June 2, 1942. B. Y. KINZEY 2,284,907

REFRIGERATING APPARATUS

Filed Dec. 23, 1938

FIG. 1.

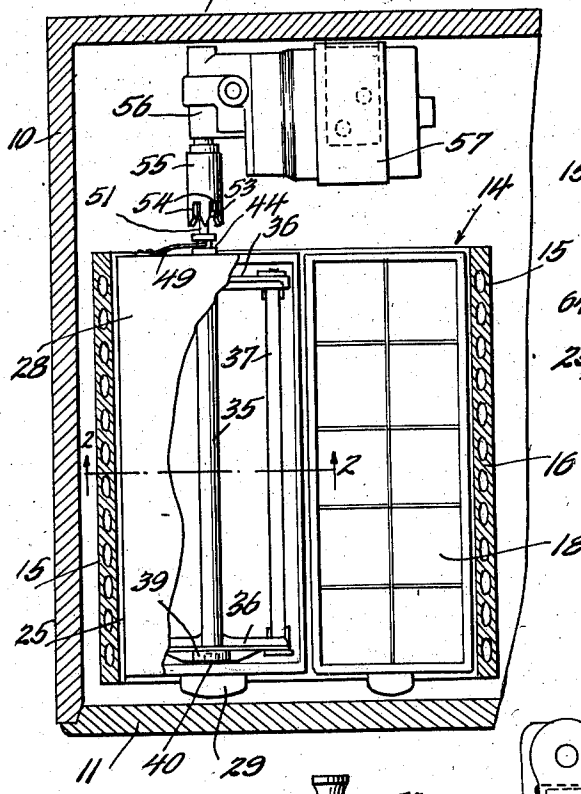


FIG. 2.

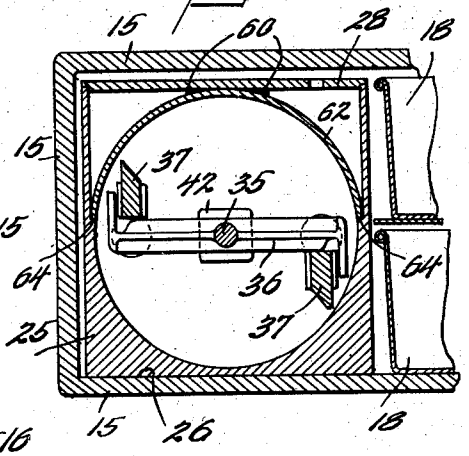
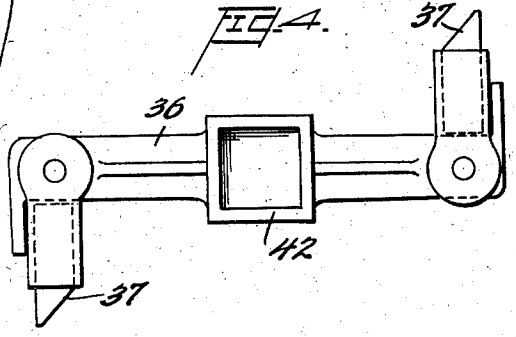


FIG. 4.



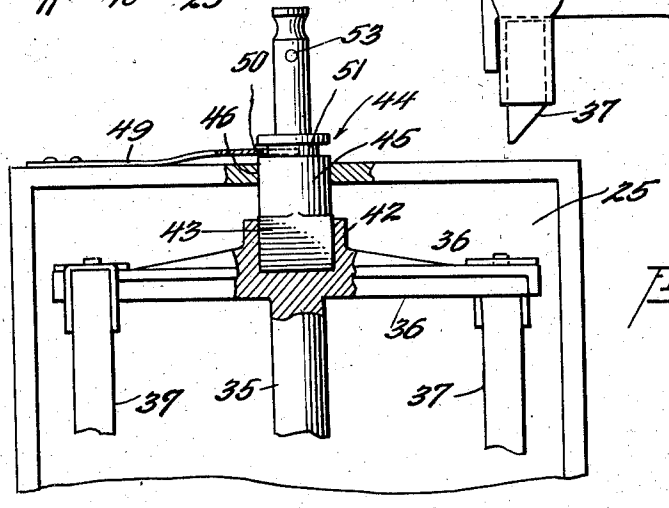


FIG. 3.

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REFRIGERATING APPARATUS

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8 Claims. (Cl. 62—114)

This invention relates to refrigerating apparatus and more particularly to refrigerators of the domestic type embodying a special freezing compartment which is adapted to receive trays for the freezing of ice cubes and the like. It has heretofore been proposed to employ in freezing compartments in such refrigerators a special form of container for the chilling or freezing of dessert mixtures, the container being provided with means such as the conventional dasher for agitating the mixture during freezing to improve the consistency and uniformity of the chilled or frozen product. One such form of apparatus is disclosed in my prior Patent 1,987,258, granted January 8, 1935, which is directed primarily to improvements in the mechanism for operating the dasher.

