Aug. 7, 1945. H. LUTES ET AL 2,381,068

REFRIGERATING APPARATUS

Filed March 16, 1942

Fig.1.

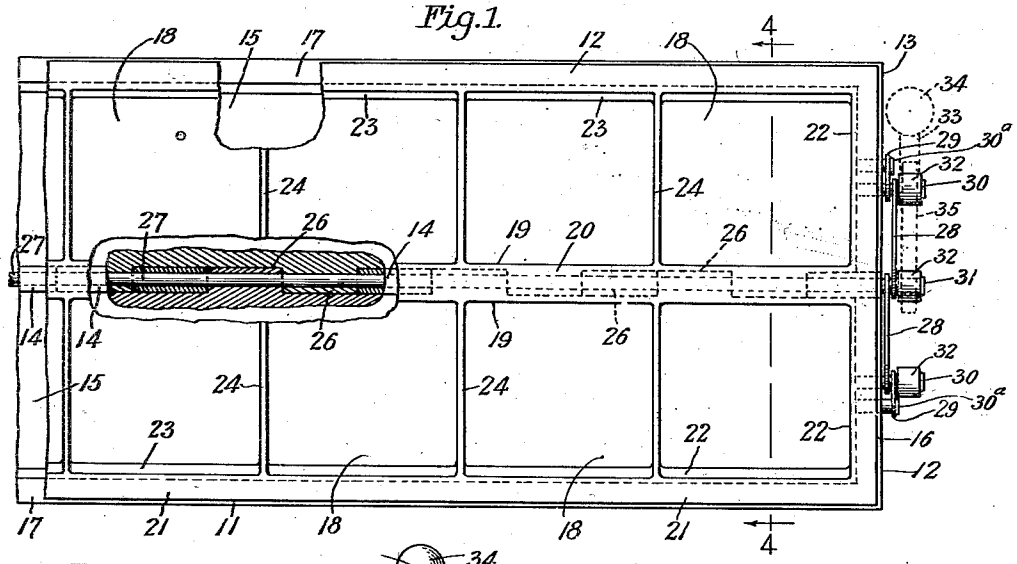


Fig.2.

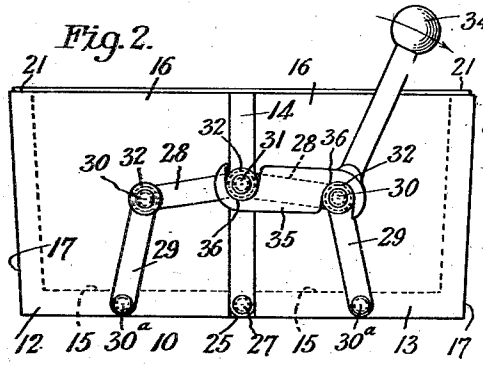


Fig.3.

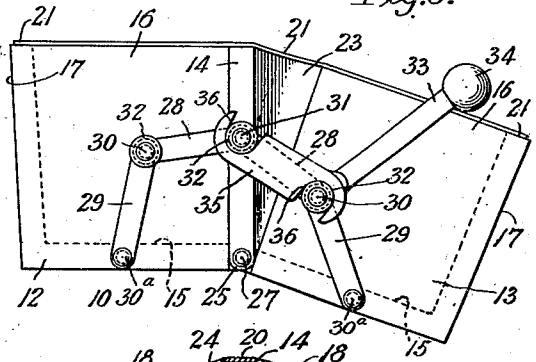


Fig.5.

