

Oct. 9, 1934.

F. D. SMITH, JR

1,976,147

ICE CUBE TRAY

Filed Oct. 13, 1933

Fig. 1.

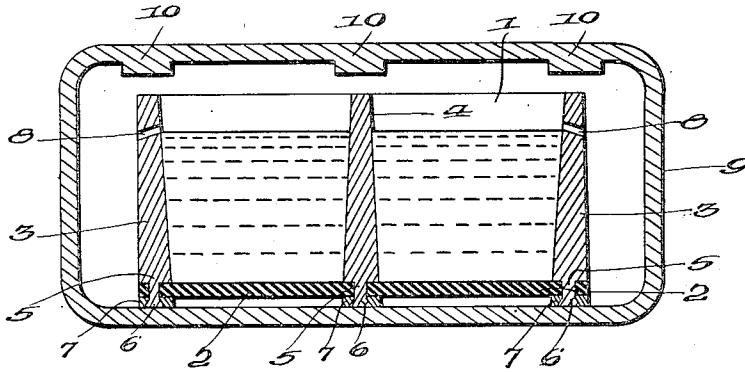


Fig. 2.

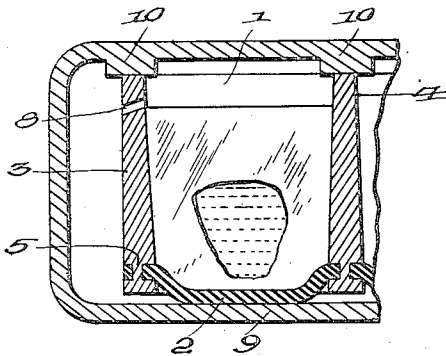


Fig. 3.

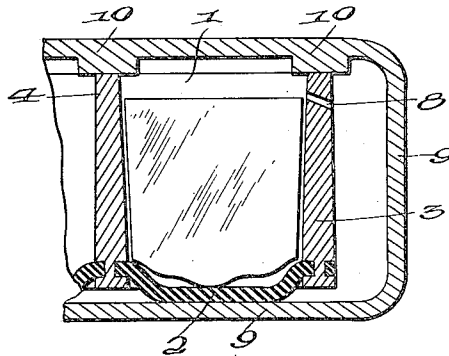


Fig. 4.

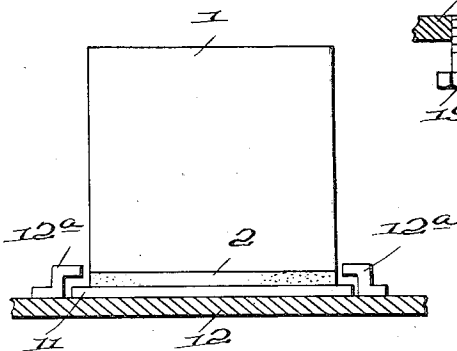


Fig. 6.

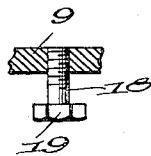
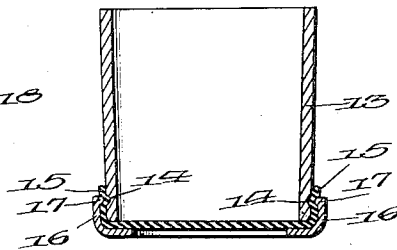


Fig. 5.



Inventor

Frank D. Smith Jr. Deceased,
Helen L. Smith Administratrix,

James M. Grace
Attorney

UNITED STATES PATENT OFFICE

1,976,147

ICE CUBE TRAY

Frank D. Smith, Jr., deceased, late of Washington, D. C., by Helen L. Smith, administratrix, Washington, D. C.

Application October 13, 1933, Serial No. 693,505

15 Claims. (Cl. 62—108.5)

This invention relates to ice cube trays which are adapted to be placed in the freezing compartment of domestic refrigerators of the mechanical or gas type.

5 The primary object of the present invention is to provide a tray in which the ice cubes automatically extricate themselves from their molds during freezing.

10 Another object of the invention is to provide a tray which frees itself automatically from the freezing shelf, sleeve or compartment.

15 A further object of the invention is not only to completely obviate the usual difficulty in removing the tray from the freezing compartment but also to obviate the tedious step of removing the ice cubes by holding the tray under a stream of water until the cubes fall out.