The present invention is more especially concerned with improvements in the container and dasher and with the driving mechanism immediately associated therewith, and has for an object the provision of a container assembly which may be readily introduced in and removed from the freezing compartment, which is constructed to afford the maximum rate of heat transfer and optimum cooperative relationship between the dasher and container. A further object of the invention is the provision of a container of the character described which prevents leakage of the mixture from the container but facilitates access to the mixture for the removal of a portion thereof without withdrawal of the dasher.

In the preferred form of the invention the container is formed to provide a generally rectangular exterior affording flat surfaces, and a cylindrical or semi-cylindrical interior surface, the exterior being dimensioned for reception in the freezing compartment in such manner as to afford maximum contact with the cold surfaces of the compartment. The container is so formed that the longest dimension thereof is disposed horizontally when in freezing position in the compartment, and the dasher is journalled for rotation on a horizontal axis coincident with the axis of the interior surface. The interior of the container is accessible through an opening in the upper side thereof, whereby the possibility of leakage through the access opening is eliminated, and this opening may be provided with a closure member forming a part of the cylindrical interior surface about which the dasher moves.

A further object of the invention is to provide a container of the type described which is inexpensive to construct, relatively light in weight, and which may be readily manipulated, even by one having no skill with apparatus of this type.

Further objects and features of the invention will be apparent from the following description taken in connection with the accompanying drawing in which:

Figure 1 is a horizontal sectional view of a portion of a domestic refrigerating unit, illustrating the application of the principles of the invention thereto;

Figure 2 is a vertical sectional view taken substantially on the line 2—2 of Figure 1;

Figure 3 is a horizontal view, partly in section, of a portion of the structure shown in Figure 1; and

Figure 4 is an end elevation of the dasher shown in the preceding figures.

In order to facilitate an understanding of the invention, reference is made to the preferred embodiment thereof shown in the accompanying drawing and specific language is employed to describe the same. It will nevertheless be understood that no limitation of the invention is thereby intended, but that various alterations and further modifications thereof are contemplated such as would occur to one skilled in the art to which the invention relates.

As hereinbefore stated, the invention finds its principal application in domestic refrigerating units, and is so illustrated herein. Thus in Figure 1 of the drawing is shown the outside wall 10 of such a unit, the usual door 11 being associated with the open front of the unit. It will be understood that the door and wall are formed in accordance with conventional practice so as to afford effective heat insulation.

The freezing compartment, indicated generally at 14, is defined by four walls 15 in which are disposed the convolutions 16 of a cooling coil, the compartment being generally rectangular in shape and open at the front and rear, and being so dimensioned and constructed as to receive and support a plurality of trays 18 in which ice cubes are formed. The structure thus far described is wholly conventional in domestic refrigerating apparatus and the details thereof form no part of the instant invention.

When it is desired to chill or freeze a special mixture, such as a dessert, one or more of the trays 18 is removed from the freezing compartment and is replaced by a container, indicated generally at 25, which may conveniently be referred to as a dessert container. The container illustrated herein is of such size as to require the removal of two ice trays, and is so dimensioned

as to substantially fill the space normally occupied by such trays, it being necessary first to remove the support for the upper of the two trays. The container 25 is preferably formed so as to define by the exterior surfaces thereof a rectangular parallelopiped, but is open at its upper side to afford access to the interior thereof, the flat bottom surface 26 thereof resting on the base of the cooling compartment and being coextensive with a considerable area of the latter. One side face extends in parallel and contiguous relation to the adjacent side wall of the freezing compartment, and the height of the container is such that the upper edges of the latter are disposed in proximity to the upper wall of the compartment. The open upper side of the container may be closed, if desired, by a cover plate 28 which rests on the upper edges of the side walls thereof and is retained thereon against displacement in any suitable manner as illustrated more particularly in Figure 2. A handle 29 is provided on the front wall of the container to facilitate withdrawal of the latter from the freezing compartment.

