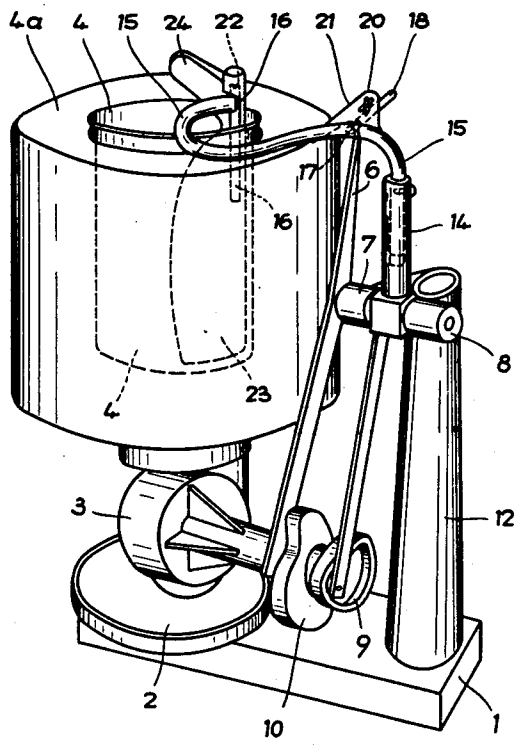
July 17, 1956 A. WOYTH ET AL 2,755,073

ICE-CREAM FREEZER

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Fig.1



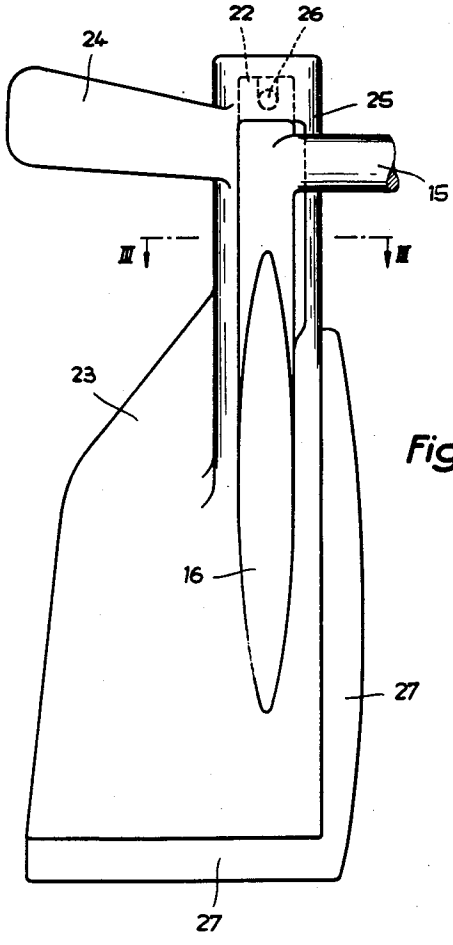
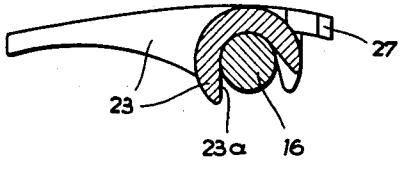


