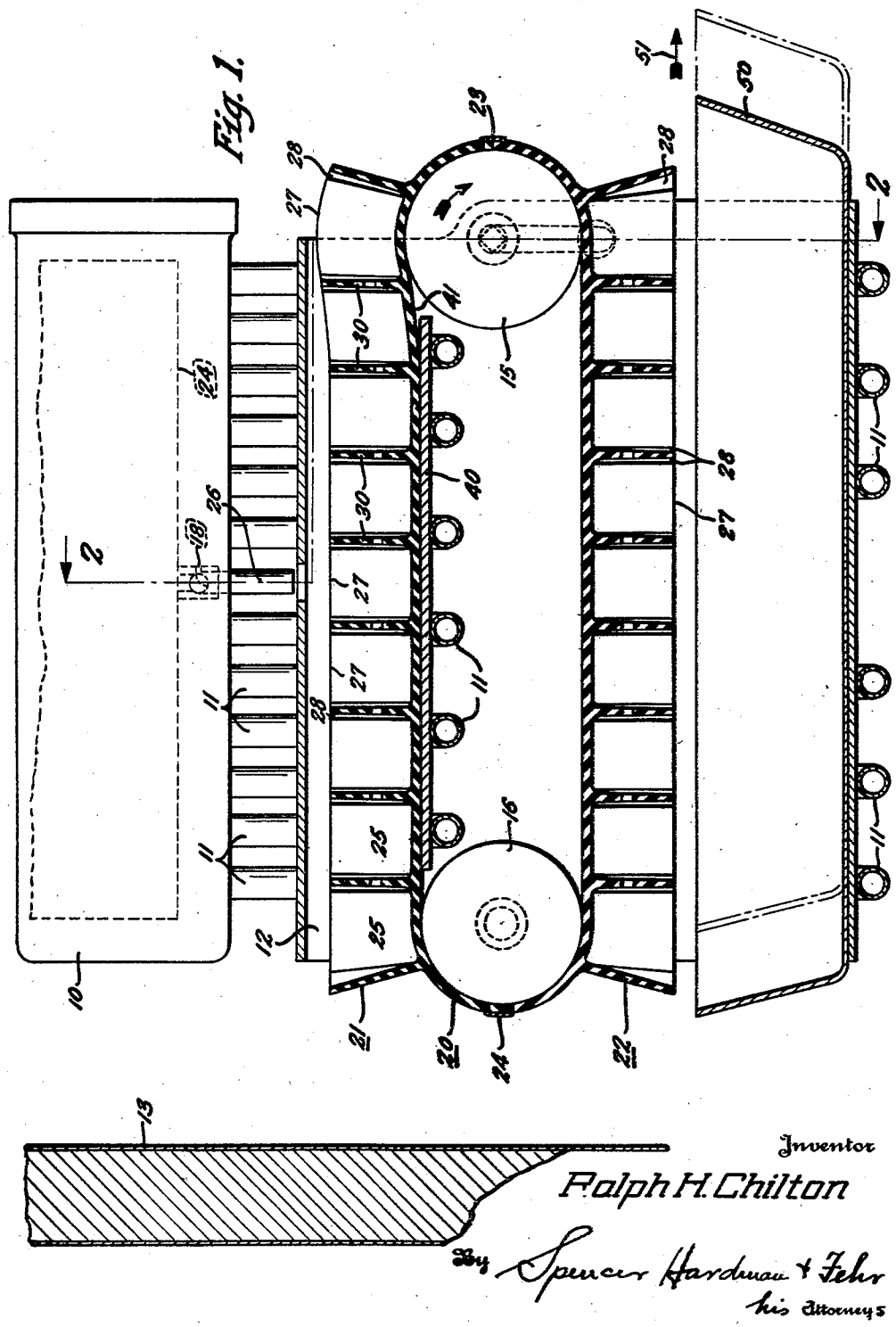
Dec. 31, 1935. R. H. CHILTON 2,026,214

FREEZING DEVICE

Original Filed Nov. 25, 1931 2 Sheets-Sheet 1

Fig. 1.