A dasher shaft 35 extends generally longitudinally of the container and is journalled in the opposite end walls thereof for rotation about a horizontal axis when the container is in position in the freezing compartment. At opposite ends thereof the shaft 35 is provided with dasher arms 36, in which are mounted for slight pivotal movement a pair of longitudinally extending blades 37, the arms and blades being constructed and assembled in conventional manner. The arm 36 at the forward end of the shaft 35 is provided with a boss 39 having a cylindrical aperture for the reception of a trunnion 40 secured to the forward wall of the container and projecting inwardly and axially thereof. The rearward arm 36 is provided with a boss 42 having a rectangular or other non-circular opening therein for the reception of the correspondingly shaped end 43 of a stub shaft 44, the latter having a cylindrical portion 45 which is received snugly within an opening 46 in the rear wall of the container, whereby the stub shaft may rotate and reciprocate in the opening. A flat spring 49 is secured to the exterior of the rear wall of the container, and the forked end 50 of this spring embraces a reduced portion 51 on the stub shaft 44, the spring normally urging the shaft 44 forwardly, but limiting such forward movement. Adjacent the rearward end thereof the stub shaft 44 is provided with a projecting pin 53, which is adapted to engage in slots 54 formed in a clutch member 55 when the container is introduced in the freezing compartment. The clutch device thereby afforded, which may be constructed as described more particularly in my prior patent hereinbefore referred to, serves to connect the stub shaft 44 and dasher shaft 35 with driving reduction gearing enclosed in a housing 56 formed integrally with a motor housing 57 carried by the rear wall 10 of the unit, whereby the dasher may be rotated.

It will be observed from the structure thus far described that the dasher may be readily introduced within the container through the upper side of the latter, journalled on the trunnion 40, and coupled to the stub shaft 44 upon rearward displacement of the latter against the action of the spring 49, the spring normally retaining the stub shaft 44 in operative relation with the dasher once the latter has been properly positioned. When the mixture has been introduced in the container, the latter is pushed rearwardly in the freezing compartment to engage the stub shaft 44 and the clutch member 55, whereupon rotation of the dasher may be initiated by energization of the motor.

It is generally recognized that in the operation of freezing apparatus of this character it is highly desirable to continuously remove from the zone adjacent the inner surface of the container the particles of the mixture which are congealed or partly frozen by contact with such surface, in order that they may be replaced by particles having a higher temperature. It is also desirable to displace the partly frozen particles upwardly as they are removed from adjacent the container wall, so that warmer particles may move into the lower and cooler portion of the container. It will be observed that by means of the construction which I employ, the continuous removal and upward displacement of the particles is readily effected. Thus the blades 37, which are pivotally mounted on the arms 36, readily swing outward into engagement with the lower portion of the container wall under the influence of gravity and without the application of high rotational speed to the dasher. Furthermore, as the blades 37 are rotated about the curved wall, they lift the partly frozen particles toward the upper portion of the container, and it is thus unnecessary to use blades of substantial width or of special configuration in order to secure this upward displacement of the particles. The result is very simply achieved by forming the interior wall of the lower portion of the chamber, in which the most rapid cooling occurs, of substantially semi-cylindrical shape about a substantially horizontal axis, the said axis being generally co-extensive with the axis of rotation of the dasher.

It is also important, as hereinbefore pointed out, to form the container with substantially flat external walls, so that the latter may be disposed in contiguous relation, over a large area, to the cold walls of the freezing compartment. However, I have discovered that it is further essential to provide for rapid conduction of heat from the curved inner wall to the flat outer surface, and I therefore form the lower half of the container as a solid integral metal member, as shown more particularly in Figure 2. In this manner, proper cooperation between the blades 37 and the coldest container walls is insured, and the heat is conducted away from these walls through solid metal directly to the cold walls of the freezing compartment, so that effective and rapid heat transfer is established and continuously maintained.

It will be observed that the only point at which leakage can possibly occur is through the opening 46 at the rear wall of the container, and I have found that no packing is needed at this point provided there is a snug fit between the stub shaft 44 and the wall of the opening. This is probably due in part to the fact that in the use of containers of this type allowance must be made for expansion of the mixture on freezing, so that the container is ordinarily only partially filled, and the pressure exerted adjacent the opening 46 is much less than that which would be exerted adjacent the lower peripheral portion of the more conventional end closure member. Again, the circumferential extent of the opening 46 is very much smaller than the circumference of the whole container.

I have found it preferable to operate my dasher at a rotational speed of about 25 R. P. M., the proper speed being established by the use of the reduction gearing hereinbefore referred to, and at such a low speed there is little tendency to discharge the mixture from the open top of the container when the dasher is rotated. However, as hereinbefore indicated, it is sometimes desirable to supply a closure member for this opening, such as that shown at 28. When a closure member is used, I prefer to associate therewith means affording a continuation or complement of the semi-cylindrical interior surface of the lower half of the container, and for this purpose I may secure to the cover plate 28, for example by welding as at 60, a semi-cylindrical member 62 which is thus removable with the cover plate. The internal lateral dimension of the upper half of the container is slightly greater than the diameter of the lower semi-cylindrical surface defining the interior thereof, whereby the lower edges of the member 62 may seat on abutting edges 64 at each side of the container. It will be observed that by this construction the container presents a smooth and substantially continuous cylindrical interior surface, so that the dasher may cooperate with the entire interior wall of the container. It is of course feasible to construct the cover plate 28 and the member 62 as a solid unit, in substantial duplication of the lower half of the container, but I find that it is preferable to reduce the weight by elimination of metal between the member 62 and cover plate 28. The resultant reduction in cooling efficiency is immaterial, since the principal heat transfer occurs through the wall defining the lower half of the container.

