Feb. 29, 1944. F. R. MILLER ET AL 2,343,018

ICE TRAY GRID

Filed April 15, 1940

Fig. 1.

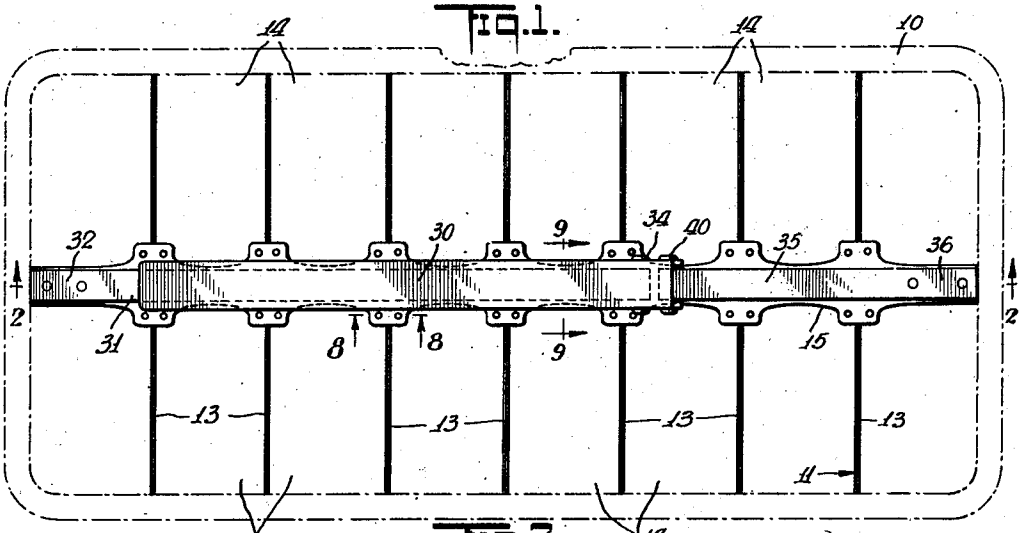


Fig. 2.

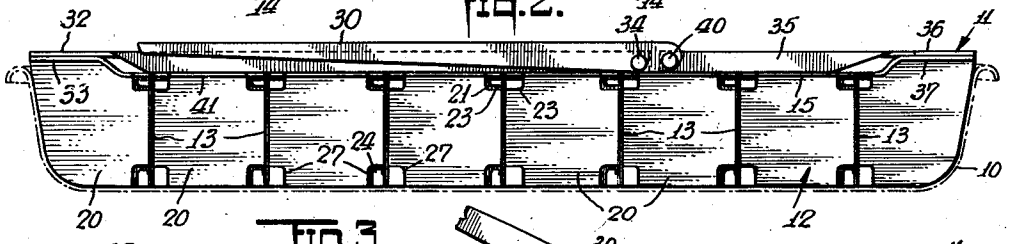


Fig. 3.

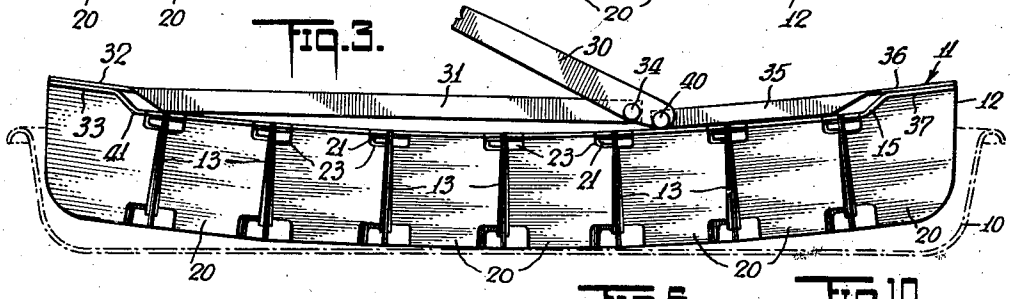


Fig. 4.

