March 17, 1942. J. W. JACOBS 2,276,491

REFRIGERATING APPARATUS

Filed June 27, 1940 3 Sheets-Sheet 1

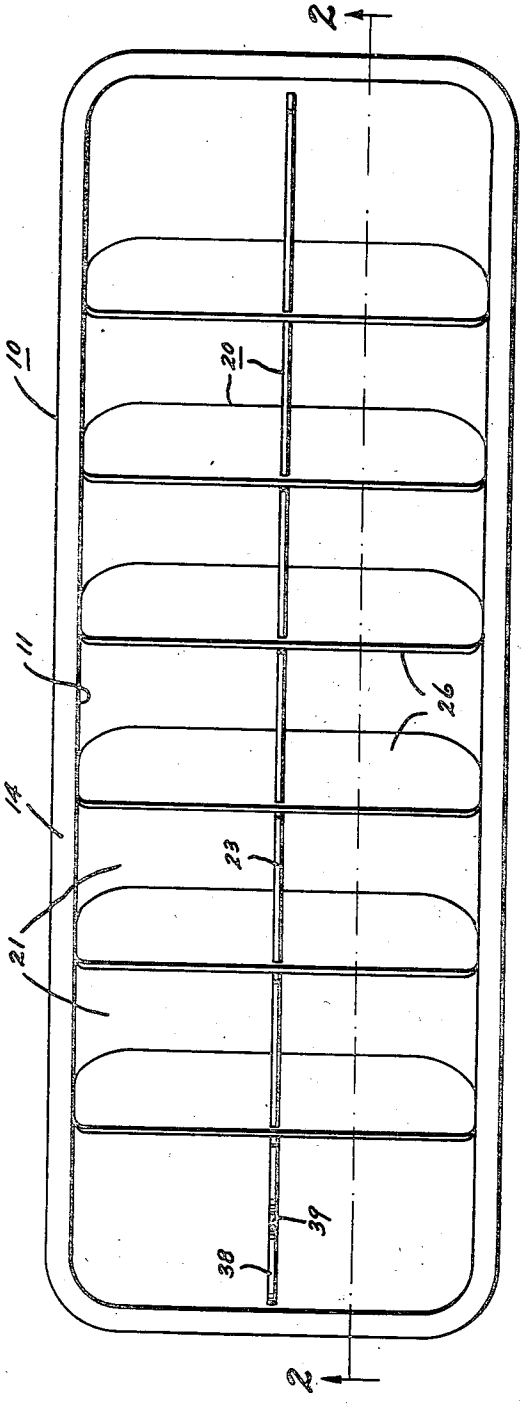


Fig. 1

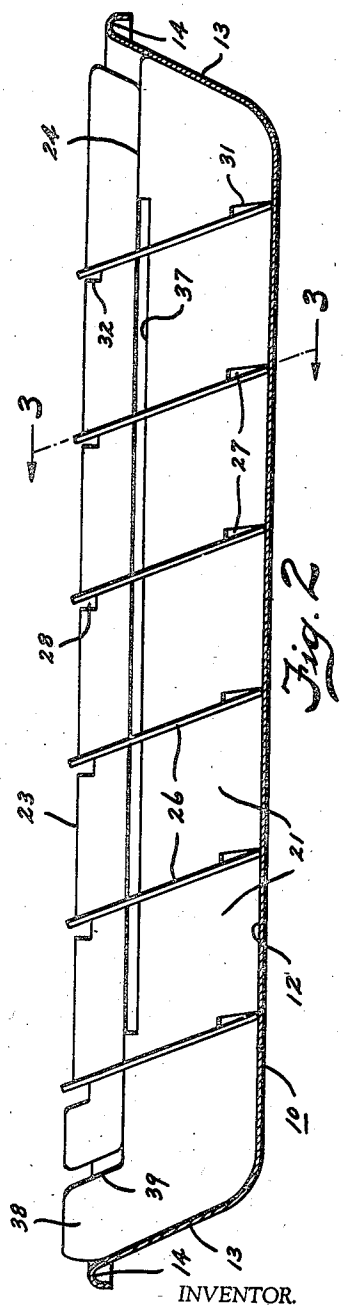


Fig. 2

INVENTOR.
JAMES W. JACOBS.
BY
Spencer, Wardman and Fahr.
HIS ATTORNEYS.