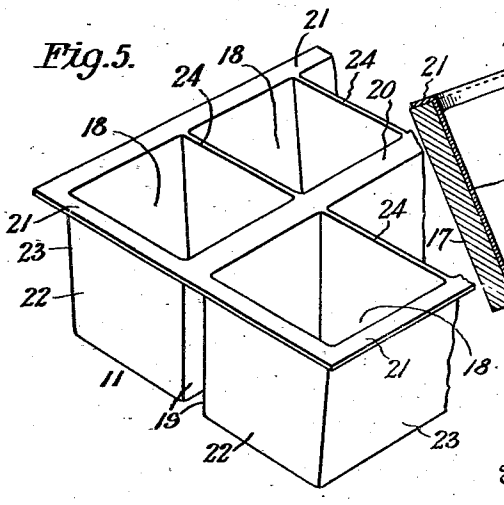
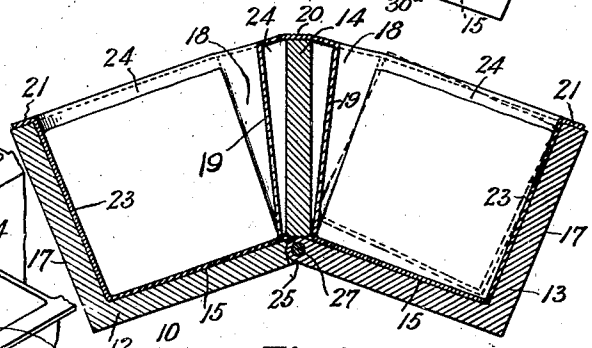


Fig.4.



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REFRIGERATING APPARATUS

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18 Claims. (Cl. 62—108.5)

The invention relates to refrigerating apparatus generally, and more particularly to an improvement in ice cube freezing trays for use as substitutes for standard forms of such trays now commonly employed in the freezing chambers of refrigerating machines, especially in that class of such machines for small commercial and home uses.

The prior related art evidences many attempts to provide ice cube freezing trays alone, or combined with ice cube ejector mechanisms, to permit of quick freezing of water contained in the several ice cube forming compartments of a freezing tray and, at the same time, allow for convenience and ease in removal of the tray from the freezing chamber of a refrigerating machine, as well as to facilitate the dislodgment of the frozen cubes from the tray compartments. Among these many attempts, trays of metal, while permitting of quick freezing, failed to allow for desired convenience and ease of removal of the trays themselves from the freezing chamber nor the frozen cubes from the tray compartments, by reason of the maximum degree of adhesion occurring between the ice formation and the metal and, to accomplish this, heat applications were more often than not resorted to. Trays of rubber have had some degree of success in this latter connection, particularly in the elimination of need for heat applications to break down the effects of adhesion, the ice cubes here being dislodged from the several cube forming compartments by flexing the walls of the tray. These rubber trays, however, have certain disadvantages, first, if the cubes are hard frozen, there is still a disconcerting adhesion of the frozen cubes to the walls of the forming compartments, and, second, by reason of low conductivity of rubber, excessive expenditures in time and power, and consequently in cost, is required to freeze an equal volume of ice as compared to that when ordinary metal trays are employed. Also, in the use of rubber trays, the ice formation begins initially at the top surface of the water in the tray compartments, as distinguished from the initial freezing of the water at the sides and bottom of metal trays, the top surface of the water in the first instance freezing substantially flat and the final freezing occurring at the bottoms of the compartments with a tendency to bulge downwardly, while, with metal trays, the bulge occurs at the top surfaces of the formed cubes. Again, certain trays have been made from a combination of metal and rubber, or of metal alone, coupled with ice cube ejector devices and mechanisms, but few of these have functioned with that degree of success to make them commercially practical, their inefficiency being due to various causes, particularly to the adhesion of the ice cubes to the tray compartment walls sufficient to prevent ready dislodgement and removal of the same and to the frosting over and sticking of the operative parts.

The present invention has for its primary object the provision of an ice cube freezing tray that surmounts these objectionable features and disadvantages of many of the exemplified structures disclosed in the prior art, with due consideration being given to simplicity in design and operation, low cost in manufacture, and ease in tray and frozen cube removal.

Another object of the invention resides in the provision of a compartmented tray construction that is preferably made entirely from any suitable non-metallic material that can be molded or pressed to required form, such as, for instance, the synthetic thermoplastic material known as "Koroseal," which can be worked to desired form, it having been found to be superior to natural rubber in that it is practically tasteless and odorless, that substantially no adhesion occurs between the surfaces of the ice cubes and the opposed walls of the compartments of trays made from it, and that, by reason of a higher conductivity, the time required for freezing the water content of the tray compartment and, consequently, the amount of power for refrigerating machine operation, is reduced to a degree comparable to that when metal freezing trays are used.

