April 16, 1935. G. L. TINKHAM 1,997,838

ICE TRAY

Filed Dec. 1, 1932

Fig. 1

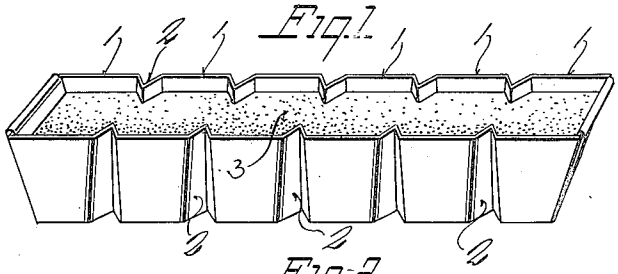


Fig. 2

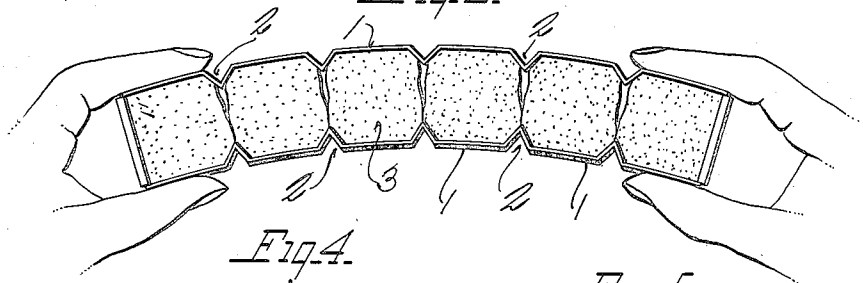


Fig. 4

Fig. 3

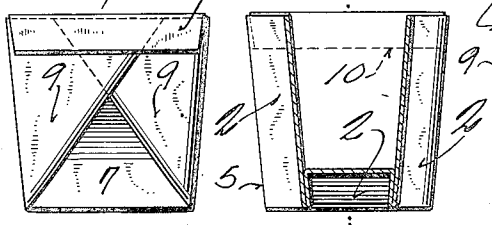


Fig. 5

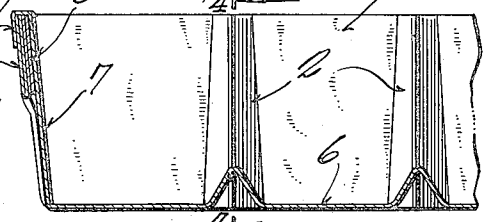


Fig. 6

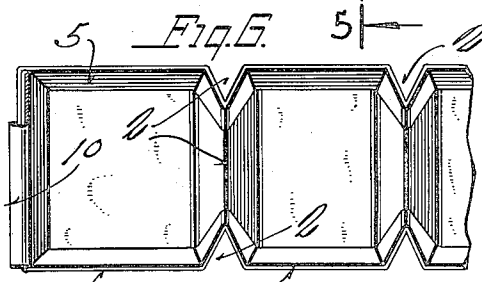


Fig. 7

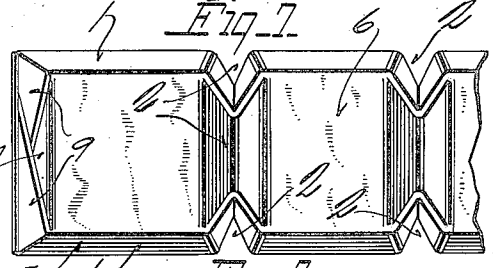


Fig. 9

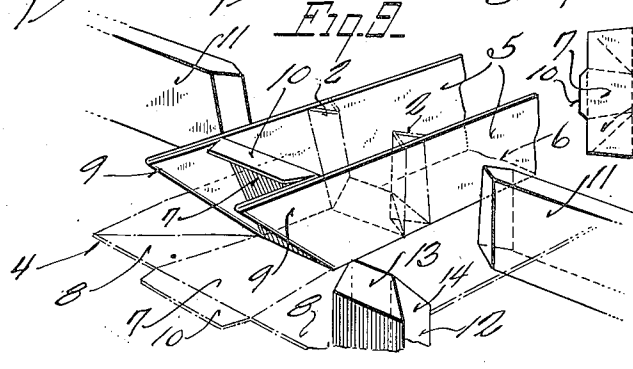
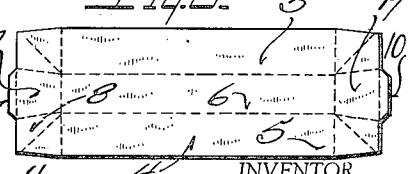


Fig. 8



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Patented Apr. 16, 1935 1,997,838

UNITED STATES PATENT OFFICE

1,997,838

ICE TRAY

Guy L. Tinkham, Detroit, Mich., assignor, by mesne assignments, to McCord Radiator & Mfg. Co., Detroit, Mich., a corporation of Maine

Application December 1, 1932, Serial No. 645,215

7 Claims. (Cl. 62—108.5)

This invention relates to ice trays for use in domestic and other refrigerating machines and more particularly to ice trays of the flexible metal type as disclosed in my co-pending application Serial No. 547,473, filed June 29, 1931, now Patent 1,894,897 issued January 17, 1933.