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Filed June 27, 1940 3 Sheets-Sheet 2

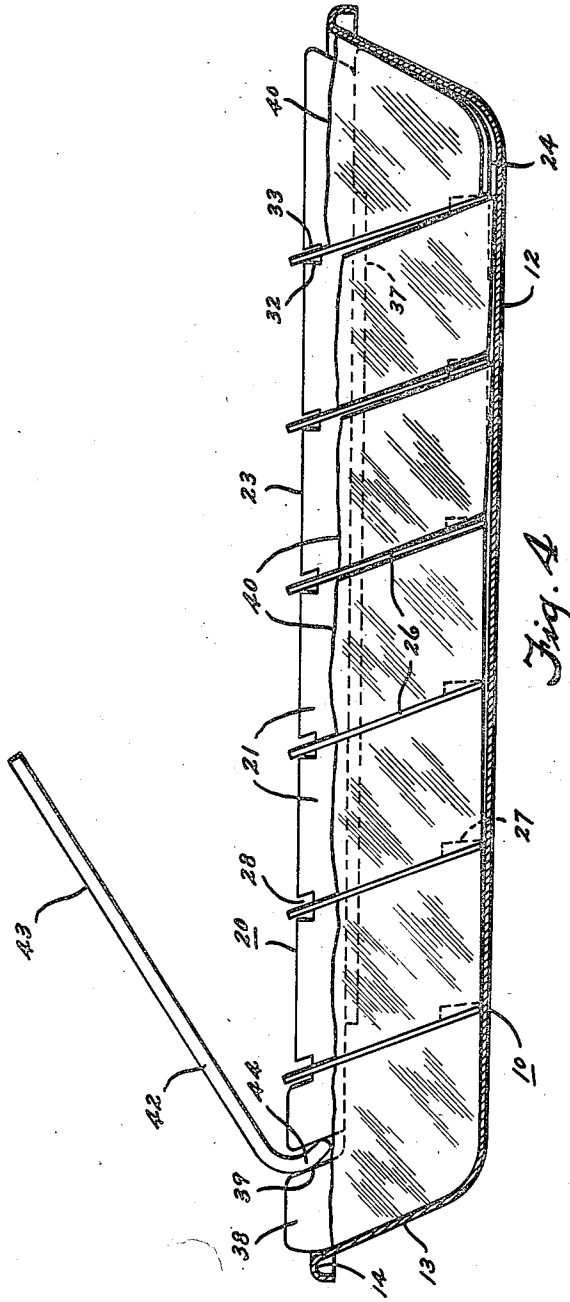


Fig. 4

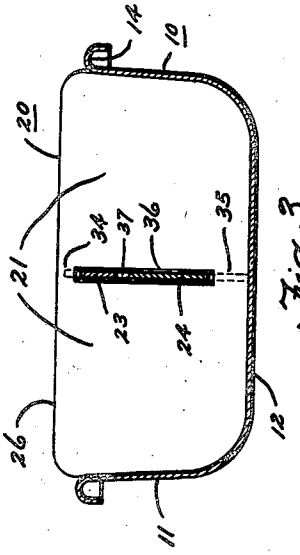


Fig. 3

INVENTOR.
JAMES W. JACOBS.

BY Spencer, Hardman and Fehr.
HIS ATTORNEYS.

