Dec. 19, 1939. G. M. BLOMQVIST ET AL 2,184,112

REFRIGERATION

Filed July 24, 1937

Fig. 1.

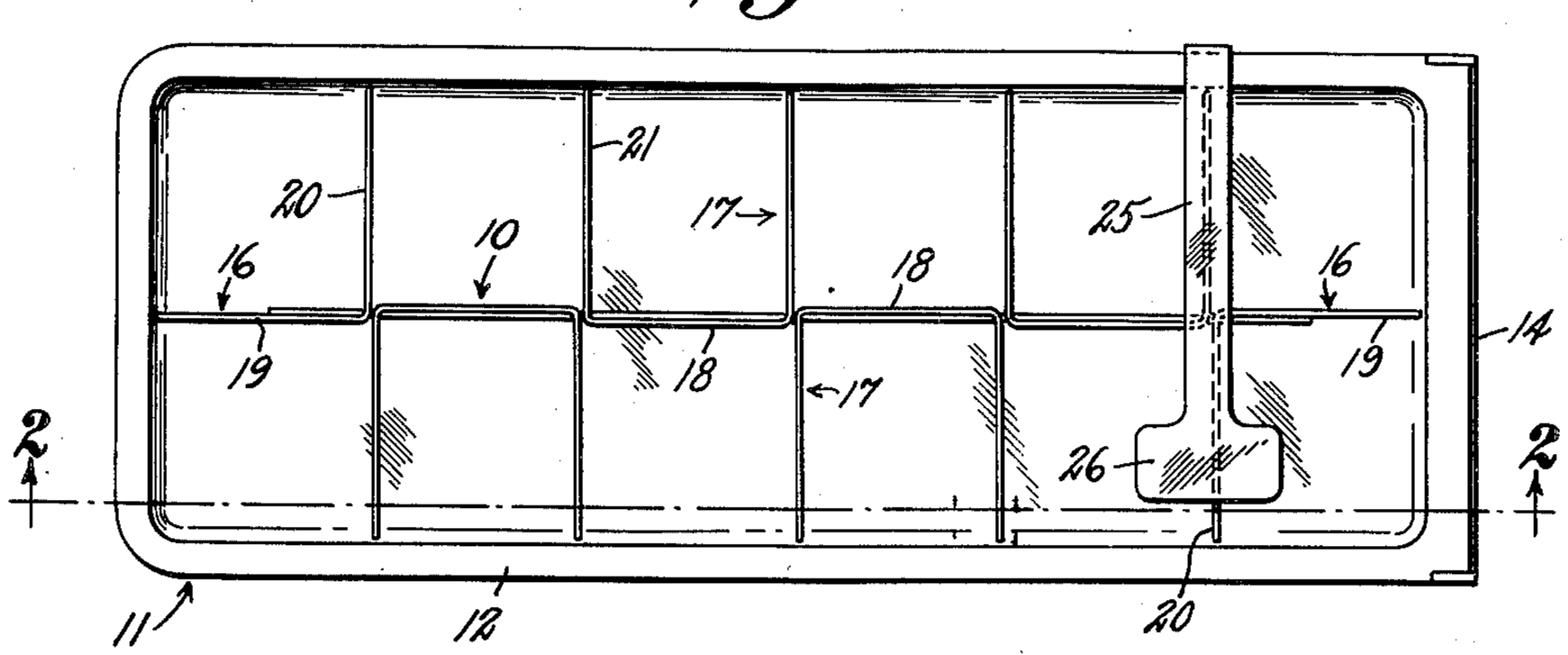


Fig. 2.