Fig.2

Fig.3



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ICE-CREAM FREEZER

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Fig.4

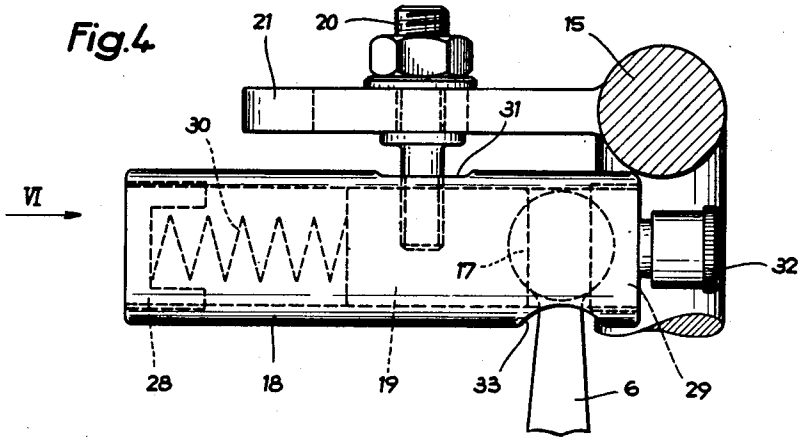


Fig. 5

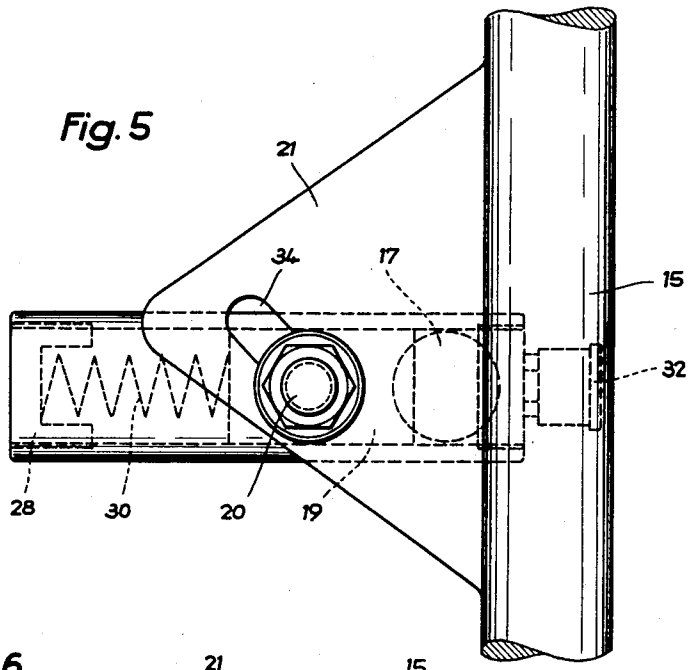
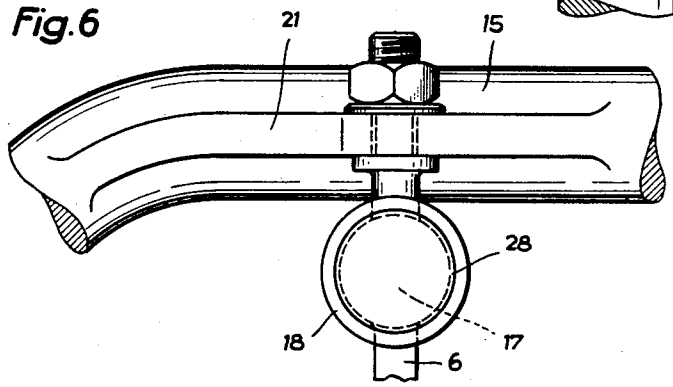