Yet another object of the invention has to do with the provision of a main, substantially rigid, tray structure to support a supplemental cube forming compartmented tray which is made from a lighter weight of the aforesaid material, the main tray being formed to provide relatively tiltable sections which, when individually manipulated from normal to tilted positions, act to loosen ice cubes within the compartments of corresponding portions of the supplemental tray by effecting a distension of the compartment walls.

A further object of the invention is to provide a novel manually actuated means for effecting the required tilting movements of the sections of the main tray in a convenient and easy manner.

With the foregoing and other objects of equal importance in view, the invention resides in the

certain new and useful combination, construction, and arrangement of parts as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a fragmentary top plan view of the improved cube freezing tray, with certain parts thereof broken away and in section;

Figure 2 is a front end elevation, showing the tiltable tray sections and the actuating mechanism therefor as they appear when normally disposed;

Figure 3 is a view similar to that of Figure 2, but showing one of the tray sections in tilted position upon the operation of a respective portion of the actuating mechanism;

Figure 4 is a transverse vertical section taken on the line 4—4 on Figure 1, and showing both tray sections disposed in tilted positions; and

Figure 5 is a fragmentary perspective view of the supplemental ice cube forming tray per se.

Referring to the drawing, wherein like characters of reference denote corresponding parts throughout the several views, the embodiment of the invention, as is exemplified therein, is comprised in a tray unit having the general configuration of a standard type of ice cube freezing tray for which it is to be substituted, after the manner of a sliding drawer, within the usual freezing chamber of a refrigerating machine. The unit consists of a main tray 10 supporting a supplemental tray 11, the main tray being of a substantially rigid construction and the supplemental tray of a substantially elastic or flexible construction. The main tray 10 may be constructed of metal but, as before stated, both it and the supplemental tray 11 are preferably made from a molded or pressed plastic material, such as "Koroseal" or the like, the main tray being fabricated from a sufficient weight and thickness of the material to give it the required rigidity and the supplemental tray from a lighter weight and thinness thereof to provide for the desired elasticity or flexibility.

As shown, the main tray 10 is formed to provide independently movable half sections 12 and 13, separated by a vertical division wall 14. Each of the tray sections 12 and 13 is made up of a bottom wall 15, end walls 16, and an outer side wall 17, with its inner side normally open and adapted to be closed when the inner edges of the bottom and end walls are moved into abutted relation to an adjacent side of the division wall 14; the said tray sections and the division wall being preferably elongated to the length of an ordinary ice cube forming tray, so that two full length, longitudinally extending, compartments are provided, one parallel to the other. The outer side walls 17 are preferably inclined to a slight degree in an outward direction with respect to the opposed vertical sides of the division wall 14.

The supplemental tray 11 is molded or pressed from a single sheet of the plastic material in a manner to form rows of depressed portions 18 forming individual ice cube forming compartments to snugly seat within the elongated compartments of the main tray 10. These depressed portions 18 are separated by a longitudinal partition structure that is formed of spaced walls 19 which are connected only at their top edges by a web 20 extending laterally therebetween and in continuation with narrow flanges 21 formed at the top edges of the end and outer side walls 22 and 23. When seated within the main tray 10, the space between the inner walls 19 will be occupied by the longitudinal division wall 14 and the web 20 and the flanges 21 will rest upon the top edges of the division wall 14 and the end and outer side walls 16 and 17 of the main tray. The interiors of the depressed portions 18 are divided by a series of transverse partitions 24 which are uniformly spaced apart to provide the aforesaid rows of compartments as aforesaid.