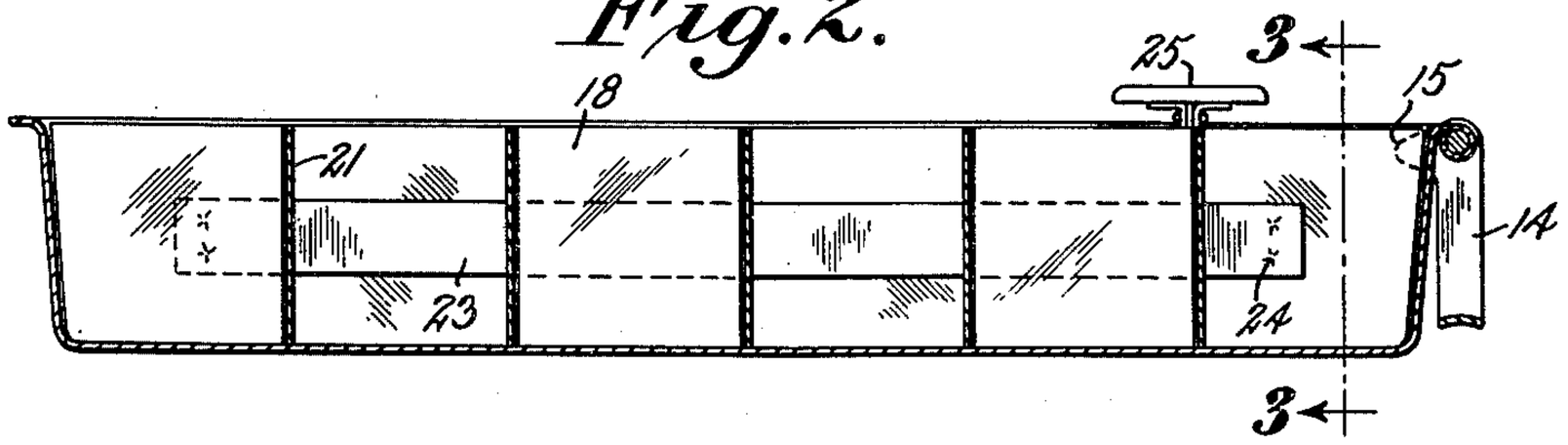


Fig. 3.

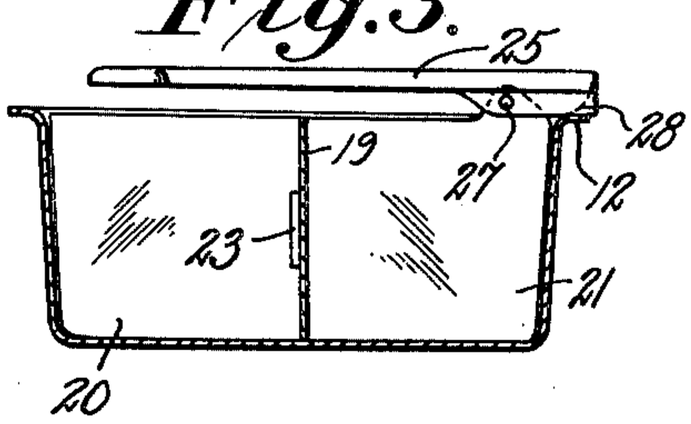


Fig. 4.

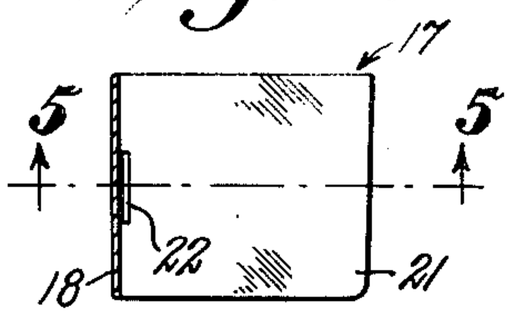


Fig. 6.

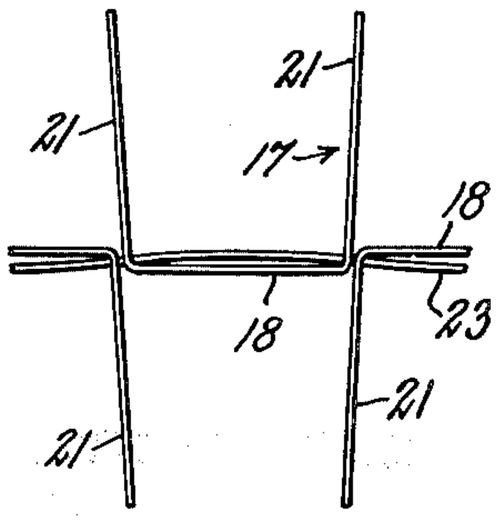
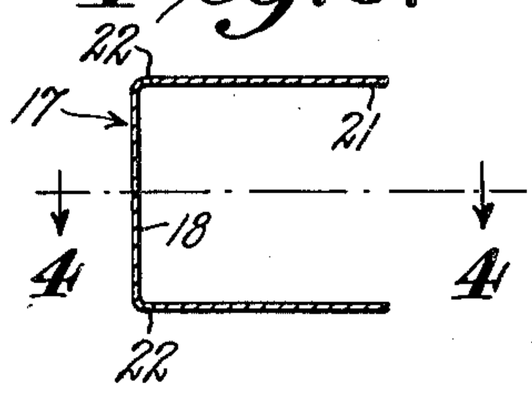


Fig. 5.