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Original Filed Nov. 25, 1931 2 Sheets-Sheet 2

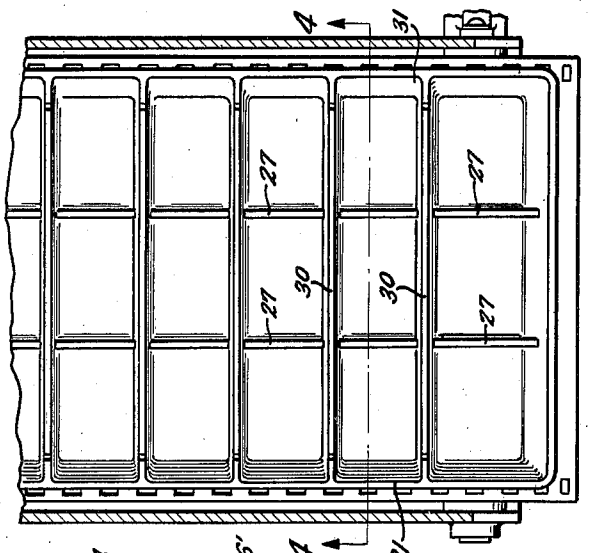


Fig. 3.

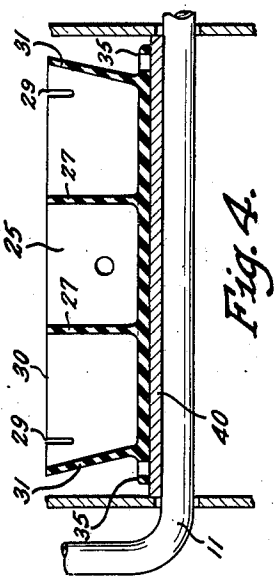


Fig. 4.

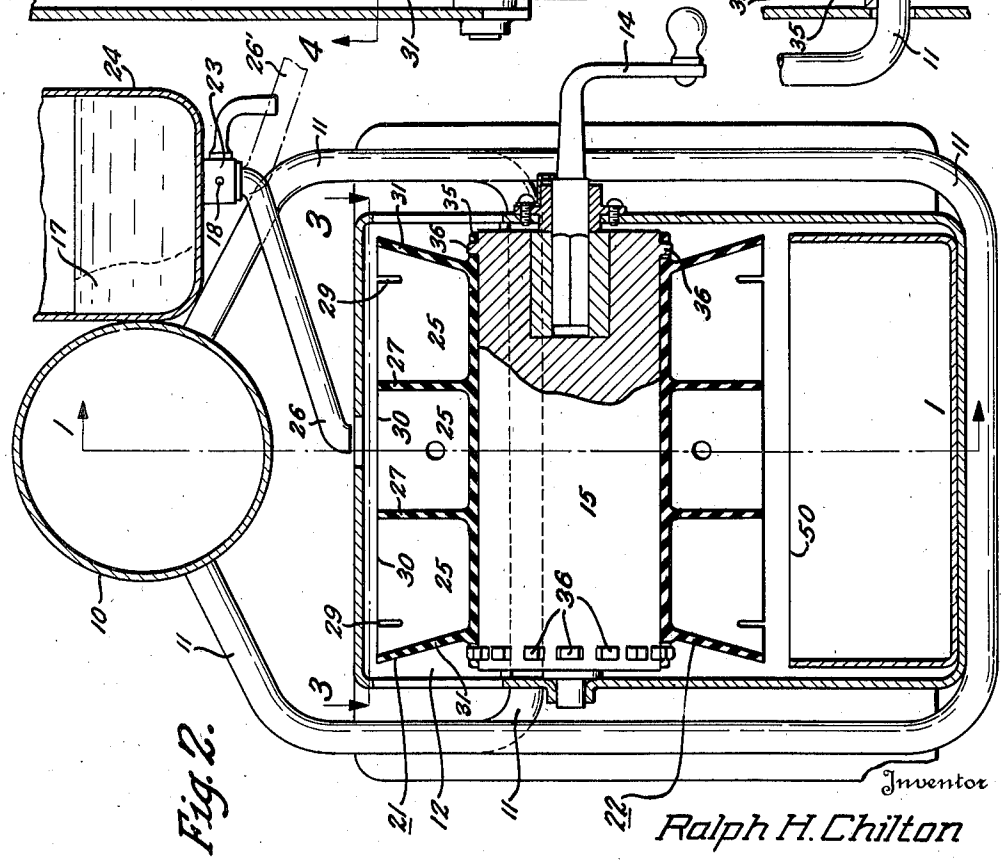


Fig. 2.