The tray sections 12 and 13 are mounted for tilting movements relatively to the division wall 14, one independently of the other, and, to this end, the inner side edges of the bottom walls 15 and the lower edge of the division wall 14 are interconnected by a hinge 25 that is coextensive therewith. The hub of the hinge 25 is preferably made up of alternately arranged barrel portions 26 which are interengaged with one another for mounting upon a common pintle 27. The tray sections 12 and 13 are also inter-connected at their front ends with the adjacent end of the division wall 14 by means of pivoted elements forming toggles, one associated with each of the tray sections for effecting tilting movements thereof as required. Each of the toggles is comprised in an upper arm 28 and a lower arm 29 pivotally connected in end to end relation, as at 30, with the opposite end of the upper arm pivoted, in turn, as at 31, to the near end of the division wall 14, and the like end of the lower arm, as at 30a, to the edge of the bottom wall 15 at a point thereon removed from the hinge 25. The pivot 31 is common to the engaged ends of both upper arms 28 of the adjacent toggle connections, and it, as well as the pivots 30, are provided with cylindrical enlargements or rollers 32 at their outer ends for the engagement therewith of an operating element 33 that may take the form of a hand lever, substantially as shown.

This operating element or lever 33 is formed from a length of metal bar or rod having a hand grip 34 at one end and an angled extension 35 at its other end, the extension being flattened and formed to provide curved seats 3 in its opposite side edges or engagement over the enlargements or rollers 32, after the manner shown in Figures 2 and 3. With the seat 36, at the free end of the extension 35 engaged beneath the enlargement or roller 32, of the fixed pivot 31, and the seat at its other end engaged over the enlargement or roller 32 on the moving pivot 30, for instance, of the right hand toggle, as in Figure 2, outward and downward pressure of the hand on the hand grip 34 will result in an oblique inward and downward movement of the moving pivot 30 and cause the arms 28 and 29 to move from normally angled relation toward a more or less alined relation, thus transmitting the pressure thereon to the fixed pivot connection 30a, when the associated tray section 13 will be swung on the hinge 25 to an outwardly tilted position, as in Figure 3. Movement of the tray section to tilted position causes a stretching of the transverse partition walls 24 of the several pockets 18, of the overlying portion of the supplemental tray 11, which is translated into a pulling action that is transmitted through the inner side wall 19 and the opposed transverse side walls of the pockets and effects a lift of the bottom walls sufficiently to impart a slight tilt of the frozen cubes within the pockets, all to the end that the latter are substantially freed from any effects of adhesion or suction that may otherwise tend to resist easy removal of them from the pockets. After being

thus loosened within the pockets 18, the frozen cubes may be readily removed in any usual or desired manner, individually or collectively.

With the tray unit as thus constructed and arranged, the two tray parts 10 and 11 can be readily separated one from the other for cleaning purposes and, in use, the supplemental tray 11 is to be easily emplaced upon or within the main tray 10 and its several pockets filled with water, or other material to be frozen. In assembly, the unit can be inserted into and removed from the freezing chamber of a refrigerating machine with a facility equal to that of a standard form of tray, but with the advantage that, by reason of its makeup from a non-metallic material, it will not itself become hard frozen within the freezing chamber, nor the cubes similarly so within the pockets 18 of the supplemental tray, or, at least, not to any near extent approaching that which is common to the use of metal trays.

From the foregoing, it will be apparent that the invention provides for a novel freezing tray construction and one that presents decided advantages over standard types thereof and particularly so with reference to ease in tray removal from the freezing chamber of a refrigerating machine and in frozen cube removal from the cube forming pockets. Also, it will be understood that change in material and in minor details of construction and arrangement of parts may be resorted to, without departing from the spirit of the invention or its scope as claimed.

What we claim, is:

1. An ice cube freezing unit for refrigerating machines, comprising a main tray formed to provide relatively movable sections each partitioned to form a series of compartments and a supplemental tray formed of an elastic material supported upon the main tray and having ice cube forming pockets depending within respective compartments of said sections, certain of the walls of said pockets being deformed upon movement of said main tray sections to effect a loosening of the frozen cubes from all of the walls of the pockets for ease in their subsequent removal.