20 A further object is to provide a tray whose design is of utmost simplicity and whose cost is consequently at a minimum.

25 The principle of operation of this invention depends upon the expansion of water during freezing and this principle is utilized to attain the objects of the present invention. It is well known that if water is frozen in a vessel subject to atmospheric conditions it will freeze from the top downward and the last part to freeze will be at the bottom of the vessel. As this portion freezes and expands, it will force the ice upwards and free it from the vessel, so long as the diameter is not greatly in excess of the depth.

30 This freezing from the top downward may be duplicated in a domestic ice box by placing the refrigerant coils above the tray or by insulating the bottom of the tray. However, such artificial freezing from the top downward is not the scope of the invention broadly.

35 By this invention, in its preferred form, the bottom of the tray is formed of thin, yet tough, flexible material, such as rubber. The rubber rests but a short distance from the bottom of the freezing shelf, sleeve or compartment, when in use. The top of the freezing sleeve is fitted with small dependent abutments lying directly over, and a predetermined distance from, the tops of the tray sides and partitions. When the water in the molds freezes the expansion will take place through the rubber and lift the tray from the bottom of the freezing sleeve. The tray is then forced up against the dependent abutments and further expansion through the rubber will cause the forming cube in the mold to be forced up and freed from the latter.

40 In place of a tray of predetermined relation to the height of the freezing shelf, the tray may be provided with a flange and the shelf provided with a fixed retaining member taking over the flange and placed a predetermined distance therefrom, so that upon expansion through the rubber the tray will rise from the shelf until the

flange abuts against the fixed retaining member. Further expansion through the rubber will cause the ice cubes to automatically extricate themselves from their molds.

To more clearly understand the invention, reference is now made to the accompanying drawing, in which like character designates like parts throughout the several views:

Fig. 1 represents a longitudinal section showing the tray, filled with a liquid to be frozen, resting in the freezing sleeve;

Fig. 2, a broken section showing an individual mold wherein the liquid is partly frozen;

Fig. 3, another broken section showing the same individual mold wherein the liquid is frozen;

Fig. 4, a modification of the invention as applied to a tray with a single row of freezing molds;

Fig. 5, a longitudinal section showing modified means for attaching the rubber bottom to the tray, and,

Fig. 6, a further modification.

Referring now to Fig. 1, the tray, generally designated as 1, is provided with a bottom 2 of thin, tough and flexible material, such as rubber. This rubber bottom is attached to the walls 3 and partition 4 in any effective manner, the flexible bottom being placed a slight distance from the lower extremities of the walls and partitions of the tray. A very effective method of attaching the bottom is to have the walls and partitions cut away such as shown at 5 and leaving gradually widening portions 6 at the lower extremities. The rubber, which is in sheet form, is appropriately scored and forced over the widened portions 6. A unitary rim 7 is then forced over portions 6 securing the rubber in place. The inner surfaces of the walls and partitions are appropriately tapered to facilitate the automatic liberation of the ice cubes. Vents 8 are provided in the walls at the desired water level.

The freezing sleeve 9, conventional in all other respects, is provided with abutments 10 which depend directly over the walls and partitions of the tray and are a predetermined distance from the latter. The tray, filled with water, or other liquid to be frozen, is placed in the freezing sleeve so that the walls and partitions thereof lie directly under the abutments 10. The tray is then ready for the freezing operation.

In Fig. 2 there is shown an individual mold in which the water is partly frozen. Expansion has taken effect through the rubber 2 to such an extent that the latter has been forced down against the bottom of the freezing sleeve 9. The cube is not, however, completely frozen, as there remains a core of unfrozen water near the bottom of the tray. When the rubber reaches the sleeve continuous expansion forced the tray itself up from the sleeve 9 until it reached the abutments 10.

Fig. 3 shows how the final expansion through

the rubber has caused the forming cube to be broken away from the tapering sides and partitions of the tray and automatically ejected upwardly. The freezing operation now completed, the tray may be easily removed from the freezing sleeve and the cubes removed by a slight tapping of the tray.

