March 27, 1951 R. E. MOORE 2,546,769

FREEZING TRAY

Filed May 28, 1947

Fig. 1.

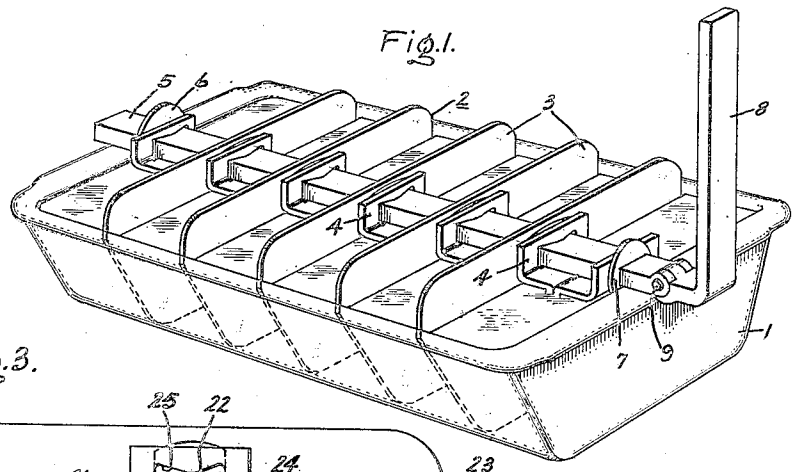


Fig. 3.

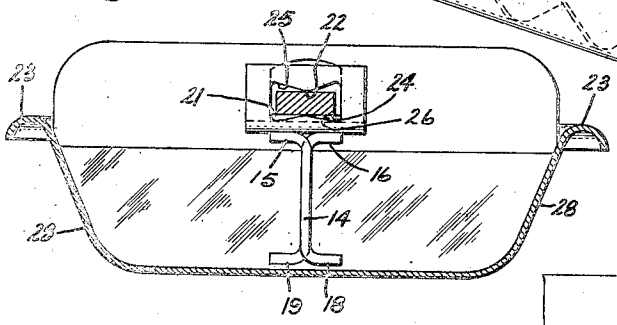


Fig. 4.

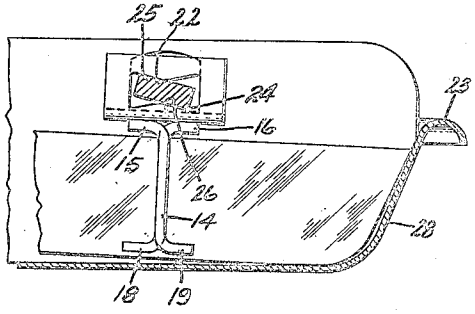


Fig. 2.

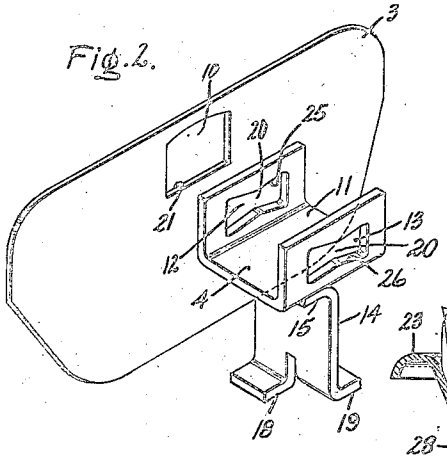
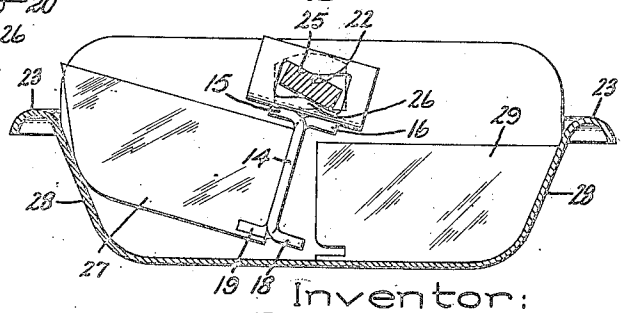


Fig. 5.



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UNITED STATES PATENT OFFICE

2,546,769

FREEZING TRAY

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Application May 28, 1947, Serial No. 751,075

8 Claims. (Cl. 62—108.5)

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My invention relates to freezing trays employed in refrigerating machines for the production of ice blocks and more particularly to arrangements for mechanically releasing the ice blocks.

Many types of refrigerating apparatus, particularly apparatus for household use, are provided with freezing trays for producing ice. Partitions are commonly provided in such freezing trays in order to divide the tray into a number of small compartments for freezing ice in the form of small blocks or cubes. It is desirable to effect the release of the ice blocks from the partitions and from the tray without the necessity of thawing, which would result in a loss of some of the ice.