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Filed June 27, 1940 3 Sheets-Sheet 3

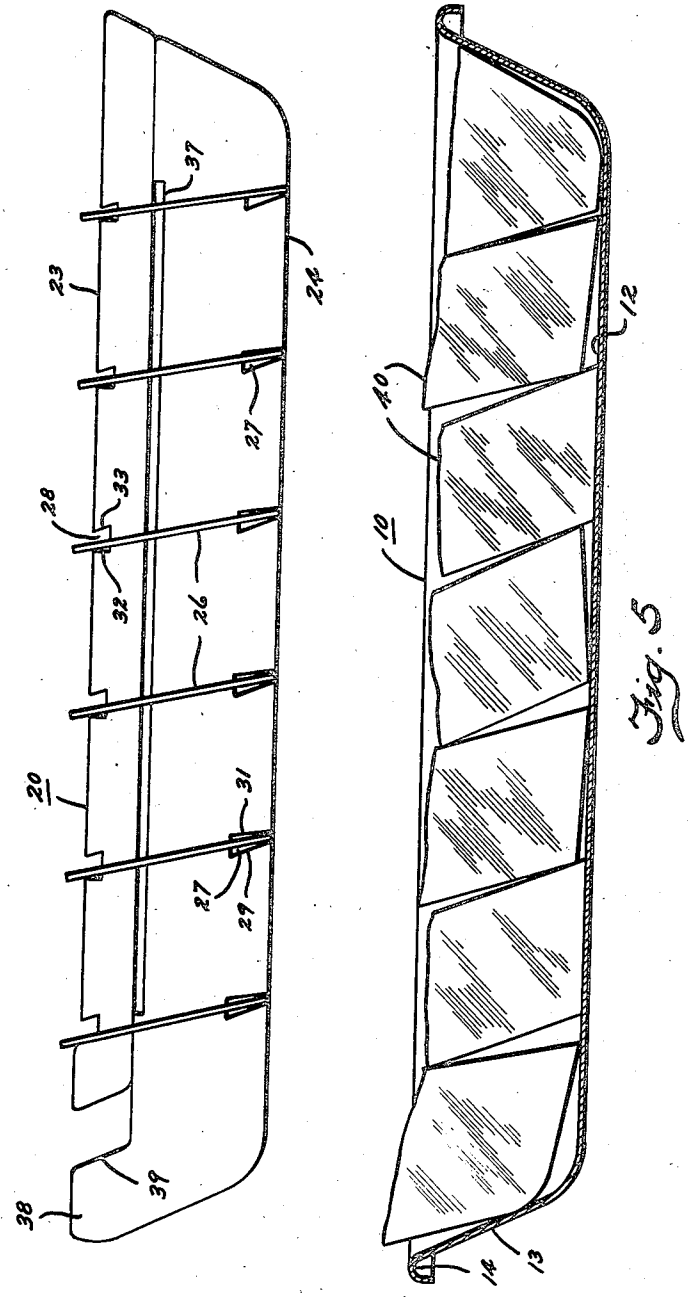


Fig. 5

INVENTOR.
JAMES W. JACOBS.

BY
Spencer, Hardman and Fehr.
HIS ATTORNEYS.

Patented Mar. 17, 1942 2,276,491

UNITED STATES PATENT OFFICE

2,276,491

REFRIGERATING APPARATUS

James W. Jacobs, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application June 27, 1940, Serial No. 342,755

3 Claims. (Cl. 62—108.5)

This invention relates to freezing devices for use in household refrigerators and particularly to ice trays and grids therefor.

The general object of my invention is to provide a freezing device of the type including a tray and a grid removably disposed therein for dividing the interior of the tray into a plurality of ice block forming compartments which grid comprises inflexible metal partitions movable relative to one another to release ice blocks from the tray and grid in order to avoid the necessity of applying heat to the device.

Another object of my invention is to provide a grid structure for an ice tray wherein a plurality of cross partitions are all moved substantially at the same time by a single member which engages each of the partitions and is moved by a lever that is detachable from the grid.