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UNITED STATES PATENT OFFICE

2,184,112

REFRIGERATION

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In Germany August 14, 1936

8 Claims. (Cl. 62—108.5)

This invention relates to refrigeration, and more particularly to ice trays and grids for use in production of ice cubes in refrigerators.

It is an object of this invention to provide an improved flexible grid which is of simple construction and from which ice cubes can easily be removed by twisting or bending the grid.

Another object of this invention is to provide an improvement for mechanically ejecting a grid from a tray whereby the ice bond is readily broken between the tray and ice cubes frozen therein.

The above and other objects and advantages of this invention will be better understood from the following description taken in conjunction with the accompanying drawing forming a part of this specification, and of which Fig. 1 is a plan view of an ice tray and grid embodying the invention; Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1; Fig. 3 is a sectional view taken on line 3—3 of Fig. 2; Fig. 4 is a vertical sectional view, taken at line 4—4 of Fig. 5, of an intermediate U-shaped member of the grid; Fig. 5 is a sectional view taken on line 5—5 of Fig. 4; and Fig. 6 is a fragmentary plan view of the grid to illustrate the shape that it assumes when it is bent.

In Fig. 1 a grid 10 is shown positioned in an ice tray 11 having resilient bottom and side walls. The tray is preferably made of suitable metal, such as aluminum or stainless steel, for example, and about the upper edges of the side walls is provided an outward extending flange 12. A U-shaped handle 14, having projections 15 adapted to bear against the underside of flange 12, is pivotally connected to an end of the tray to facilitate the removal thereof from a cooling element of a refrigerator.

The grid 10 consists of a plurality of L-shaped end members 16 and intermediate U-shaped members 17 arranged to form a longitudinal partition and a plurality of spaced transverse partitions or dividing members. The closed ends 18 of the U-shaped members 17 and one side 19 of the L-shaped end members 16 are substantially in alignment to provide the longitudinal partition. The other side 20 of the end members 16 and the open sides 21 of the intermediate members 17 extend from the longitudinal partition to the longitudinal side walls of the tray, the sides 20 and 21 of adjacent members 16 and 17 extending in opposite directions to provide the transverse partitions or dividing members.

In the sides 20 and 21 of the members 16 and 17, and closely adjacent to the portions thereof forming the longitudinal partition, are provided vertical slots 22, as shown most clearly in Figs. 4 and 5, which are about one-third the height of the members. The members 16 and 17 are held together by a strip 23 which extends through the slots 22 and is secured at its ends at 24, as by welding, for example, to the sides 19 of the L-shaped members 16.

The members 16 and 17 forming the vertical partitions of the grid may be stamped from thin sheet metal, such as stainless steel or aluminum. The resilient strip 23 interlocks the members 16 and 17 and preferably is made of a metal, such as stainless steel, so that it will be mechanically durable and will effectively transmit the bending and torsional forces imparted thereto when the grid is twisted and bent.

At one end of the grid is provided a lever 25 for mechanically removing the grid from the tray. The lever 25 is provided with a handle portion 26 and is pivotally connected at 27 to a raised part of a transverse partition formed by an end U-shaped member 17. The lever 25 extends beyond the pivotal connection 27 toward the longitudinal side wall of the tray and is adapted to bear against the flange 12 when it is in its horizontal position, as shown in Fig. 3.

In using the grid just described, the grid is positioned in a tray and the latter is filled with water. After the water has been frozen and ice cubes have been produced by placing the tray in a cooling element of a refrigerator, the tray is removed from the cooling element with the aid of handle 14. The grid 10 is removed from tray 11 by raising lever 25, and with such lifting movement a separating force is exerted between the grid and the tray.

By applying the separating force at a corner of the tray at which region the elasticity of the tray is relatively small, the danger of deforming the tray is at a minimum even though considerable force is applied to a tray side wall to effect separation of the grid and tray. The separating force first breaks the ice bond at the corner of the tray. With continued upward movement of lever 25, the breaking away of the ice takes place approximately diagonally of the tray. By first breaking the ice bond at one corner of the tray, the tray is loosened from the ice with what may be referred to as a "rolling-off" action.

The provision of a lever which extends transversely of the tray and acts on a longitudinal side wall adjacent the corner of the tray is particularly suited for a flexible grid of the type described. The so-called "rolling-off" action that

takes place when the ice is loosened from the tray is aided by the fact that the grid may be twisted. The twisting movement is imparted to the resilient strip 23 whereby a torsional force is progressively transmitted along the length of the strip and to the member 16 and 17.