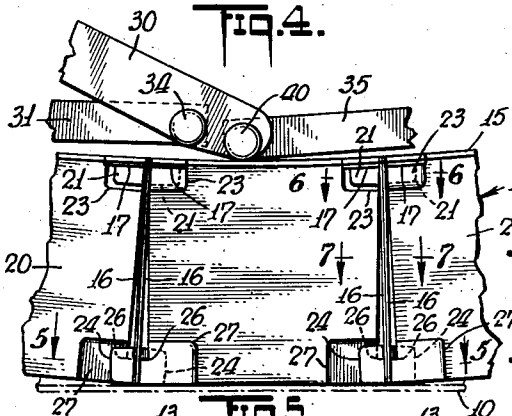


Fig. 5.

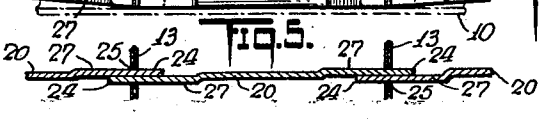


Fig. 6.

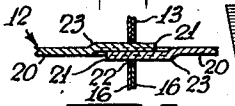


Fig. 7.

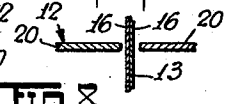


Fig. 8.

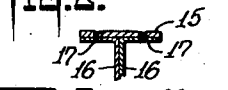


Fig. 9.

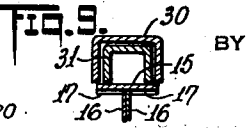


Fig. 10.

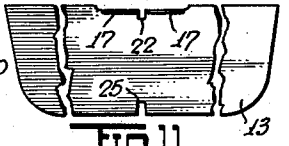
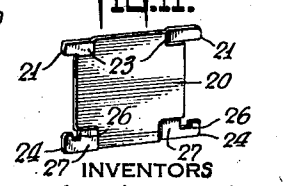


Fig. 11.



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ICE TRAY GRID

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Application April 15, 1940, Serial No. 329,642

10 Claims. (Cl. 62—108.5)

The present invention relates to improvements in mechanical ice tray grids for forming ice cubes.

One object of the present invention is to provide a new and improved mechanical ice tray grid, which can be simply and effectively operated with a minimum amount of manual effort to release the ice cubes from the grid walls.

Another object is to provide a new and improved ice tray grid having a lever mechanism of substantial mechanical advantage for breaking the ice bond between the ice cubes and its enclosing grid walls.

Another object is to provide a new and improved ice tray grid having ice releasing mechanical means, which can be operated while the grid is retained in its tray, and which lends itself to easy releasing operation with little or no fingering of the ice cubes.

Another object is to provide a new and improved mechanical ice tray grid, which can be operated to release the ice cubes from the grid walls without splintering or otherwise damaging said cubes.

Among other objects is to provide a mechanical ice tray grid, which is simple in construction with a minimum number of parts, which is of extremely practical and rugged construction and not likely to get out of order, and which is well suited to meet the requirements of economical manufacture.

Various other objects of the invention will be apparent from the following particular description, and from an inspection of the accompanying drawing, in which:

Fig. 1 is a top plan view of a grid device, embodying the present invention, and shown with its mechanical releasing means in ice-freezing position,

Fig. 2 is a longitudinal section taken on line 2—2 of Fig. 1,

Fig. 3 is a section similar to that of Fig. 2, but showing the releasing means in the process of being operated,

Fig. 4 is an enlargement of a portion of Fig. 3,

Figs. 5, 6 and 7 are detail sections taken on lines 5—5, 6—6 and 7—7 of Fig. 4 respectively,

Figs. 8 and 9 are detail sections taken on lines 8—8 and 9—9 of Fig. 1, respectively,

Fig. 10 is a front elevation of one of the crosswise partitions of the grid, and

Fig. 11 is a perspective of one of the plate segments constituting part of the longitudinal partitions of the grid.