A further object of my invention is to provide a grid for an ice tray having a two-part longitudinal partition and a plurality of cross partitions movably interlocked therewith and connected together by connections which maintain the partitions in a normal ice block forming position and wherein movement of one part of the two-part longitudinal partition lengthwise relative to the other part thereof moves all the cross partitions and wherein the connections of the partitions are constructed and arranged to cause all the cross partitions and said one part of the longitudinal partition to simultaneously return to their respective normal positions by gravity after being moved.

A still further and more specific object of my invention is to provide a grid of the type described in the preceding objects with inclined cross or transverse partitions that are tilted toward but not into the vertical whereby the weight of the inclined partitions moves same back into a normal ice block forming position and such movement thereof causes their operating member or the one part of the longitudinal partition to move back into its normal position relative to the other part of the longitudinal partition.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a top plan view of a freezing device including a tray and a grid constructed in accordance with the present invention disposed in the tray;

Fig. 2 is a side view of the freezing device shown in Fig. 1 and is taken on the line 2—2 thereof;

Fig. 3 is a vertical transverse sectional view taken on the line 3—3 of Fig. 2 showing the interlocking arrangement of the movable partitions of the grid;

Fig. 4 is a view similar to Fig. 2 with ice blocks in the device and showing some of the blocks loosened from the tray and grid and showing the grid elevated relative to the tray; and

Fig. 5 is a view showing all the ice blocks removed from the grid and the grid removed from the tray.

Referring to the drawings, for the purpose of illustrating my invention, I have disclosed a freezing device comprising a metal tray 10 having side walls 11, a bottom wall 12 and opposed end walls 13. The tray walls 11 and 13 diverge outwardly toward the top of the tray to facilitate the removal of ice therefrom. Walls 11 and 13 of tray 10 have their upper edge rolled or bent over to form a rim 14 which extends continuously around the top of the tray to stiffen same.

A unitary metallic grid structure, generally represented by the reference character 20, is removably disposed within tray 10 and divides the interior of the tray into a plurality of rows of open top compartments 21 (see Figs. 1 and 2). The grid structure 20 includes a longitudinal partition, composed of an upper inflexible metal part or member 23 and a lower inflexible metal part or member 24 disposed one above the other in substantially the same vertical plane, and a plurality of spaced apart inflexible metal partitions 26 extending transversely through the plane of the longitudinal partition to form walls of the compartments 21. The complementary parts or members 23 and 24 of the longitudinal partition are arranged for movement relative to one another. Lower part 24 of the longitudinal partition is provided with a plurality of spaced apart slots or notches 27 extending upwardly a short distance from its bottom edge. Upper part or member 23 of the longitudinal partition is provided with a plurality of spaced apart slots or notches 28 extending downwardly a short distance from its top edge. The slots or notches 27 include upright walls 29 and 31 (see Fig. 5), both inclined in the same general direction with respect to the vertical but at different angles relative to one another. The slots or notches 28 include upright walls 32 and 33 (see Fig. 5) which are spaced apart a greater distance relative to one another from one end to the other end of the part or member 23 for a purpose to be pres-

ently described. The slots or notches 27 and 28 in members or parts 24 and 23 respectively cooperate with one another to receive upper and lower bounding or web portions 34 and 35 of an opening 36 cut in the transverse partitions 26 (see Fig. 3). Thus, the two parts 23 and 24 of the longitudinal partition extend through and are movably locked to the plurality of transverse partitions 26 to provide a removable unitary grid structure. It is to be noted that the top edge of member 24 is cut away as at 37 to facilitate assembly of the partitions together and to reduce the sliding contact or friction of part 23 upon part 24. One end of part or member 24 is raised as at 38 and disposed in horizontal alignment with the part or member 23. The part or member 23 of the longitudinal partition is shorter than the part 24 thereof and, when in a normal position with respect to part 24, provides a space between its end and the side wall 39 of the raised end portion 38. This space between the end portion of parts 23 and 24 of the longitudinal partition is provided to receive a tool or lever for applying force between the parts to move same in the manner and for the purpose to be presently described. Since the walls 29 and 31 of slots 27 are both inclined in the same general direction with respect to the vertical, the transverse partitions 26 lie against the slot wall 29 to normally dispose the partitions 26 in parallel relation and at an angle with respect to the vertical in the normal ice block forming position as shown in Fig. 2 of the drawings. The normal inclined disposition of the partitions 26 provides the compartments 21 with a parallelogram form in one direction of cross section therethrough.