Fig.6



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Fig. 7

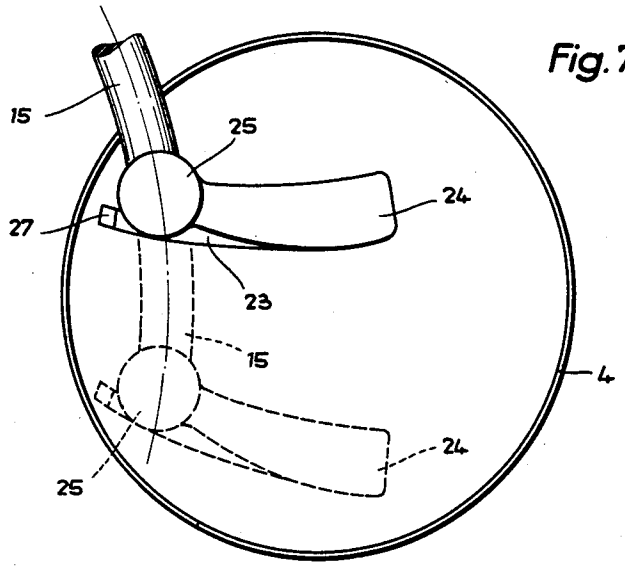


Fig. 8

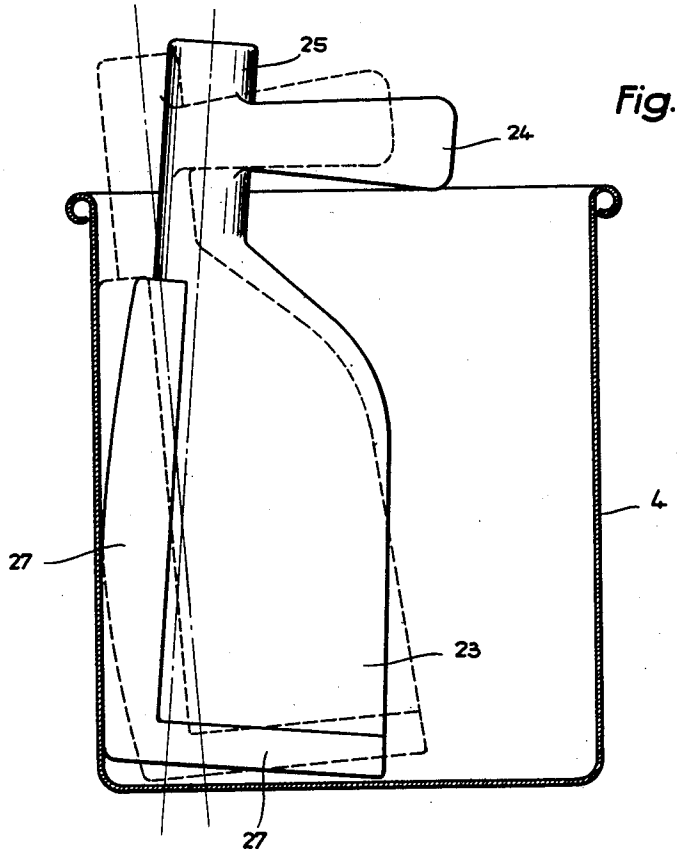


Fig. 9

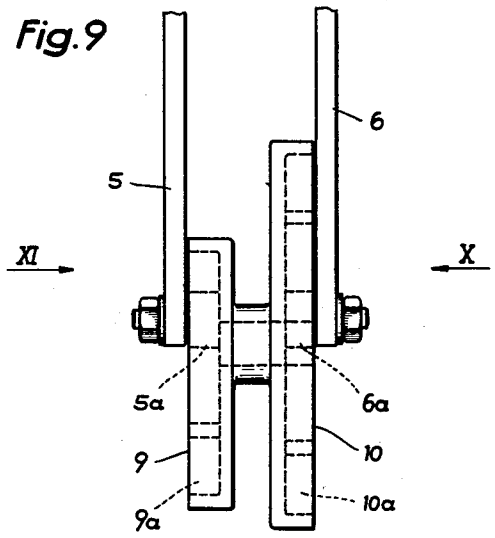


Fig. 10

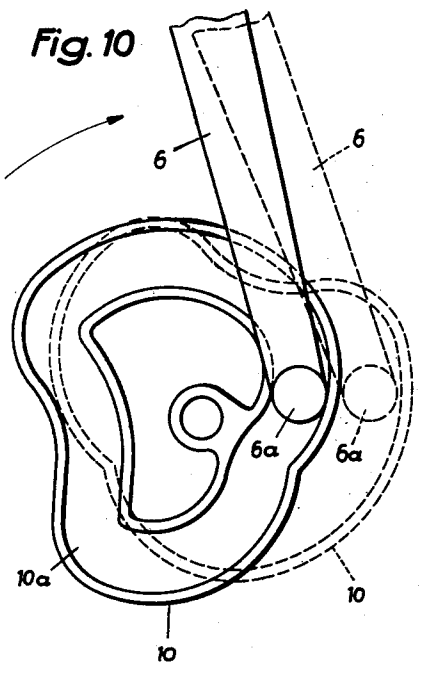
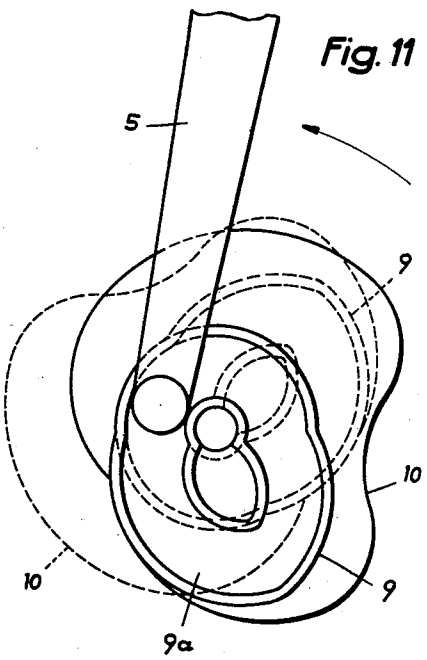


Fig. 11

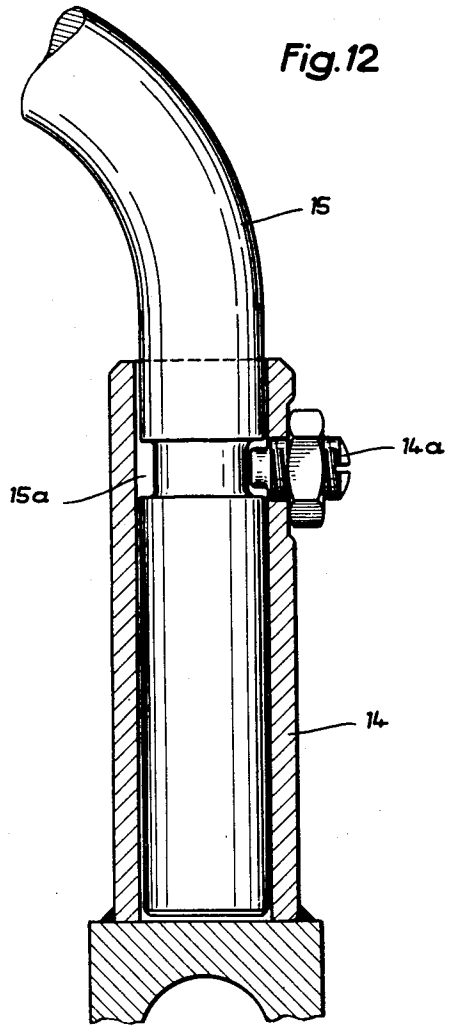


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Fig.12



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Patented July 17, 1956

2,755,073

ICE-CREAM FREEZER

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Application September 5, 1952, Serial No. 307,978

Claims priority, application Germany September 8, 1951

7 Claims. (Cl. 259—82)

In the hitherto known ice-cream freezers drive is effected either through an aperture in the base of the can or in the top of the can which, of course, involves the arrangement of parts relatively movable to each other above the opening of the can. It is quite obvious that with cans having the aperture in the base it is impossible to avoid contaminating the ice-cream. The same is true of arrangement where the aperture is in the top of the can because in this case it is, of course, possible that lubricating oil which is necessary for the relatively moving parts will fall into the ice-cream.