In the specific form of the invention shown, a shallow ice cube tray or pan 10 of the usual type for storage in the freezing compartment of a refrigerator has removably fitted therein a mechanical grid device 11, embodying the features of the present invention. This grid device 11 comprises a main or center partition 12, intersected by a plurality of substantially parallel cross partitions 13, and defining with said latter partitions and the walls of the tray 10 a series of adjoining cells or molds 14 in which the ice cubes are formed.

The grid 11 is resiliently bendable as a unit for ice releasing operations as will be hereinafter described. For that purpose, there is provided a spring strip 15, made of suitable strong spring material such as spring steel, and shown in the form of a leaf spring extending along the top of the center partition 12 substantially at right angles to said partition.

The cross partitions 13 are rigidly secured at their upper edges to the spring 15. For that purpose, each of these partitions 13 is desirably of thin double wall construction with its laminations 16 held in face to face contact by any suitable means as for instance spot welding, and formed at their upper ends on opposite sides of the center partition 12 with outwardly extending transverse flanges or ears 17, affording seats for the spring 15. The spring 15 may be secured to these flanges 17 by spot welding, pinching or other suitable expedient.

The center partition 12 comprises a series of plate segments 20, arranged side by side substantially in one plane, and relatively movable angularly edgewise and with respect to the cross partitions 13 to permit elastic bowing of the grid unit. These plate segments 20 are supported at their upper ends to the cross partitions 13 desirably by means of tabs or tongues 21, forming side extensions of the upper corners of said segments, and seated in notches 22 at the upper ends of said partitions.

The upper corner sections of each segment 20 are slightly offset from the main plane of said segment to offset the corresponding tabs 21, and to form shallow depressions 23 for the reception of the tabs 21 of adjoining segments 20. The adjoining top corner sections of adjoining segments 20 are offset in opposite directions as shown in Figs. 4 and 6, so that the tab 21 of one segment extends into the adjoining depression 23 of the adjoining segment to permit co-planar positioning and operation of said segments.

By means of the construction described, the cross partitions 13 are rigidly secured at their

upper ends to the spring 15, and the center partition segments 20 are effectively locked between said spring and said cross partitions, and between adjoining cross partitions to form a strong indivisible grid unit.

In order to permit relative angular movement of the segments 20 edgewise while limiting the extent of this movement, each of these segments is formed at its lower corner sections with side extensions in the form of tabs or tongues 24, passing through notches 25 at the lower edges of the cross partitions 13. Each of the segments 20 is formed with a notch 26 between each tab 24 and the main section of the segment to receive the portion of the corresponding cross partition above its notch 25. The width of the notches 26 is sufficiently greater than the thickness of the cross partitions 13 to permit limited angular movement of the segments 20 transversely of the planes of the cross partitions upon bending of the grid unit.

The lower corner sections of the segments 20 are offset in a manner similar to that of their upper corner sections to guide said segments for co-planar angular edgewise movement. For that purpose, the lower adjoining corner sections of the adjoining segments 20 are offset in opposite directions to form shallow depressions 27 for the slide reception of the tabs 24 of adjoining segments.

The offsets 23 and 27 on each segment 20 may be formed by a single stamping operation, with the corner sections on one side thereof offset in one direction from the main plane of the segment and the corner sections on the other side offset in the opposite direction.

Upon application of bending force to the spring 15, the center partition segments 20 will be spread fanwise, so that said spring will yield inwardly of said segments into bow-shape, shown in Figs. 3 and 4. Since the cross partitions 13 are normal to the spring 15, the inward bowing of said spring will cause said partitions to spread angularly from parallel positions shown in Fig. 2, to positions in which they diverge radially outwardly from said spring as shown in Figs. 3 and 4. During this bowing operation of the grid unit, the divergent spreading of the cross partitions 13 will cause said partitions to peel away from the adjacent surfaces of the ice cubes, and will thereby break the ice bond between said cubes and said partitions. The outward flaring of the cross partitions 13 will then permit the released ice cubes to be dropped easily into a suitable receptacle.