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Patented Dec. 31, 1935 2,026,214

UNITED STATES PATENT OFFICE

2,026,214

FREEZING DEVICE

Ralph H. Chilton, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application November 25, 1931, Serial No. 577,222
Renewed April 10, 1935

16 Claims. (Cl. 62—108.5)

This invention relates to a container and associated means for freezing ice in a freezing compartment of a refrigerator.

An object of the invention is to provide a highly flexible freezing container and means for moving it from its freezing position in the freezing compartment to an ice-removing position and simultaneously bending it partially around a roller to facilitate the removal of the frozen contents.

A more specific object is to provide such a container carried by a continuous flexible belt mounted upon rollers and moved by the rotation of one of said rollers to cause the container to bend around said driving roller to facilitate the removal of the ice.

Another object is to provide a series (two or more) of containers carried by the flexible belt, each having a plurality of interconnecting ice pockets therein and each being movable to a filling position where all the pockets of one container may be filled with water to the desired level from a single water supply while said belt is stationary. If there were interconnecting ice pockets in a long flexible container extending around either of the rollers it would not be possible to fill only the upper portion of said container since the water would run out through the interconnecting pockets where the container bends down around one or both rollers. In order to provide high flexibility to the container preferably both the longitudinal and transverse partitions are slotted, thus forming the interconnections between the ice pockets. By this invention the length of the belt is divided into a series of separate containers whereby each container may have the interconnecting ice pockets throughout its length and yet there will be no chance for the water to leak or run out at the belt rollers. This feature of filling all the pockets of one container at one time is especially advantageous since no means is required for filling each pocket or transverse row of pockets as it passes over the rear roller to its up position. By filling a large number of pockets at one time while the belt is stationary, as is possible by this invention, the filling means may be greatly simplified whether it is automatic or manually controlled. In the form illustrated herein, a single manually controlled valve serves as the simple means for filling each entire container after it is turned to its up or freezing position, the slotted partitions permitting the water to run into and fill all the pockets to the same level.

A further feature of this invention is the refrigerated metal plate upon which the flexible container directly rests while freezing takes place, thus greatly enhancing rapidity of freezing due to rapid conduction of heat through the bottom of said container.

A further feature is the elevation of the driving roller slightly above said metal freezing plate whereby the flexible container is more easily pulled loose from said plate if it is frozen thereto.

A further feature of the invention is the mounting of the water reservoir used for filling the freezing containers in a location whereby the water therein will be maintained at or only slightly above 32° F. and the means for preventing the freezing up of the filling duct leading from said reservoir to a point adjacent the container.

A further feature of the invention is the inclination of the longitudinal side walls of the flexible container and the slotted construction of the transverse and longitudinal partitions thereof which facilitates the bending of the container around the rollers upon which it is mounted.

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 embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a somewhat diagrammatic view of the organization of this invention, showing a longitudinal section of a continuous belt carrying two containers mounted upon two rollers within a freezing compartment of a cooling unit of a domestic refrigerator.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 shows a plan view of the flexible container and is taken on line 3—3 of Fig. 2.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Similar reference characters refer to similar parts throughout the several views.