Thus, it is an object of the invention to provide an ice-cream freezer having the usual ice-cream can for manual or power drive and an agitator contained in the can, a refrigerating receptacle surrounding the ice-cream can. The agitator has a driving arm bent laterally in such a manner that the parts of the agitator relatively movable to each other are located outside the upper opening of the ice-cream can, preferably at the side of the can or at the side of the refrigerating receptacle. The can and a paddle of the agitator are rotatably moved in relation to each other; preferably the can is rotated around the paddle.

The paddle of the agitator is given a particular configuration in order to insure that the latter during its movement, imparted to it by the drive mechanism, will contact the greatest possible amount of the interior surface area of the revolving ice-cream can thus providing a thorough mixing and continuous scraping of the ice-cream from the walls of the can. The ice-cream can is preferably rotated by a drive mechanism which also effects a swinging movement of the agitating paddle in the ice-cream can as well as a simultaneous rocking movement of the paddle.

One preferred embodiment of the ice-cream freezer of the present invention is described in the following description, reference being had to the accompanying drawings, in which:

Fig. 1 is a perspective side view of the freezer in one preferred embodiment thereof, the prime mover and the freezing equipment being omitted.

Fig. 2 is a view of a detail of Fig. 1 showing the paddle loosely suspended on a pin, the pin being fixed to a lever.

Fig. 3 is a transversal section taken on the line III—III of Fig. 2.

Fig. 4 is an enlarged view of another portion of Fig. 1 showing the arrangement at the top of the paddle.

Fig. 5 is a plan view of Fig. 4.

Fig. 6 is an edge elevational view looking in the direction of the line VI of Fig. 4.

Fig. 7 is a top view of the can showing 2 different positions of the paddle during its swinging movement caused by the double-arm levers which are guided by cams.

Fig. 8 is a vertical view of the ice-cream can showing two tilted positions of the paddle.

Fig. 9 is an edge elevational of the cams which control swinging and tilting movements of the paddle.

Fig. 10 is an elevational view looking in the direction of the line X of Fig. 9 showing two positions of the cam.

Fig. 11 is an elevational view looking in the direction of the line XI of Fig. 9 showing two positions of the can.

Fig. 12 is a view partly in vertical section of a portion of Fig. 1 showing the connection between the holding tube and the paddle arm.

The ice-cream freezer, of the present invention, includes a base 1 mounting at a suitable location, for instance, by means of an upright 12, a prime mover (not shown) having driving connection with a vertical shaft mounted in a gear box 3 by means of a belt pulley 2 (preferably a V-belt pulley). From the top of this gear box a second vertical shaft is extended upward and turns at a lower speed than the drive shaft. An ice-cream can 4 is secured in a suitable manner to the top end of the second shaft so as to be continuously rotated during operation of the freezer. The can 4 is surrounded by a stationary refrigerating receptacle 4*a*; the can 4 turning within the refrigerating medium in the receptacle 4*a*. The second shaft projects through the bottom wall of the refrigerating receptacle in a suitably sealed manner to prevent the refrigerating medium from escaping downward. The top end of the can 4 is somewhat higher than the receptacle 4*a* in order to prevent the refrigerating medium from overflowing from the receptacle 4*a* into the can 4. As already pointed out the refrigerating receptacle 4*a* is stationary whilst the can 4 is mounted for rotation therein.