2. An ice cube freezing unit for refrigerating machines, comprising a main tray formed to provide longitudinal, relatively movable, sections each partitioned to form a series of compartments and a supplemental tray formed of an elastic material supported upon the main tray and having ice cube forming pockets depending within respective compartments of said sections, certain of the walls of said pockets being deformed upon movement of said main tray sections to effect a loosening of the frozen cubes from all of the walls of the pockets for ease in their subsequent removal.

3. An ice cube freezing unit for refrigerating machines, comprising a main tray formed to provide oppositely tiltable sections each partitioned to form a series of compartments and a supplemental tray formed of an elastic material supported upon the main tray and having ice cube forming pockets depending within respective compartments of said sections, certain of the walls of said pockets being deformed by tilting movements of said main tray sections to effect a loosening of the frozen cubes from all of the walls of the pockets for ease in their subsequent removal.

4. An ice cube freezing unit for refrigerating machines, comprising a main tray formed to provide longitudinal, oppositely tiltable sections each partitioned to form a series of compartments and a supplemental tray formed of an elastic material supported upon the main tray and having ice cube forming pockets depending within respective compartments of said sections, certain of the walls of said pockets being deformed by tilting movements of said main tray sections to effect a loosening of the frozen cubes from all of the walls of the pockets for ease in their subsequent removal.

5. An ice cube freezing unit for refrigerating machines, comprising a main tray formed to provide longitudinal, oppositely tiltable sections each partitioned to form a series of compartments and a supplemental tray formed of a thermoplastic material supported upon the main tray and having longitudinal rows of ice cube forming pockets depending within respective compartments of said main tray sections, certain of the walls of each row of said pockets being deformed by the tilting movement of a respective main tray section to effect a loosening of the frozen cubes from all of the walls of the pockets for ease in their subsequent removal.

6. An ice cube freezing unit for refrigerating machines, comprising a main tray formed to provide a central vertical division wall, compartment sections hingedly connected to the lower edge of said division wall, said compartment sections being open at their inner sides and adapted to have the inner edges of their bottom and end walls abutted against adjacent sides of said division wall when normally disposed, and a supplemental tray formed of a thermoplastic material supported upon the main tray and having rows of ice cube forming pockets depending within the compartments of said main tray sections, certain of the walls of each row of said pockets being deformed by the tilting movement of a respective main tray section to effect a loosening of the frozen cubes from all of the walls of the pockets for ease in their subsequent removal.

7. The freezing unit as in claim 1, with a manually actuable means mounted on said main tray for imparting the required movements to said compartment sections.

8. The freezing unit as in claim 3, with a manually actuable means carried by said main tray for imparting the required tilting movements to said compartment sections.

9. The freezing unit as in claim 4, with a manually actuable means carried at one end of said main tray for imparting the required tilting movements to said compartment sections.

10. The freezing unit as in claim 5, with a manually actuable means carried at one end of said main tray for imparting the required tilting movements independently to said compartment sections.

11. The freezing unit as in claim 6, with a manually actuable means interconnecting said compartment sections for imparting the required tilting movements to said compartment sections.

12. The freezing unit as in claim 6, with a manually actuable means interconnecting said compartment sections one with the other and with said division wall for imparting the required tilting movements to said compartment sections.

13. The freezing unit as in claim 6, with a manually actuable means carried at one end of said main tray and interconnecting said compartment sections one with the other for imparting the required tilting movements independently to said compartment sections.

14. The freezing unit as in claim 6, with a toggle connection between each of said compart-

ment sections and said division wall for imparting the required tilting movements independently to the compartment sections.

15. The freezing unit as in claim 6, with a toggle connection between each of said compartment sections and said division wall and means for actuating the toggle connection for imparting the required tilting movements independently to the compartment sections.

16. The freezing unit as in claim 6, with the main tray of a rigid material construction.

17. The freezing unit as in claim 6, with the main tray of a rigid non-metallic construction.

18. The freezing unit as in claim 6, with the main tray of a molded thermoplastic material construction.

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