In Fig. 4 there is shown a modification of the invention whereby the tray is provided with flanges 11 and the freezing shelf 12 with stops 12a, which take over the flanges 11 and allow a limited upward movement of the tray. The tray is fitted with a rubber bottom, positioned slightly above the bottom of the freezing shelf, just as in Fig. 1. Expansion through the rubber bottom causes the tray to be lifted from the freezing shelf until the flanges 11 reach the stops 12a. Thereafter, further expansion forces the cubes from the molds as shown in Fig. 3. Although Fig. 4 shows this modification as applied to a single row unit tray, it is obvious that the flange and stop arrangement may, with equal facility, be applied to the usual multiple row trays.

Fig. 5 shows a modified method for applying the rubber bottom, as applied to a single row unit tray. The outer surface of the walls 13 of the tray are cut away slightly near the bottom forming a small notch 14. Rubber sheeting 15 is then placed over the bottom and the sides bent upwardly to a point above the notches 14. A metallic rim 16, having beads 17, is then placed over the rubber and the beads forced into notches 14, through the rubber, securing the rim to the tray. The rim, of course, is sufficiently cut away at the bottom to allow expansion through the rubber to the freezing shelf or sleeve.

In Fig. 6 is shown a further modification of the invention as applied to the abutments shown in Figs. 1, 2 and 3. Instead of the abutments being integral with the top of the freezing sleeve, the latter may be provided with a bolt 18 and head 19. In this way, the abutment is made adjustable with respect to the distance to the top of the tray. Also, those domestic refrigerating units not provided with an integral abutment may be fitted out with one to adapt the same for the present invention.

In the appended claims, the term "shelf" is intended to cover any feasible support for the tray, such as the sleeve 9 in Figs. 1, 2 and 3 and/or the shelf 12 in Fig. 4.

What is claimed is:

1. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, and means responsive to the expansion of water upon freezing for lifting the tray from said shelf and the formed cubes from their molds.

2. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, means responsive to the expansion of water upon freezing for automatically lifting the tray from the shelf and means cooperating with said tray to automatically free the formed cubes from the walls of their molds.

3. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, means responsive to the expansion of water upon freezing on said tray for automatically lifting the latter from the shelf and means, cooperating with said first means through said tray to automatically free the formed cubes from the walls of their molds.

4. In a freezing system for domestic refrigerators, the combination of a tray for molding

cubes, a shelf for said tray, means responsive to the expansion of water upon freezing for automatically lifting the tray from the shelf and means on the shelf, cooperating with said tray to automatically free the formed cubes from their molds.

5. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, means responsive to the expansion of water upon freezing on said tray for automatically lifting the latter from the shelf and means on the shelf, cooperating with said tray to automatically free the formed cubes from their molds.

6. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, means responsive to the expansion of water upon freezing for automatically lifting the tray from the shelf, said means comprising a flexible bottom for said tray, and means, cooperating with said first means through said tray to automatically free the formed cubes from their molds.

7. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a sleeve for said tray, means responsive to the expansion of water upon freezing for automatically lifting the tray from the sleeve and means, cooperating with said first means through said tray to automatically free the formed cubes from the mold, said means comprising abutments on the sleeve.

8. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, means responsive to the expansion of water upon freezing for automatically lifting the tray from said shelf and means for arresting movement of the tray after it has reached a predetermined height above the bottom of the shelf.

9. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, a shelf for said tray, means responsive to the expansion of water upon freezing for automatically lifting the tray from said shelf and means on said shelf for arresting movement of the tray after it has reached a predetermined height above the bottom of the shelf.

10. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, said tray having a flexible bottom slightly elevated from the lower extremities of the tray walls, and a sleeve having abutments depending over the walls of the tray.

11. The combination as set forth in claim 10 wherein the flexible bottom is rubber.

12. In a freezing system for domestic refrigerators, the combination of a tray for molding cubes, said tray having a flexible bottom slightly elevated from the lower extremities of the tray walls, flanges on the tray walls, and a shelf having stops depending over said flanges and permitting a predetermined vertical movement of the tray.

13. The combination as set forth in claim 12 wherein the flexible bottom is rubber.

14. An ice cube tray for domestic refrigerators having metallic sides and partitions and having a flexible bottom slightly elevated from the lower extremities of the tray walls and partitions.

15. An ice cube tray as set forth in claim 14 wherein the flexible bottom is rubber.

HELEN L. SMITH,
Administratrix of the Estate of Frank D.
Smith, Jr., Deceased.