As previously mentioned, provision has been made to insure that the drive mechanism for an agitating paddle 23 is not arranged above the opening of the ice-cream can 4. The present embodiment shows the drive mechanism located laterally of the refrigerating receptacle; i. e. between the upright 12 and the receptacle 4*a*. The drive mechanism properly speaking comprises two double-armed levers 5 and 6, pivotally mounted on stationary bearings 7 and 8 secured to the upright 12. Operation of the levers 5 and 6 is effected by means of rotating cams 9 and 10 suitably driven through the gearing 3. Upon rotation of the cams 9 and 10 the cam followers 5*a* and 6*a*, see Fig. 9, provided at the lower ends of the levers 5 and 6 are guided in corresponding grooves 9*a* and 10*a* of the cams 9 and 10 so as to cause a swinging and a rocking movement of the levers. The lever arm 5 carries as its upper continuation a holding tube 14 which upon movement of the lever 5 under the action of the cam 9 is given a swinging motion. In the present arrangement this swinging motion is about the axis of the horizontal bearing 8. The holding tube 14 serves to receive a paddle-arm 15 bent in form of an S such as to permit a turning movement of the arm 15 on the vertical axis of the end inserted into the tube 14; an unintentional or undesired withdrawing of the paddle arm from the tube being prevented by any suitable means. One form of retaining means is shown in Fig. 12, wherein the inserted end of the paddle arm 15 is provided with a circular groove 15*a* engaged by a stud 14*a* mounted through the wall of the tube 14, leaving the paddle arm 15 free for rotary movement on the axis of the tube 14 while retaining it against withdrawal from the tube. The paddle arm 15 laterally overlies the refrigerating receptacle 4*a* and the rim of the can and has secured to its inner end a pivot 16 extending perpendicularly to the arm 15. The pin 16 for the most part of its length extends vertically down into the can 4 and has a short upper extension 22. The lever arm 6 is pivoted on the bearing 7 and adapted to move in parallel relationship to the lever 5, the movement of the lever 6 being controlled by the cam 10. This lever arm 6 has an upper extension and terminates at its upper end in a ball 17, see Figs. 4 to 6, engaging a compensating spring device, as shown by way of example in Fig. 3. This compensating spring device comprises a

tube 18 closed at both ends by means of threaded plugs 28, 29. This tube 18 has a sliding bolt 19 movable therein and carrying a pin 20 projecting outside the tube 18 through a slot 31 provided in the top of the tube 18. The tube 18 is engaged from below, through an opening 33, by the ball 17 secured to the end of the lever arm 6. The ball 17 is located between a threaded end plug 29 of the tube 18 and the movable bolt 19; a spring 30 being provided to constantly urge bolt 19 towards the ball 17. The other end of the tube 18 is closed by an adjustable screw bolt 32 to adjust, if necessary, the movement of said paddle arm 15. The pin 20 projecting from the tube 18 is in engagement with a slot 34 of a segment 21, which extends from the paddle arm 15 thereby controlling the movement of the latter, so that under the action of the force transmitted to it the paddle arm will be imparted a rocking movement in the holding tube 14.

Owing to the fact that the connection between the paddle arm 15 and the lever 6 is not a rigid one by being effected through the mediation of the device in the tube 18, interferences occurring during the agitating movement of the paddle in the ice-cream can such as by sticking or by lumps formed in the ice may be compensated so that no fracture or bending of the elements of the mechanism may happen. Thus, two movements are imparted to the paddle arm 15; i. e. a swinging movement caused by the lever arm 5 with its holding tube 14 from the cam 9 and a second rocking movement by the lever 6 through the compensating spring device 17, 18, 19, 20 and segment 21. Both of the two movements are completely positive and invariably controlled by the two cams 9 and 10.

As already mentioned before, the paddle arm 15 carries secured to its end, i. e. above the opening of the can 4, a pin 16 projecting substantially vertically into the can but also having a short extension 22 above the arm 15. The paddle 23 properly speaking is simply sleeved on the pin 16, 22 using the handle 24 provided for this purpose. Positive engagement between the paddle 23 and the lever arm 15 and the pin 16, 22 respectively is provided by the fact that the pin engages a groove 23*a* in the agitating paddle. In order to prevent the agitating paddle from being rotated relatively to the pin 16, the upper short extension 22 of the pin is provided with a slot. The upper end 25 of the grooves 23*a* has a web 26 engaging the slot of the extension 22, see Fig. 2. When the paddle 23 is placed on the pivot, the web 26 will be brought into engagement with the above mentioned slot in the upper extension 22 of the pin thus preventing rotation of the agitating paddle with relation to the pin 16 and the paddle arm 15 respectively. The paddle carries at its edge opposite the wall and the bottom of the ice-cream can 4*a* web or edging 27 of resinous plastic material to which reference is made in the following.