It is an object of my invention to provide a freezing tray having a partition assembly comprising a plurality of partition elements and including an improved arrangement for facilitating the breaking loose and removal of ice blocks from the tray and the partition assembly.

It is another object of my invention to provide a partition assembly for freezing trays comprising a plurality of partition elements forming a plurality of ice block compartments and including an improved arrangement for retaining the partition elements in assembled relation and for accommodating relative movement between the partition elements to facilitate the release of ice blocks therefrom.

It is a further object of my invention to provide a partition assembly for freezing trays comprising a plurality of partition elements forming a plurality of ice block compartments and including an improved arrangement for effecting movement of some of said partition elements to secure release of the ice blocks.

Further objects and advantages of my invention will become apparent as the following description proceeds and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing in which Fig. 1 is a perspective view of a freezing tray and partition assembly embodying my invention; Fig. 2 is an exploded view showing details of the partition elements; Fig. 3 is a transverse sectional elevation view; Fig. 4 is a fragmentary view similar to Fig. 3 showing the ice releasing elements in a different position; and Fig. 5 is a transverse sectional elevation view similar to Fig. 3 showing the ice releasing elements in still another position.

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Briefly the freezing tray illustrated in the drawings includes a shallow tray and a partition assembly removably mounted in the tray to provide a plurality of ice block compartments. The partition assembly is composed of a plurality of transverse separators and a plurality of longitudinal separators, all of the separators being assembled on a bar extending longitudinally of the tray. The separators and the bar are so related that initial turning of the bar causes a camming action which is effective to lift some of the separators relative to the others and a further turning movement of the bar is effective to swing some of the separators relative to the others. The successive actions resulting from the turning of the bar effect a release of the ice blocks from the separators and from the tray and move the blocks into position for ready removal from the tray.

Referring now to the drawing, I have shown a shallow rectangular freezing tray 1 and a removable partition assembly 2 mounted therein to provide a plurality of ice block compartments. The partition assembly includes a plurality of transverse separators 3 and a plurality of longitudinal separators or ice block lifters 4. In order to facilitate the arrangement of the separators as a unitary assembly and also to provide an operating element for effecting release of the ice blocks as hereinafter described, a cam member or bar 5 is arranged longitudinally of the tray, and alternate longitudinal and transverse separators are assembled thereon. Washers 6 and 7 are provided on the bar 5 adjacent the end separators. If desired, these washers may be of a resilient type adapted to snap into grooves provided in the bar in order that the partition assembly may be handled as a unit when removed from the tray. Since the partition assembly merely rests within the tray 1, it may be removed readily therefrom when desired, and it may also be used with any freezing tray having sloped sides as shown in the drawing.

In order to obtain sufficient leverage for easily releasing the ice blocks by the turning of the bar 5, an operating arm 8 is pivoted on the bar by a pivot pin 9. The operating arm 8 is shown in Fig. 1 in an upwardly extending position which it occupies when release of the ice blocks is being effected. During the freezing operation, the operating arm 8 may be swung about the pivot pin 9 to a horizontal position wherein it rests on the top edges of the transverse separator elements. Although the operating arm 8 has been illustrated assembled to the bar 5, it will be apparent that the arm may, if desired, be made separate from the bar and adapted to be placed in engage-

ment with a projecting end of the bar when release of ice blocks is to be effected.

Referring now to Fig. 2, wherein a transverse separator element 3 is shown in detail, it can be seen that the separator is provided with an opening 10 near its top edge for facilitating assembly of the separator on the bar 5. This opening is wider than the width of the bar 5 and is substantially higher than the thickness of the bar 5 in order to permit the bar to turn freely within the opening 10 without causing movement of the transverse separator. Each of the longitudinal separators, or ice block lifters, 4 includes a U-shaped upper portion 11 having openings 12 and 13 in the two upwardly extending sections of the U-shaped portion for facilitating assembly of the separator on the bar 5. A second portion 14 is secured to the lower surface of the U-shaped portion 11 in any suitable manner, as by welding, and extends downwardly therefrom to provide a wall of an ice block compartment. To facilitate securing of the section 14 to the upper portion 11 the former is provided with laterally extending flanges 15 and 16. Similar outwardly extending flanges 18 and 19 are provided at the lower extremities of the section 14 in order to provide a substantial surface for effecting a lifting action on the ice blocks. Each of the openings 12 and 13 is elongated and flares toward both ends from a narrow portion or neck 20 at the center. The width of this narrow portion is substantially equal to the thickness of the bar 5. The bar 5 thus may rock in the openings about its central longitudinal axis.