Water is placed in the device and the device is positioned in or on a cooling element of a refrigerating system to freeze the water by the refrigerating effect produced by the element. After the water has been frozen, in the form of ice cubes or blocks 40 in compartments 21, the device is removed from the cooling element prior to harvesting the ice blocks from the tray 10 and grid 20. In Fig. 4 of the drawings I show a lever 42, having a handle portion 43 and a cam portion or end 44, that has been detachably applied to the freezing device. The cam portion or end 44 of lever 42 has been inserted in the space between the one end of upper part 23 of the longitudinal partition and the raised end portion 38 of the lower part 24 thereof. The lever 42 has been slightly elevated to cause the end 44 thereof to apply force between the parts 23 and 24 of the longitudinal partition and this force has moved the upper part 23 lengthwise relative to the lower part 24 of the longitudinal partition. In applying this force between the relatively movable parts of the longitudinal partition, the tip of the end 44 of lever 42 engages the end of the part 23 and the rounded or camming surface of the end portion 44 of the lever bears or fulcrums against the edge or shoulder surface 39 of the raised portion 38 of part 24. Movement of the lever 42 from its original position of application to the grid structure to the position thereof shown in Fig. 4 to slide part 23 lengthwise of part 24 of the longitudinal partition causes the walls 32 of slots or notches 28 to engage and apply force to the transverse partitions 26 to tilt same toward the vertical. Transverse partitions 26 pivot about the lower edge of the part 24 of the longitudinal partition within the slots 27 and upon being tilted toward the vertical the ice blocks 40 are broken away from the tray 10 and grid 20. The force employed to break the ice blocks 40 loose from the tray and grid also causes the grid and other ice blocks bonded thereto to be broken away from the tray. This latter function is inherent in the device disclosed since the ice blocks 40 in the end of the structure, opposite the end to which the lever is detachably applied, are forced against the one end 13 of the tray 10 and are caused to move upwardly relative to the tray. Breaking of the grid 20 together with the ice blocks 40 still bonded thereto from the tray 10 permits the grid to be removed from the tray, if desired. The lever 42 may then be further elevated to cause further movement of the part 23 of the longitudinal partition lengthwise relative to the other part 24 thereof. This further movement of part 23 and partitions 26 is limited by the construction and arrangement of the slotted interconnections of the partitions. For example, web portion 35 of the end transverse partition 26 strikes the wall 31 of slot 27 to stop the end partition from being moved into the vertical. This position of the grid structure 20 is illustrated in Fig. 5 of the drawings wherein all the transverse partitions 26 are shown as having been moved from their normal inclined ice block forming position toward but not into the vertical. The normal inclination of the partitions 26 and their movement toward the vertical in addition to breaking the ice blocks 40 loose from the grid also causes enlargement of the compartments 21 which permits the loosened ice blocks to fall freely from the grid structure 20 into the tray 10 or other suitable receptacle.