The foregoing description of the agitating paddle has been given only by way of example, other forms being possible.

An essential feature of the paddle motion resides in that due to the laterally rocking movement of the holding tube 14, the pin 16, 22 is rocked in an amount controlled by the cam 9—of approximately 30° of the periphery of the cam—and that in addition thereto by the operation of the lever arm 6 through the mediation of the compensating spring device 17, 18, 19, 20 and the segment 21 a turning movement of the paddle arm 15 in the holding tube 14 will be caused by the cam 10. In this way, the pin 16, 22 and accordingly the paddle 23 with its web or edging 27 which is slightly curved at its vertical running surface are not only swinging in the can but simultaneously slightly rocked, i. e. in a vertical plane, thereby contacting the interior wall of the can always only at one point so that the edge 27 is in a certain degree rolling off the interior wall of the can 4. This brings about the great advantage that the ice-cream contents of the can is thoroughly agitated so that it cannot stick to the can 4 at any point of it by freezing thereto since the paddle during its operation is also moved as far as to the central axis of the can 4.

In the already mentioned operation, the paddle 23 carries out alternately two different movements caused by the cams 9 and 10. The movements caused by the cam 9 is transmitted by the lever 5 into a reciprocating movement within the holding tube 14 in such a manner, that the S-shaped paddle arm 15 is guided in the holding tube 14 transmits a swinging movement to the paddle 23, whereby the contents of the can 4, e. g. the ice-cream, will be removed positively from the whole bottom of said can. After the paddle 23 having reached its normal position at the interior wall of the can 4, the cam 10 causes a rocking movement transmitted from the lever 6, which is supported like a ball by the tube 18 to the pin 20 which is also supported by the tube 18, said pin 20 engaging in a slot 34 of the segment 21, which is fixedly secured at the paddle arm 15. The rocking movement results in a positive scraping off of the contents from the interior walls of the can and transports it towards the center of the can for mixing. (See Fig. 8.) After scraping off the mixture from the walls of the can during a vertically rocking movement the paddle swings out horizontally pushing and scraping off the mixture from the bottom and bringing it to the interior walls of the can. Of course, the two movements are not independent of each other, but will be carried out alternately in regular intervals, whereby the effect according to the invention will be obtained without restriction.

The foregoing description of the various stages of movement of the paddle illustrates that the paddle serves a double purpose, of which one is substantially characterized in that it scrapes with its edge 27 the frozen ice-cream from the interior wall of the can, and the other that by its lateral movement the ice-cream is again pressed against the cooling wall of the can thereby simultaneously providing for a regular agitation of the ice-cream contents within the can.

It will be apparent from the foregoing that the ice-cream freezer according to the invention, notwithstanding it being driven from below, does not show any rotating or sliding machine elements being arranged above or within the can 4, not even above the refrigerating receptacle but located laterally, as may be best seen in Fig. 1. It will be obvious that any contamination of the ice-cream contained in the can will be completely prevented. The space between the upper rims of the refrigerating receptacle and of the can may be covered by baffles or a rubber sleeve, in which case the paddle arm, if required, may be arranged to pass through the rubber sleeve (not shown).

What we claim is:

1. An ice cream freezer comprising an ice-cream can, a stationary brine receptacle surrounding said ice cream can, means for separately rotating the ice cream can from the bottom, a self-contained and self-supporting complete unit and an attached gear unit box and its relatively movable parts in said means, an agitating paddle extending substantially vertically within said ice cream can and having an arm extending from said can, a drive mechanism coupled to said gear box and providing a relative rotating movement between said can and said agitating paddle and also a separate motion of the agitating paddle within said can, the arm moving the agitating paddle and being actuated by the drive mechanism being bent substantially horizontally and connected with relatively movable parts of said drive mechanism, said movable parts being located outside the upper opening of the ice cream can and connected with said gear box attached rigidly to the stationary brine receptacle whereby said agitating paddle due to said separate motion is adapted to scrape off the contents of the can from the interior walls and the bottom.