The operating mechanism for bowing the grid unit comprises an operating lever 30, and a link transmission between said lever and the ends of the spring 15. This transmission desirably includes a link 31, having its outer end 32 anchored to one end 33 of the spring 15 by any suitable means as for instance spot welding, and having its inner end pivotally connected at 34 to the lever 30. The other part of the link transmission comprises a link 35, having its outer end 36 anchored to the other end 37 of the spring 15 by spot welding or the like, and having its inner end pivotally connected at 40 to the lever 30. The two pivotal points 34 and 40 are spaced close together lengthwise of the lever 30, and are located near one end thereof, so as to obtain maximum mechanical advantage compatible with practical construction. Also, the two links 31 and 35 are desirably of different length to permit the use of a longer lever 30,

In one position, the two links 31 and 35 extend end to end along the top of the spring 15 with the lever collapsed in closely folded position over said links as shown in Fig. 2. In order to impart substantial rigidity to the members of the ice releasing mechanism, and at the same time permit close compact folding of said members in the collapsed position shown in Fig. 2, the main sections of the links 31 and 35 are desirably of channel construction, and the lever 30 is of similar channel shape but wider to straddle or nest over said links in said collapsed position as shown in Figs. 2 and 9.

When it is desired to distort the grid to break the ice bond, the lever 30 is manually lifted from the collapsed position shown in Fig. 2 into a position laterally of the two links 31 and 35, while the grid device is still in the tray 10. During this lever movement, the two inner ends of the links 31 and 35 pivotally connected to the lever 30 are pulled inwardly in the manner of a toggle-joint whereby the cross partitions 13 are caused to spread angularly outwardly.

When the lever 30 is raised, the lower end thereof bears against the spring strip 15, as shown most clearly in Fig. 4. In this manner the lever 30 exerts a downward force or pressure at the point of contact with the grid, as it is being raised from the horizontal position shown in Fig. 2. At the same time a pull is exerted between the pivotal connections 34 and 40. The pull exerted between the pivotal connections 34 and 40 is transmitted through the links 31 and 35 to the ends of the grid, so that the force multiplying mechanism effects a pull having upward components at both ends of the grid. Since the lever 30 at its lower end exerts a downward force at an intermediate region of the grid, this lever when grasped by the hand not only is capable of distorting the grid but at the same time is operative to hold down the grid in the tray. When the lever 30 is moved back to its horizontal position, the tension in spring member 15 causes the lever to move to the collapsed position shown in Fig. 2.

To compactly receive the releasing mechanism so that it does not extend beyond the general contour of the grid unit in the collapsed position, and to predetermine the direction of bending of the spring 15, the central portions 41 of said spring is set with a concavity or hollow. This concavity compactly receives the ice releasing mechanism in the collapsed position of said mechanism as shown in Fig. 2, and at the same time confines the bending of the spring 15 in the direction shown in Figs. 3 and 4.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An ice tray grid including a flat horizontal elongated leaf spring, a partition extending downwardly from and along said spring and forming a unit with said spring, said partition being formed by a series of plate segments relatively movable angularly fanwise to permit said spring to be bowed, a series of spaced partitions extending crosswise of said first partition and

forming a grid unit therewith, a manually operable lever operative to assume a position extending substantially horizontally along the top of said spring, and means operable upon upward swinging movement of said lever from said position for bowing said spring to cause said crosswise partitions to diverge outwardly from said spring.

2. An ice tray grid including a flat horizontal elongated leaf spring, a partition extending downwardly from and along said spring and forming a unit with said spring, said partition being formed by a series of plate segments relatively movable angularly fanwise to permit said spring to be bowed, a series of spaced partitions extending crosswise of said first partition and forming a grid unit therewith, a manually operable lever operative to assume a position extending along the top of said spring, and a pair of links in one position extending substantially in axial alignment, and having their inner ends pivotally connected to said lever at spaced points and their outer ends anchored to the opposite ends of said spring, respectively, whereby upon angular movement of said lever said links will be tensioned to bow said spring and correspondingly cause said crosswise partitions to diverge outwardly from said spring.