In accordance with the invention disclosed and claimed in that application, the tray when in use is flexed in the hands of the user to fracture the mass frozen in the tray into the smaller units or sections required for table or other use and to free the units from the walls of the tray for immediate discharge therefrom. When making the tray of metal and by a drawing process, it is essential to use a metal having considerable elongation in order that sufficient resiliency may be retained in the drawn metal to permit repeated flexing of the tray when in use without weakening or straining it.

While the drawing process is not an objectionable way in which to produce the tray, yet it does more or less confine the production to metals having considerable elongation, especially for relatively deep trays, which is not the case of a folding method to which in part the invention of the present application relates. By the folding method the tray is folded into shape rather than drawn into shape, thereby setting up no undue strains in the metal in the production of the tray, with the result that the resiliency of the metal is not impaired and the tray may be flexed with greater safety and have longer life than a drawn tray.

The folding method makes possible the use of metals which could not ordinarily be used by the drawing process either because of insufficient elongation to the drawing or impairment of the resiliency of the metal when drawn to the depth necessary to produce a tray. Thus the factor of elongation of the metal is not an important one in the folding method, and I may therefor employ any desired metal having the resiliency necessary for the flexing of the tray when in use, having regard of course to the nature of the edible materials to be frozen in the tray. Aluminum and certain of its alloys are highly desirable metals for tray production, and by my folding method can be used because their resiliency is not impaired or sacrificed, which is likely to be the case when the drawn process is employed, especially for deep trays as are required for commercial purposes. Stainless steel is another metal desirable for tray production. While this metal has considerable elongation, yet for deep drawing there is a likelihood of a rupture taking place when thin gauge metals are used. This is not the only objection, however, an equally important one being that it may be necessary to anneal the metal during the drawing process, and this would necessitate pickling and finishing costs which the folding method avoids. Even if annealing were not necessary, there might be die marks left on the drawn material which would have to be eliminated by polishing. Obviously, by the folding method of my invention, I am not restricted or limited to the use of any particular metals for tray production, but may select those metals best adapted for the purpose, and even use those having sufficient elongation, as it is evident that by the folding method all finishing cost can be reduced or entirely eliminated. The particular metals referred to have been cited by way of example and not as limiting in any sense my invention thereto.

In addition to the folding method, my invention also relates to the apparatus for performing it, and also to the folded tray itself.

In the accompanying drawing:

Fig. 1 is a perspective view of my improved tray;

Fig. 2 shows the manner in which the tray is flexed in the hands of the user to fracture the frozen contents thereof into the small sections or units required for use and to free the same from the walls of the tray for immediate discharge therefrom;

Fig. 3 is an end view of the tray on a slightly larger scale than used in the preceding figures;

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 5;

Fig. 5 is a fragmentary longitudinal sectional view taken on line 5—5 of Fig. 4;

Figs. 6 and 7 are top and bottom plan views, respectively, of the portion of the tray shown in Fig. 5;

Fig. 8 shows the flat blank from which the tray is folded into shape; and

Fig. 9 illustrates the manner in which the tray is folded into shape and one way in which expansion joints are provided in its bottom and side walls.

As shown in the drawing, the tray comprises a series of unit-forming sections 1, 1 connected by expansion joints 2, 2 which, as hereinafter described, are integral with the side and bottom walls of the tray. These joints extend across said walls and through the upper edges of the side walls and permit the tray, when grasped at its ends between the hands of a user, to be flexed laterally to shorten one side wall and elongate

the other. The joints also extend into the tray to score the mass frozen therein during the process of freezing. Thus the tray when flexed will fracture the frozen mass at the scoring into the smaller units or sections as required for use and also free them from the walls of the tray for immediate discharge therefrom. The manner in which the tray is flexed is shown in Fig. 2, and the fractured units or sections are marked 3, 3, being generally in the shape of cubes. The frozen mass prior to fracture is shown in the tray in Fig. 1, the tray occupying its normal position at this time.

The upright or surrounding marginal walls of the tray are inclined upwardly as shown so that the cube-forming sections 1 are wider at the top than at the bottom and thus facilitate the discharge of the cubes or units from the tray when fractured from the mass at the scoring in the flexing of the tray.