10 designates the refrigerant tank and 11 the duct loops leading therefrom and surrounding the freezing compartment 12 of the cooling unit, which may be located in the upper portion of a refrigerator box, in a manner well known. The rear wall of the box is shown at 13 in Fig. 1 to illustrate how the cooling unit comprising this invention is preferably spaced from the rear wall. Two rotatable drums 15 and 16 are suitably mounted within freezing compartment 12 to carry the continuous flexible belt 20 and the containers 21 and 22 carried thereby. In the form shown,

the two containers 21 and 22 are molded each in one piece of flexible soft rubber after the manner of molding the ordinary rubber ice tray. Then the two are connected together at their ends at 23 and 24 by any suitable splices or joining means to form the continuous belt 20 which is mounted upon drums 15 and 16. Drum 15 is shown as having a crank handle 14 for manually rotating same to cause the containers 21 and 22 to move as a belt around said drums and switch places with each other. Container 21 may be filled with water, when in its top position as shown in Figs. 1 and 2, by turning the handcock 23 which lets water run by gravity from the reservoir 24 through duct 26 and fill all the ice pockets 25 of the entire container 21 while it remains in the position shown.

A special feature of this invention is the construction of the containers whereby they are sufficiently rigid to support themselves when filled with water as described above, and at the same time are sufficiently flexible to pass around the drums 15 and 16. The longitudinal partitions 27 are not continuous but stop short of each transverse partition 30 leaving the slots 28, as clearly shown in Fig. 1. The transverse partitions 30 are preferably continuous across the container to give suitable support to the outwardly inclined side walls 31 against outward distortion under the weight of the contained water. However in order to more easily permit side walls 31 to buckle outwardly when passing around the drums 15 and 16 short slots 29 are preferably provided in the upper portions of transverse partitions 30. Of course the deeper the slots 29 are the greater will be the bending flexibility of the container around the drums, but the less will be the staying effect of partitions 30 upon the side walls 31. The best balance between these two can be readily obtained by trial for a given design simply by varying the depth of slots 29.

The flexible container preferably has its bottom projecting laterally on each side to form flanges 35 which have holes molded therein to mesh with sprocket teeth 36 on drum 15. By this means a very strong tractive pull can be exerted by the driving drum 15 to pull the container free from a possible frosted bond with the metal plate 40 which supports the container between the two drums. Another aid in freeing the rubber container 21 from plate 40 is obtained by causing the container to rise up from plate 40 at point 41 as it passes to drum 15 (see Fig. 1). It will be clear that when drum 15 is rotated in the direction of the arrow it will tend to break loose the frozen bond at point 41 and this loosening will progress along the length of plate 40 due to the progressing change in angle of the container bottom and also due to a slight stretching of the flexible rubber bottom when it is put under tension by the rotation of drum 15.

In operation, container 21 is moved to the position shown and filled with water from tank 24 by the hand operated cock 23. Since the water will run into all the pockets 25 the operator can easily see when the desired level is reached and then shut off cock 23. Tank 24 is preferably adjustably located with one side adjacent the refrigerant boiler 10 so that some ice 17 will form therein on that side only, which will maintain the rest of water in tank 24 very slightly above 32° F. without danger of freezing same. The cock 23 when turned to shut off the water opens up a vent hole 18 (see Fig. 2) which permits all the water in duct 26 to immediately run out into container 21. Also duct 26 may be arranged to swing laterally about a pivot connection 19 at cock 23 to an adjacent position above freezing temperature immediately after the filling operation. Thus all difficulties of water freezing in duct 26 and causing it to clog with ice are prevented.

Now since container 21 is filled with water very nearly the freezing point it will be frozen therein very rapidly, due to the surrounding cold air and the refrigerated metal plate 40 immediately adjacent the bottom of the container.

To remove the frozen ice blocks from the container the operator slowly turns crank 14 which progressively pulls the container loose from its frosted bond with plate 40 as described above, and as the container due to its great flexibility as described above bends around drum 15 the ice blocks are loosened and may be either picked therefrom by hand or allowed to drop down into the removable ice pan 50 which serves as an ice reservoir where the ice blocks may be kept without melting. Thus only several ice blocks may be removed at one time, or all may be dumped into pan 50, which preferably is pulled slightly forward in direction of arrow 51 during this dumping operation. If container 21 is entirely emptied at one time, as described, the lower container 22 will then be in its filling and freezing position. It is then filled with cold water as above described and the operation repeated. With this device the following advantages are inherent: (1) ice is very rapidly produced since the container is filled with water very near its freezing point; (2) the removal of the frozen blocks is simply done by any child or unskilled person without possibility of damage to any parts by the simple turning of a crank; (3) the ice blocks need no washing since they need not be touched by hand during removal but may all be dumped into the removable pan 50 and then carried to the user in said pan 50; (4) there is no messy filling of a removable freezing tray at the kitchen sink with a consequent wetting of the outside of the tray, which wetting ordinarily causes such a tray to be later tightly frozen in place and hence hard to remove; (5) the flexible container is kept absolutely sanitary since it is not removed and carried around by hand to various places and need never be touched by hand at all.