Since all the transverse partitions 26 are still disposed in an inclined position with respect to the vertical after they have been moved from their normal inclined ice block forming position toward the vertical, their weight is disposed on one side of their pivot point and their weight, upon detachment of lever 42 from the grid 20, will cause same to move by gravity, from their manually moved position shown in Fig. 5, back into their normal ice block forming position shown in Fig. 2 of the drawings. The interlocking connection of the transverse partitions 26 with the upper part 23 of the longitudinal partition causes sliding of the part 23 back into its normal position with respect to the part 24 along with the return of the partitions 26 to their normal inclined position. The transverse partitions 26 may, if desired, be simultaneously tilted but are preferably sequentially tilted in order to reduce the force required to be applied by lever 42. In the present disclosure, the spacing of the walls 32 and 33 of each slot 28 progressively further apart from one end to the other end of the grid structure causes sequential tilting of the transverse partitions 26. This sequential or progressive tilting of the partitions 26 divides the force required to release ice blocks into a plurality of forces, taking place at different positions of elevation of the lever 42 to thereby prevent damage to the grid structure and to make the lever more readily movable.

From the foregoing it will be apparent that I have provided an improved grid structure for disposition in a tray of a liquid freezing device, which structure is of low cost and wherein a detachable lever may be employed to move all the movable partitions substantially at the same time or with one operation of the lever as distinguished from a lever that is applied at a plurality of points along the grid structure in sep-

arate and successive operations. I have eliminated the necessity of permanently mounting a lever on each grid and a single lever thereby serves as a device for moving the movable grid walls of a plurality of freezing devices in a household refrigerator cabinet. The construction and arrangement of the partitions of my improved grid structure are such that the partitions of the grid will return by gravity to their normal ice block forming position after all the ice blocks are removed therefrom. By this latter feature I have eliminated one of the reasons why it has heretofore been deemed necessary to permanently attach a lever to each gird structure.

While the form of embodiment of the invention as herein disclosed, consitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A unitary removable grid for an ice tray comprising, a longitudinal partition composed of a lower part and an upper part disposed in substantially the same vertical plane and movable lengthwise relative to one another, a plurality of spaced apart partitions extending transversely to said longitudinal partition and having connections with each of said parts thereof to form the sole means for securing said partitions together, the connections of said transverse partitions with said parts of said longitudinal partition being so constructed and arranged as to maintain said upper part of said longitudinal partition in a normal predetermined position relative to said lower part thereof and to maintain said transverse partitions in a normal inclined position with respect to the vertical, detachable means adapted to engage and apply force between said parts of said longitudinal partition for moving one of said parts lengthwise relative to the other part thereof to cause tilting of said transverse partitions toward the vertical, and the connections of said transverse partitions with said parts of said longitudinal partition also being constructed and arranged to limit the relative lengthwise movement of said parts and prevent some of said transverse partitions from being tilted into the vertical whereby said transverse partitions and said one part of said longitudinal partition will return by gravity to their respective normal positions when said means is detached from said grid.

2. A structure constructed in accordance with claim 1 wherein the lengthwise movement of said upper part of said longitudinal partition relative to the lower part thereof causes tilting of said transverse partitions progressively from one portion to another portion of the grid.

3. A unitary removable grid for an ice tray comprising, a longitudinal partition composed of a lower part and an upper part disposed in substantially the same vertical plane and movable lengthwise relative to one another, a plurality of spaced apart partitions extending transversely to said longitudinal partition and having connections with each of said parts thereof to form the sole means for securing said partitions together, said lower part of said longitudinal partition having a raised end portion disposed in horizontal alignment with said upper part thereof, the connections of said transverse partitions with said parts of said longitudinal partition being so constructed and arranged as to normally maintain an end of said upper part of said longitudinal partition in predetermined spaced relation to the raised end portion of said lower part thereof and to maintain said transverse partitions in a normal inclined position with respect to the vertical, a detachable lever adapted to be inserted in the space between the aligned ends of said parts of said longitudinal partition for applying force to said parts to move said upper part lengthwise relative to said lower part and cause tilting of said transverse partitions toward the vertical, and the connections of said transverse partitions with said parts of said longitudinal partition also being constructed and arranged to limit the relative lengthwise movement of said parts and prevent some of said transverse partitions from being tilted into the vertical whereby said transverse partitions and said upper part of said longitudinal partition will return by gravity to their respective normal positions when said lever is detached from said grid.

JAMES W. JACOBS.