To fold the tray into shape from sheet metal in accordance with my invention, I provide a flat blank of the desired metal and of the size and rectangular shape required as shown at 4 in Fig. 8. The blank is first folded longitudinally to provide the upright side walls 5, 5 and the bottom wall 6 of the tray. The side walls are in parallel relation as shown in Fig. 9 and are spaced apart throughout their length substantially the same distance as the width of the tray intermediate the joints 2. In folding up the side walls 5, the ends of the tray may also be formed. In Fig. 9 I have shown the manner in which one end wall is formed, it being understood that the other end wall is similarly formed, either at the same time or subsequently thereto, depending upon the character of the machine or apparatus employed for the production of the tray. The bottom wall 6 is shorter then the length of the blank and is disposed to leave similar rectangular sections 7, 7 at the ends of the blank as continuations of said bottom wall. These sections are substantially as wide as the bottom wall, and are in the forming of the end walls of the tray folded upwardly between the side walls to positions substantially normal to the bottom wall as shown in Fig. 9. In doing this the triangular sections 8, 8 of the blank joining and on opposite sides of the sections 7 fold against the inner sides of the portions of the side walls 5 where they project or extend beyond the end walls 7. This produces the form shown in Fig. 9, wherein it will be noted that the projecting ends of the side walls are in folded form providing triangular sections 9, 9 of a double thickness of sheet metal. The sections 9, 9 are on opposite sides of the end wall 7 and are folded inwardly against the outer side of the same to complete the end wall of the tray as shown in Fig 3. The sections 9 overlap as shown in Fig. 3 and are secured or clamped in that relation to the section 7 by a flange 10 at the upper edge of the section 7, said flange being bent downwardly over the upper edges of sections 7 and 9 and pressed against the outer sides of the latter as indicated in Figs. 3 and 5. This produces an effective end wall construction for the tray and one which will not leak because the folded connections extend to the top of the tray and thus terminate above the level of the liquid therein in the use of the tray.

After the tray has been folded in the manner shown and described, the expansion joints 2 are provided in the side and bottom walls of the tray. This is accomplished by forcing the metal at the joints into the tray and may be done in any desired way. In Fig. 9 I have illustrated one method of making the joints. The joints in the side walls of the tray are formed by the use of dies or tools 11, 11 disposed on opposite sides of the tray and having V-shaped ends which when forced against the side walls will displace the metal inwardly and provide the V-shaped joints as shown. A similar joint is formed in the bottom wall of the tray by a tool or die 12, which as shown in Fig. 9, has a V-shaped upper or operating end 13 and similarly shaped grooves 14 in the sides so as to not only force the metal of the bottom wall into the tray, but also to displace the surplus metal into folded form about the lower ends of the joints in the side walls as shown in Figs. 4 and 7. The required number of joints are formed in the tray along the length of the same to divide the tray into the requisite number of unit-forming sections 1 and to render the tray flexible for the purpose heretofore described.

Instead of forming the joints in the walls of the tray after it has been completely set up as herein shown and described, the joints could be formed after the side walls have been set up and before the end walls are folded into place. Moreover, all of the joints could be formed at one or more closely allied operations by an appropriately designed machine or apparatus, or each set could be formed in the desired or required sequence. It is to be of course understood that my invention contemplates the folding of the tray and the forming of the joints therein in any desired way, the specific illustrations as herein given being by way of example and not by way of limitation except to the extent as indicated in the appended claims. Likewise, the use of any particular metal or metals is optional, it being within the scope of the invention to produce a folded tray with expansion joints from any desired material.

I claim as my invention:

1. An ice tray for use in mechanical refrigerators, comprising a body having connected bottom, side and end walls, said body consisting of flexible sheet material bent to provide said walls, and integral portions of the bottom and the side walls at spaced points along the length of the tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs.

2. An ice tray for use in mechanical refrigerators, comprising a body having connected bottom, side and end walls, certain of said walls consisting of a one-piece blank of flexible sheet material bent to provide said walls, and integral portions of the bottom and the side walls at spaced points along the length of the tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them, whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs.

3. A flexible metal ice tray for use in mechanical refrigerators, comprising a body having connected bottom, side and end walls, said body consisting of a one-piece blank of sheet metal of the desired flexibility bent to provide said walls and to retain the inherent flexibility of the metal, and integral portions of the bottom and the side walls at spaced points along the length of the

tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them, whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs.

4. An ice tray comprising a one-piece blank-formed body of flexible sheet material bent to provide a bottom, side and end walls, integral portions of the bottom and the side walls at spaced points along the length of the tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them, whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs.

5. An ice tray for use in mechanical refrigerators, comprising a body having connected bottom, side and end walls, said body consisting of flexible sheet material bent to provide said walls, integral portions of the bottom and the side walls at spaced points along the length of the tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them, whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs, and extensions on the side walls at the ends of the tray bent into overlapping relation with the end walls.

6. An ice tray for use in mechanical refrigerators, comprising a body having connected bottom, side and end walls, said body consisting of flexible sheet material bent to provide said walls, integral portions of the bottom and the side walls at spaced points along the length of the tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them, whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs, and extensions on the side walls at the ends of the tray bent into overlapping relation with the end walls, and having integral connection with the side and end walls throughout the height thereof.

7. An ice tray for use in mechanical refrigerators, comprising a body having connected bottom, side and end walls, said body consisting of flexible sheet material bent to provide said walls, integral portions of the bottom and the side walls at spaced points along the length of the tray being displaced into the tray to provide ribs dividing the tray into a series of connected cells and expansion joints between them, whereby the mass frozen in the tray will be scored at the ribs and be fractured at the scoring on flexing the tray at the ribs, extensions on the side walls at the ends of the tray bent into overlapping relation with the end walls, and flanges extending from said end walls and bent into overlapping relation with the side wall extensions over the upper edges of said extensions.

GUY L. TINKHAM.