It is to be understood that the principles of this invention may be readily applied to any form of cooling unit having a freezing compartment and that the particular form of cooling unit here disclosed is chiefly for the purpose of illustrating applicant's invention as defined by the claims.

While the form of embodiment of the present invention as herein disclosed, constitutes 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. In a refrigerator having a freezing chamber, in combination, a flexible belt mounted upon rotatable drums so as to pass through said freezing chamber, driving means for said drums, and a flexible non-metallic freezing container on said belt and elongated in the direction of movement of said belt and having partitions therein to divide the frozen contents into blocks, said partitions having slots therein so located as to open and thereby facilitate the passing of said container around said drums and the ejection of the frozen blocks from said container.

2. In a refrigerator having a freezing chamber,

in combination, a flexible belt mounted upon rotatable drums so as to pass through said freezing chamber, driving means for said drums, and a flexible non-metallic freezing container on said belt and elongated in the direction of movement of said belt and adapted to pass around said drums with said belt when said drums are rotated to eject the frozen contents from said container, said container having a longitudinal partition having a series of slots therein to facilitate the bending of said container around said drums and the ejection of the frozen blocks therefrom.

3. In a refrigerator having a freezing chamber, in combination, a flexible belt mounted upon rotatable drums so as to pass through said freezing chamber, driving means for said drums, and a flexible non-metallic freezing container on said belt and elongated in the direction of movement of said belt, and adapted to pass around said drums with said belt when said drums are rotated to eject the frozen contents from said container, said container having slotted transverse partitions therein to facilitate the bending of said container around said drums and the ejection of the frozen blocks therefrom.

4. In a refrigerator having a freezing chamber, in combination, a flexible belt mounted upon rotatable drums so as to pass through said freezing chamber, driving means for said drums, and a flexible non-metallic freezing container on said belt and adapted to pass around said drums with said belt when said drums are rotated to eject the frozen contents from said container, said container having slotted transverse partitions and a slotted longitudinal partition therein to facilitate the bending of said container around said drums and the ejection of the frozen contents therefrom.

5. In a refrigerator having a freezing chamber, in combination, a flexible belt mounted upon rotatable drums so as to pass through said freezing chamber, driving means for said drums, and a flexible non-metallic freezing container on said belt and adapted to pass around said drums with said belt when said drums are rotated to eject the frozen contents from said container, said container having outwardly inclined flexible side walls and transverse partitions aiding in supporting said side walls while stationary against undue outward flexure under the weight of the contained liquid, said transverse partitions having a slot therein to facilitate the bending of said container around said drums and the ejection of the frozen contents therefrom.

6. In a refrigerator having a freezing chamber, in combination, a flexible belt mounted upon rotatable drums so as to pass through said freezing chamber, driving means for said drums, and a flexible non-metallic freezing container on said belt, said container having transverse partitions and a longitudinal partition slotted between said transverse partitions to facilitate the bending of said container around said drums and the ejection of the frozen contents therefrom.

7. In a refrigerator having a freezing chamber, in combination, an elongated highly flexible freezing container having continuous longitudinal side walls and mounted upon rotatable rollers so as to pass longitudinally through a freezing position in said freezing chamber, said elongated container having a series of transverse partitions therein forming longitudinally arranged individual ice pockets, means for filling said container while in its freezing position, and means for rotating said belt and adapted to pass around said drums are to bend therearound whereby to facilitate the freeing of its frozen contents therefrom.

8. In a refrigerator having a freezing chamber, in combination, a highly flexible elongated freezing tray movably mounted in said freezing chamber so as to be capable of being moved longitudinally from its freezing position to an ice-removing position, said elongated tray having a series of transverse partitions therein forming longitudinally arranged individual ice pockets, and roller means for moving said tray and bending it partially around said roller to facilitate the removal of its frozen contents.