Referring now to Fig. 3, it can be seen that, in order to provide for relative movement between the longitudinal separators and the transverse separators when the bar 5 is turned, the bar is arranged to rest on the lower surface 21 of the opening 10 in each of the transverse separators, and the surface 22 at the narrow central portion of each of the openings 12 and 13 of the longitudinal separators rests on the top surface of the bar. In order to insure that the bar 5 is supported on the transverse separators, the tray is made of such depth that the rim 23 of the tray is below a plane extending through the lower surfaces 21 of the openings 10.

When it is desired to release the ice blocks from the tray the operating arm 8 is first lifted to the vertical position as shown in Fig. 1, and the arm is then forced either to the right or to the left. Assuming that the arm has been moved to the right as shown in Fig. 4, that is in a clockwise direction, a corresponding turning movement of the bar 5 is effected. During this initial movement of the bar 5 to the position shown in Fig. 4 the bar pivots about its lower righthand edge 24 and the central portion of the top surface of the bar presses against the surface 22 of each of the longitudinal separators at the narrow central portions 20 of the openings 12 and 13 therein. This causes a lifting of the longitudinal separators as the bar is turned and results in a relative movement of these separators with respect to the transverse separators 3, since the pressure of the righthand edge 24 of the bar against the surfaces 21 of the transverse separators prevents any movement of the transverse separators. The action resulting from this initial turning movement of the bar is a lifting action of the longitudinal separators or ice block lifters 4. The relative movement between the longitudinal separators and the transverse separators during this period is sufficient to break the ice blocks loose from the transverse separators and from the tray. There is no turning movement of the longitudinal separators during this period because of the flared construction of the openings 12 and 13 therein. It can be seen from Fig. 4 that the bar 5 is able to move through the angle which the bar in that figure bears to the horizontal before it comes in contact with the surfaces 25 and 26 of the flared openings.

After the bar has been turned into contact with the surfaces 25 and 26, a further turning movement of the bar is accompanied by a corresponding turning or swinging movement of the separators 4. This is illustrated in Fig. 5, wherein the bar 5 has been turned through an angle greater than the limited angle shown in Fig. 4. This turning movement of the longitudinal separators results in a forcing of the loosened ice blocks on the lefthand side of the longitudinal separators, one such ice block being indicated at 27, toward the lefthand side of the freezing tray. In order to prevent a binding of the ice blocks against the sides of the tray during this turning movement of the longitudinal separators, the sides of the tray are inclined outwardly as indicated at 28. At the same time, it will be noted from Fig. 5 that the longitudinal separators have broken free from the right-hand ice blocks, one of which is indicated at 29. Since the sections 14 of the longitudinal separators tend to flex during this turning movement, the ice blocks 27 are normally freed from the longitudinal separators and are moved toward the side of the tray for ready removal. However, in any event, should the ice blocks 27 stick to the separators they are forcibly broken loose when the separators are turned in the opposite direction to remove the ice blocks 29 from the tray. The ice blocks 29 have, of course, been broken loose from the separators and from the tray during the initial lifting action and the subsequent turning movement of the longitudinal separators to remove ice blocks 27, and they may be easily removed when the separator is turned in the opposite, that is, counterclockwise direction. If desired, the bar 5 may, of course, be first turned in a counterclockwise direction to break the ice blocks loose and to remove the ice blocks 29 from the tray and then reversed to remove the ice blocks 27.

Although I have shown the entire cam member or bar 5 as being of a rectangular cross section, it will be apparent that the bar may be of any desired cross sectional shape and only the portions adjacent the openings in the separators need be rectangular in cross section for exerting pressure against the longitudinal and transverse separators to cause the successive lifting and turning movement of the longitudinal separators.

The broad idea of providing a swinging movement of a longitudinal separator between the two members of a pair of stationary transverse separators and about a longitudinal axis in the upper portion of the partition assembly is not my invention but is described and claimed in a copending application of Robert R. Hobson, Serial No. 750,992, filed May 28, 1947, now Patent No. 2,509,000, issued on May 23, 1950 and assigned to the same assignee as the present invention.

While I have illustrated specific embodiments of my invention, it will be apparent that my invention is not limited to the specific construction

shown and described, and I intend by the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination with a freezing tray, a partition assembly, said assembly including a bar extending longitudinally of said tray, a plurality of transverse separators mounted on said bar and forming walls of ice block compartments, each of said transverse separators having an opening for receiving said bar, a plurality of longitudinal separators mounted on said bar and forming walls of ice block compartments, each of said longitudinal separators having an opening of such size as to permit the turning of said bar through a limited angle without resultant turning movement of said longitudinal separators, said bar engaging said longitudinal separators and said transverse separators during movement through said limited angle to lift said longitudinal separators relative to said transverse separators, and means for turning said bar through an angle greater than said limited angle whereby a turning movement is imparted to said longitudinal separators.