In some instances it may be desirable to pivot the lever 25 substantially at the center of the tray. While a direct separating force may be exerted between the grid and tray wall under these conditions, the deformation of the longitudinal side wall usually is sufficient to break the ice bond at the surface of the ice. After the ice bond is broken at the surface of the ice and at the tray side wall, the ice is readily loosened from the tray with continued upward movement of the lever. When it is desired to effect removal of the grid from the tray in this manner, the portion of the lever bearing against the tray may be rounded, as indicated by the dotted line 28 in Fig. 3, to produce a wedging action between the side wall of the tray and the rounded edge of the lever. With such wedging action the tray side wall is forced outward and springs away from the ice adhering thereto.

To remove the ice cubes from the grid 10 the latter is bent to distort the strip 23 and flex the members 16 and 17. When the grid is twisted the torsional force imparted to the strip 23 causes the latter to assume approximately the shape shown in Fig. 6, whereby the ice cubes are effectively released from the grid. If desired, the flexibility of the grid may be increased by securing only one end of strip 23 to an end partition member 16. This permits longitudinal movement of the members 16 and 17 along the strip 23 when the grid is bent to facilitate the removal of the ice cubes from the grid.

Instead of providing the closed slots 22 in the partition members 16 and 17, slots may be provided which are open at the top or bottom of the partition members. In such case the slots may be closed after the strip has been inserted in the slots or a member provided to block any movement of the strip out of the slots.

In making a grid 10 the members 16 and 17 may be assembled on a long strip or band of material. After the end members 16 are secured to the band, as by welding, the strip may be cut at the end members 16. Instead of providing L-shaped end members 16, all of the members assembled on the strip may be U-shaped. Certain of the U-shaped members may be cut into two parts to provide the end partition members having only two sides.

Although a particular embodiment of the invention has been shown and described, it will be apparent that various modifications and changes may be made without departing from the spirit and scope of the invention, and that certain features may be employed independently of others, as pointed out in the following claims.

What is claimed is:

1. A grid unit for refrigerators including a plurality of U-shaped partitions or wall members, the closed ends of said members being substantially in alignment and the sides of adjacent members extending in opposite directions from the longitudinal axis of the grid unit, said members having vertically extending slits in the sides thereof adjacent the closed ends, and a flat strip extending through the slits to hold said members together as a unit.

2. A grid unit for refrigerators including a plurality of individual L-shaped end members and U-shaped intermediate members, certain of the sides of said L-shaped members and the closed ends of said U-shaped members being substantially in alignment and serving as a longitudinal partition, the sides of adjacent members normal to the longitudinal partition extending in opposite directions therefrom and serving as transverse partitions, said members having openings in the sides thereof extending from the longitudinal partition, and an element extending through said openings to hold said members together as a unit.

3. In ice freezing apparatus, the combination of a tray body, a grid removably fitting into said tray body and including a centrally disposed longitudinal partition and transverse partitions, and a lever pivoted on one of said transverse partitions at a region removed from said longitudinal partition and cooperating with only one wall of said tray near a corner thereof to lift said grid from said tray.

4. A grid unit for refrigerators comprising a plurality of partition elements each having two or more side walls joined together, openings arranged one at each juncture of two of said side walls, and a strip extending through the openings to hold said partition elements together, said strip being disposed substantially in the plane of certain of said side walls.

5. A grid unit for refrigerators comprising a plurality of metallic partition elements each having a longitudinally extending portion and one or more transversely extending portions joined thereto, a resilient metallic member extending substantially the length of the grid unit in a vertical plane adjacent to said longitudinally extending portions and upon which said partition elements are mounted, and said resilient metallic member being sufficiently durable mechanically to effectively transmit bending and torsional forces imparted thereto when the grid unit is twisted and bent.

6. In combination with an ice freezing tray having a bottom and side walls, a grid including a longitudinal partition and transverse partitions, and a lever operatively connected to one of said transverse partitions and adapted upon movement thereof to cooperate with a side wall parallel to the longitudinal partition and at a region offset with respect to the medial longitudinal and transverse axes of the tray to exert a separating force between the grid and the tray.

7. A grid member removably fitting into an ice tray member having a bottom, end walls and longer longitudinal side walls, and manually operable means attached to said grid member and including a part transverse to the longitudinal side walls adapted to cooperate with the tray member at a region offset with respect to the medial longitudinal and transverse axes of the tray member to break the ice bond and loosen the grid member from the tray member.

8. A grid unit for refrigerators comprising a plurality of partition elements having longitudinally extending portions in alignment and one or more transversely extending portions connected to each of said longitudinally extending portions, said transversely extending portions of said partition elements each having an opening adjacent each juncture of two of said portions, and a metallic strip passing through the openings to hold said elements together.

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