2. An ice cream freezer comprising an ice cream can,

a brine receptacle surrounding said ice cream can, an agitating paddle extending substantially vertically within said ice cream can and having an arm extending from said can, a drive mechanism including movable parts for providing a rotating movement of said can in relation to said agitating paddle and including an arm to effect a rocking and swinging movement of said agitating paddle, the arm moving said agitating paddle being bent substantially horizontally and connected with the relatively movable parts of said drive mechanism, a gear box included in said drive mechanism, said movable parts being located outside the upper opening of the ice cream can and connected with said gear box attached rigidly to the brine receptacle whereby said agitating paddle is adapted to scrape off the contents of the can during said rocking movement from the interior walls and during said swinging movement from the bottom.

3. An ice cream freezer as defined in claim 2, wherein said agitating paddle is loosely suspended on a pin shaped support which extends vertically into the ice cream can and is rigidly connected to the end of said arm closely above the upper opening of said can, said pin guiding the agitating paddle during the swinging and rocking motions closely along the walls and bottom of the container.

4. An ice cream freezer as defined in claim 3, wherein said paddle may be withdrawn from said pin and also may be set on during operation of the apparatus.

5. An ice cream freezer as defined in claim 2, wherein said arm is bent in S-shape and projects outwardly in lateral direction closely above the upper rim of said can and changes parallel motions of the levers into a vertical and horizontal guiding motion for the agitating paddle.

6. An ice cream freezer comprising an ice cream can, a brine receptacle surrounding said ice cream can, an agitating paddle extending substantially vertically within said ice cream can and having an arm extending from said can, a drive mechanism including movable parts providing a rotating movement of said can in relation to said agitating paddle and also a rocking and swinging movement of the agitating paddle, the arm moving said agitating paddle and being actuated by said drive mechanism being bent substantially horizontally and connected with the relatively movable parts of said drive mechanism, a gear box attached rigidly to the brine receptacle, said movable parts being located outside the upper opening of the ice cream can and connected with said gear box whereby said agitating paddle is adapted to scrape off the contents of the can during said rocking movement from the interior walls and during said swinging movement from the bottom, and said arm being bent in S-shape and projecting outwardly in lateral direction closely above the upper rim of said can, lever arms causing said bend of the arm to swing said paddle about a first axis which is substantially radial of and perpendicular to the axis of the can, and also to rock said paddle about a second axis which is in a plane substantially at right angles to said first axis, one of said lever arms being provided at its upper end with a ball engaging with a compensating spring device which has its pin in engagement with a segment secured to the arm and causes the swinging movement, and a cam operated from said gear box and defining cam grooves, said lever arms being rotatably mounted on an upright and having their other ends guided in cam grooves.

7. An ice cream freezer comprising an ice cream can, a brine receptacle surrounding said ice cream can, an agitating paddle extending substantially vertically within said ice cream can, and having an arm extending from said can, a drive mechanism providing a rotating movement of said can in relation to said agitating paddle and also a rocking and swinging movement of the agitating paddle, the arm moving said agitating paddle and being actuated by said drive mechanism being bent substantially horizontally and connected with the relatively movable parts of said drive mechanism, a gear box attached rigidly to the brine receptacle, said movable parts being located outside the upper opening of the ice cream can and connected with said gear box whereby said agitating paddle is adapted to scrape off the contents of the can during said rocking movement from the interior walls and during said swinging movement from the bottom, a pin rigidly secured on one end of said arm above the upper opening of said can, said agitating paddle being mounted on said pin, said pin having a short upper extension to be engaged in a head of said agitating paddle, and interengaging means being provided to prevent relative movement between said paddle and said pin.

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