It will be appreciated that with this construction, the removal of the cover plate 28 renders the interior of the container readily accessible for the extraction of a part only of the frozen mixture, and that the dasher need not be withdrawn for this purpose.

Obviously my improved container may be employed in conjunction with other types of drive mechanism than that illustrated; for example I may use the type of drive disclosed in my prior patent hereinbefore referred to, and may associate with this drive control mechanism of the character shown in the patent or of more conventional character.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In refrigerating apparatus for domestic use of the type provided with an ice tray receiving chamber having a front opening through which ice trays may be introduced, the combination with a dessert container for reception within said chamber, said container having flat external surfaces defining generally a rectangular parallelopiped and being open at the upper side to permit the introduction of a dessert mixture therein, said container having a substantially semi-cylindrical lower internal surface, of agitating means supported in said container for rotation about a generally horizontal axis substantially coextensive with the axis of the said semi-cylindrical internal surface, and closure means for the open upper side of said container, said closure means being formed to afford an internal, substantially semi-cylindrical surface disposed in complementary relation to said first named internal surface.

2. In apparatus for freezing edible liquids, the combination with a container having upstanding side walls and a bottom wall affording a substantially semi-cylindrical internal surface, said container being open at the upper side, of a closure member for said upper side formed to provide a semi-cylindrical internal surface disposed in complementary relation to said first named internal surface and surrounded laterally by said side walls.

3. In refrigerating apparatus for domestic use of the type provided with an ice tray receiving chamber having a front opening through which ice trays may be introduced, the combination with a dessert container for reception within said chamber, said container having walls affording external surfaces defining generally a rectangular parallelopiped and being open at the upper side to permit the introduction of a dessert mixture therein, said container having a substantially semi-cylindrical lower internal surface, of agitating means for displacing congealed particles of the mixture from a zone adjacent said internal surface, means supporting said agitating means in said container for rotation about a generally horizontal axis substantially coextensive with the axis of the said semi-cylindrical internal surface, said supporting means including an element coaxial with said agitating means and extending through a wall of the container, said element being displaceable axially into rotative driving engagement with said agitating means, and removable closure means for said upper side.

4. In refrigerating apparatus for domestic use of the type provided with an ice tray receiving chamber having a front opening through which ice trays may be introduced, the combination with a dessert container insertable in said chamber, said container having a solid lower portion affording a flat external bottom surface and a substantially semi-cylindrical internal surface, of agitating means supported in said container for rotation about a generally horizontal axis substantially coextensive with the axis of the said semi-cylindrical internal surface, driving means disposed adjacent the rear of said chamber, means for coupling said driving means with said agitating means on insertion of said container in said chamber, and removable closure means for said upper side.

5. In refrigerating apparatus for domestic use of the type provided with an ice tray receiving chamber having a front opening through which ice trays may be introduced, the combination with a dessert container for reception within said chamber, of agitating means within said container, means supporting said agitating means for rotation about a generally horizontal axis, said supporting means including an element coaxial with said agitating means and extending through a wall of the container, said element being displaceable axially into rotative driving engagement with said agitating means, driving means disposed adjacent the rear of said chamber, and means for mechanically coupling said driving means with said element on insertion of said container in said chamber.

6. In refrigerating apparatus for domestic use of the type provided with an ice tray receiving chamber having a front opening through which ice trays may be introduced, the combination with a dessert container for reception within said chamber, of agitating means within said container, means supporting said agitating means for rotation about a generally horizontal axis,

said supporting means including an element coaxial with said agitating means and extending through a wall of the container, said element being rotatively coupled to said agitating means, driving means disposed adjacent the rear of said chamber, and means for effecting mechanical rotative coupling of said driving means with said element on insertion of said container in said chamber.

7. In apparatus for freezing edible mixtures, the combination with a container having an internal wall defining part only of a cylindrical surface and an opening for the introduction of the mixture, of removable closure means for said opening having an internal wall cooperating with said first named wall to define the complementary portion of said cylindrical surface, and agitating means mounted in said container for rotation on the axis of said cylindrical surface, said agitating means having portions extending into close proximity to said walls to effect displacement of chilled particles therefrom.

8. In apparatus for freezing edible mixtures, the combination with a container having an internal wall defining part only of a cylindrical surface and an opening for the introduction of the mixture, of removable closure means for said opening having an internal wall cooperating with said first named wall to define the complementary portion of said cylindrical surface, and agitating means mounted in said container for rotation on the axis of said cylindrical surface, said agitating means having portions extending into close proximity to said walls to effect displacement of chilled particles therefrom, said container being formed to provide a flat external bottom surface for engagement with the flat lower surface of an ice tray receiving chamber.

BERTRAM Y. KINZEY.