2. In combination with a freezing tray, a partition assembly, said assembly including a bar extending longitudinally of said tray, a plurality of transverse separators forming walls of ice block compartments and having openings therethrough, said bar extending through said openings, a plurality of longitudinal separators forming walls of ice block compartments and having openings therein for receiving said bar, each of said openings in said longitudinal separators having a central vertical dimension substantially equal to the thickness of the bar and flaring toward both sides to provide dimensions of greater size than the thickness of said bar whereby said bar may be turned through a limited angle without causing turning of said longitudinal separators, and means for effecting turning of said bar through more than said limited angle to cause turning movement of said longitudinal separators for positioning the ice blocks for ready removal from the tray.

3. In combination with a freezing tray, a partition assembly, said assembly including a bar extending longitudinally of said tray, a plurality of substantially stationary transverse separators forming walls of ice block compartments, each of said transverse separators having an opening therein, said bar extending through said openings and resting on the bottom surface of each of said openings, a plurality of longitudinal separators mounted on said bar and forming walls of ice block compartments, each of said longitudinal separators having an opening therein for receiving said bar, each of said openings in said longitudinal separators being substantially equal to the thickness of the bar at the center of said opening and flaring to a larger dimension at each edge, and means for turning said bar for effecting release of the ice blocks, the initial turning movement causing a pivoting of said bar about its edge on said transverse separators to raise the central longitudinal axis of said bar whereby said longitudinal separators are lifted to effect a breaking loose of said ice blocks, further turning movement of said bar effecting a swinging movement of said longitudinal separators to move the ice blocks laterally of the tray.

4. In combination with a freezing tray, a partition assembly, said assembly including a plurality of transverse separators forming walls of ice block compartments, each of said separators having an opening therein, a bar of rectangular cross section arranged longitudinally of said tray and extending through said openings, said bar resting on the bottom surface of each of said openings, a plurality of longitudinal separators forming walls of ice block compartments, each of said longitudinal separators having an opening therein for receiving said bar, each of said longitudinal separators being supported on said bar, and means for turning said bar whereby said bar pivots about one edge on the bottom surfaces of said openings in said transverse separators to lift said longitudinal separators relative to said transverse separators for releasing said ice blocks.

5. In combination with a freezing tray, a partition assembly, said partition assembly including a plurality of transverse separators forming walls of ice block compartments, each of said transverse separators having an opening therein, a bar of rectangular cross section extending through said openings and resting on the bottom surfaces thereof, and a plurality of longitudinal separators forming walls of ice block compartments, each of said longitudinal separators having an opening therein for mounting said longitudinal separators on said bar, each of said last-named openings having one vertical dimension substantially equal to the thickness of said bar and flaring to a larger vertical dimension.

6. In combination with a freezing tray, a partition assembly, said partition assembly including a plurality of transverse separators assembled on said bar and forming walls of ice block compartments, each of said transverse separators having an opening therein, a bar of rectangular cross section extending through said openings and resting on the bottom surfaces thereof, a plurality of longitudinal separators assembled on said bar and forming walls of ice block compartments, each of said longitudinal separators having an opening therein for mounting said longitudinal separators on said bar and means for turning said bar to lift said longitudinal separators relative to said transverse separators, each of said longitudinal separators including portions extending laterally therefrom for lifting the ice blocks adjacent thereto.

7. In combination with a freezing tray, a partition assembly, said partition assembly including a bar of rectangular cross section extending longitudinally of said tray, a plurality of transverse separators forming walls of ice block compartments, each of said transverse separators having an opening therein sufficiently large to permit turning movement of said bar therein, said bar extending through said openings and resting on the bottom surfaces thereof, a plurality of longitudinal separators forming walls of ice block compartments, each of said longitudinal separators having an opening therein for mounting said longitudinal separators in aligned relationship on said bar, and means for turning said bar to cause said bar to pivot about an edge thereon on said bottom surfaces of said openings in said transverse separators and to engage said longitudinal separator for imparting lifting motion to said longitudinal separators relative to said transverse separators, each of said longitudinal separators including laterally extending portions for facilitating the lifting the ice blocks adjacent thereto.

8. In combination with a freezing tray having sloping side walls, a partition assembly, said as-

sembly including a plurality of transverse separators forming walls of ice block compartments, each of said transverse separators having an opening therein, a plurality of longitudinal separators forming walls of ice block compartments, each of said longitudinal separators having an opening therein, a bar of elongated cross section extending through said openings in said transverse and said longitudinal separators, said bar engaging both said transverse separators and said longitudinal separators, and means for effecting a

turning movement of said bar to lift said longitudinal separators relative to said transverse separators and for effecting a further turning movement of said bar to swing said longitudinal separators for moving said ice blocks laterally over the sloping side walls of said tray for ready removal from said tray.

ROBERT E. MOORE.

No references cited.