have become frozen. In previous constructions it has been necessary for the user to remove the tray from the evaporator shelf merely to see if the ice is frozen. This, of course, breaks the bond between the tray and the evaporator shelf resulting in a less efficient heat transfer between the freezing water and the evaporator shelf. The present invention eliminates this necessity since if the tray is not already loosened from the evaporator shelf the user will know that the ice is not yet frozen.

By selecting the proper thickness for the portion 15 of the bottom 11 with relation to the thickness and flexibility of the partition 14 the tray will be released before the cubes are released. The portion 15 of the bottom 11 and the partition 14 are made so that they will return to their initial position when the brine in the space 17 is melted. By selecting a brine solution of the proper freezing temperature the cubes can be released slightly before the water has become frozen, but after it has been frozen to the compartment walls.

The tray need not be made of metal as described but could obviously be made of rubber, in which case the grid assembly and the partition could be molded integrally with the tray.

From the foregoing it can be seen that this invention provides an ice tray for a domestic refrigerator in which means is provided for automatically releasing the tray from the evaporator shelf and also the cubes from the tray which is permanently associated with the tray, in which it is unnecessary to remove the tray from the evaporator shelf to see if the ice has been frozen and which is easy and economical to manufacture.

While I have shown but a single embodiment of my invention, it is understood that this embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the exact structure shown and described but to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. An ice tray adapted to be positioned on the evaporator shelf of a domestic refrigerator in combination with temperature responsive automatic means for simultaneously releasing the tray from the shelf and ice from the tray.

2. An ice tray adapted to be positioned on the evaporator shelf of a domestic refrigerator in combination with means positioned in the bottom of the tray for raising the tray from the shelf and ice in the tray.

3. An elongated ice tray adapted to be positioned on the evaporator shelf of a domestic refrigerator, said tray having an enclosed space extending the length thereof and a freezable fluid in said space, the bottom wall of said space comprising a thin flexible member whereby the freezing of the fluid will raise the tray from the evaporator shelf.

4. An elongated ice tray adapted to be positioned on the evaporator shelf of a domestic refrigerator, said tray having a closed space extending the length thereof and a freezable fluid in said space, the bottom and top walls of said space being made of thin flexible material whereby the freezing of the fluid will raise the tray from the evaporator shelf and ice cubes from the tray.

5. An ice tray adapted to be positioned on the evaporator shelf of a domestic refrigerator, said tray having a hermetically closed space in its bottom with flexible top and bottom walls and an expansible fluid in said closed space.

6. An ice tray adapted to be positioned on the evaporator shelf of a domestic refrigerator, said tray having a hermetically closed space in its bottom with flexible top and bottom walls and a grid assembly secured in said tray, said grid assembly being constructed to yield upwardly with the top wall of said closed space, and an expansible fluid in said closed space.

7. An elongated ice tray having a flat bottom for good thermal contact with the evaporator shelf of a domestic refrigerator, a hermetically closed recess formed in the bottom of said tray, said recess extending the length of the tray and on opposite sides of its longitudinal center line,

that portion of the bottom of the tray which forms the bottom of said recess being of thin flexible material.

8. An elongated ice tray having a flat bottom for good thermal contact with the evaporator shelf of a domestic refrigerator, a hermetically closed recess formed in the bottom of said tray, said recess extending the full length of the tray and on opposite sides of its longitudinal center line, that portion of the bottom of the tray which forms the bottom wall of said recess and the top wall of said recess being of thin flexible material.

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