9. In a portable automatic refrigerator including a chilling unit, a flexible belt having pockets therein, means for filling said pockets with precooled liquid from a tank within said refrigerator, means placing a portion of said belt in heat exchange relation to said chilling unit for freezing said liquid into ice cubes, and means for distorting said belt and thereby ejecting ice cubes therefrom.

10. In a refrigerator having a freezing chamber, in combination, a stationary freezing support in said chamber, a rotatable drum adjacent said freezing support, and an elongated flexible non-metallic freezing container normally resting on said support during freezing of its contents and adapted to pass around said drum when said drum is rotated to eject the frozen contents from said container, said container having flexible side walls which are normally outwardly inclined to such an extent that they will buckle outwardly rather than inwardly when said container bends around said drum.

11. In a refrigerator having a freezing chamber, in combination, an endless belt mounted upon rotatable rollers so as to pass through a freezing position in said chamber, a plurality of elongated flexible freezing containers arranged longitudinally on said belt each having a series of apertured transverse partitions therein forming longitudinally arranged and interconnecting ice pockets so that all the pockets of each container may be filled from a single source without moving said container, a single supply means for filling each container while stationary in its freezing position, and means for rotating one of said rollers to cause each elongated container to bend progressively therearound to facilitate the removal of its frozen contents.

12. In a refrigerator, in combination, a freezing chamber having a stationary metal support therein maintained at freezing temperature, a rotatable drum adjacent said support, an elongated flexible freezing container adapted to move over said metal support and around said drum, said container being normally supported upon said support during freezing of its contents and bonded thereto by condensation frost, said drum being so positioned relative to said support as to tend to lift said belt from said support when said drum is rotated, whereby to facilitate the freeing of any frozen bond between said belt and support.

13. In a refrigerator, in combination, a freezing chamber having a stationary metal support therein, a rotatable drum adjacent said support, an elongated flexible freezing container adapted to move over said support and around said drum, said container being normally supported upon said support during freezing of its contents, the top of said drum being positioned substantially higher than said support so that said flexible container is pulled upwardly at an angle from

the plane of said metal support to its point of contact with said drum when said drum is rotated.

14. In a refrigerator, in combination, a freezing chamber having a metal support therein maintained at a freezing temperature, a freezing container having a flexible bottom wall adapted to rest directly upon said metal support during the freezing of its contents whereby to increase the rate of freezing, and means for progressively flexing said flexible bottom wall so as to facilitate its separation from said metal support and simultaneously moving said container toward an ice removing position.

15. A refrigerating apparatus having a freezing chamber, in combination, a highly flexible elongated freezing tray movably mounted in said freezing chamber so as to be capable of being moved longitudinally from its freezing position to an ice removing position, said elongated tray having a plurality of transverse partitions therein forming longitudinally arranged individual ice pockets, a pair of spaced apart rollers and a refrigerated plate intermediate the rollers for supporting said tray, and means for rotating one of said rollers for causing movement of said tray along said plate and bending thereof partially around one of said rollers to facilitate removal of its frozen contents.

16. A refrigerating apparatus having a freezing chamber, in combination, a highly flexible elongated freezing tray movably mounted in said freezing chamber so as to be capable of being moved longitudinally from its freezing position to an ice removing position, said elongated tray having a plurality of partitions extending longitudinally with the tray and a plurality of transverse partitions therein forming a plurality of individual ice pockets, roller means for moving said tray and bending it partially around said roller to remove the frozen contents therefrom, and said longitudinally extending partitions being separated from the transverse partitions at the intersecting points thereof to facilitate removal of the frozen contents from the tray.

RALPH H. CHILTON.

CERTIFICATE OF CORRECTION.

Patent No. 2,026,214. December 31, 1935.

RALPH H. CHILTON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 75, claim 7, strike out the words "belt and adapted to pass around said drums are" and insert instead the syllable and words tating one of said rollers to cause said container; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of February, A. D. 1936.

Leslie Frazer

(Seal) Acting Commissioner of Patents.