3. An ice tray grid device including a substantially horizontal spring strip, a series of spaced partitions extending downwardly from and crosswise of said strip and forming a unit therewith, said strip having a downward concavity along a substantial portion of its length, and toggle mechanism including a pair of link members having their inner ends connected at a region intermediate the ends of the grid and their outer ends connected to opposite ends of the grid, said toggle mechanism being capable of nesting in said concavity when not in use, and operative to cause downward bowing of said strip, whereby said partitions are diverged outwardly and downwardly from said strip.

4. An ice tray grid device including a substantially horizontal spring strip, a series of spaced partitions extending downwardly from and crosswise of said strip and forming a unit therewith, said strip having a downward concavity along a substantial portion of its length, and a link mechanism for bowing said strip downwardly whereby said partitions are diverged outwardly and downwardly from said strip, said link mechanism in one position being capable of nesting in said concavity.

5. An ice tray grid device including a substantially horizontal leaf spring, a series of spaced partitions extending downwardly from and crosswise of said spring and forming a unit therewith, said spring having a downward concave set along a substantial portion of its length, and a toggle-joint for bowing said strip downwardly, whereby said partitions are diverged outwardly and downwardly from said spring, said toggle-joint in one position being capable of nesting in said concave set.

6. The combination with a tray, of a distortable grid insertable into and removable from said tray, and force multiplying mechanism to cause distortion of said grid, said mechanism being so constructed and arranged that, when said grid is positioned in said tray and said mechanism is operated to produce force to cause distortion of said grid, a pull is effected having upward components at spaced points of said grid and simultaneously a downward force is imparted to said grid at a region between said spaced points.

7. The combination with a tray, of a distortable grid insertable into and removable from said tray, and force multiplying mechanism operative to cause distortion of said grid, said mechanism including a movable part and being so constructed and arranged that, when said grid is positioned in said tray and movement of said part is effected to produce force to cause distortion of said grid, upward forces are exerted at spaced points of said grid with said part simultaneously exerting a downward force on said grid at a region between said spaced points.

8. The combination with a tray, of a distortable grid insertable into and removable from said tray, said grid including a plurality of partitions or wall pieces and a backbone member at the upper edges of said partitions or wall pieces, and force multiplying mechanism operative to cause distortion of said grid with accompanying bending of said backbone member, said mechanism including a movable part and being so constructed and arranged that when said grid is positioned in said tray and movement of said part is effected to produce force to cause distortion of said grid, upward forces are exerted at spaced points of said grid with said part simultaneously exerting a downward force on said backbone member at a region of said grid between said spaced points.

9. The combination with a tray, of a distortable grid insertable into and removable from said tray, said grid including a plurality of partitions or wall pieces and a backbone member at the upper edges of said partitions or wall pieces, and toggle mechanism operative to cause distortion of said grid with accompanying bending of said backbone member, said toggle mechanism including a lever and link members having their inner ends connected to different points on said lever and their outer ends connected to the outer ends of said grid, said mechanism being so constructed and arranged that, when said grid is positioned in said tray and said lever is moved to produce force to cause distortion of said grid, upward forces are exerted at the ends of said grid and a part of said lever simultaneously exerts a downward force on said backbone member at a region between the outer ends of said grid.

10. The combination with a tray, of a distortable grid insertable into and removable from said tray, and force multiplying mechanism operative to cause distortion of said grid, said force multiplying mechanism including a movable part and being so constructed and arranged that, when said grid is positioned in said tray and movement of said part is effected to produce force to cause distortion of said grid, a component of said force is exerted at one region of said grid to hold the latter in said tray and simultaneously other components are exerted at other regions removed in opposite directions from said one region to effect separating movement of said grid with respect to said tray.

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