

Nov. 1, 1938.

W. B. ANDERSON

2,135,022

LIQUID CONGEALING APPARATUS AND PROCESS OF TREATING SAME

Filed May 16, 1935

2 Sheets-Sheet 1

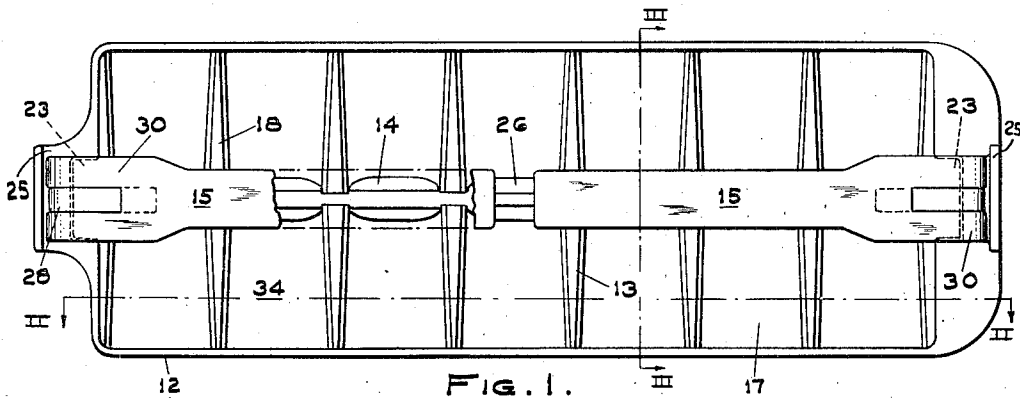


FIG. 1.

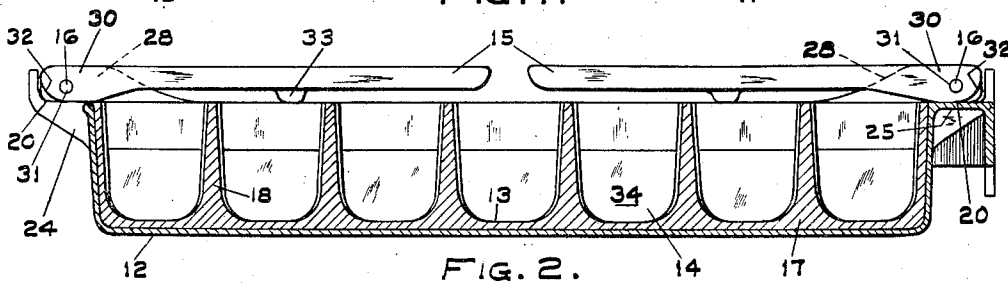


FIG. 2.

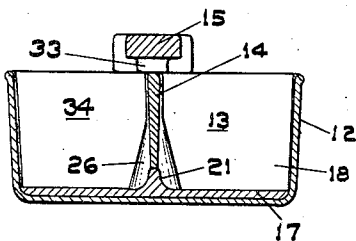


FIG. 3.

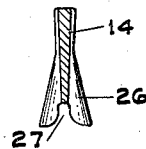


FIG. 4.

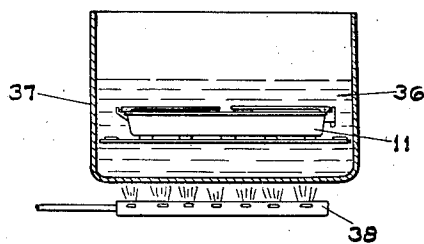


FIG. 5.

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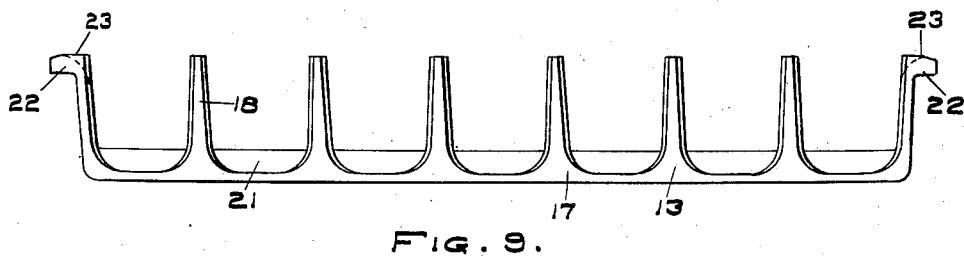
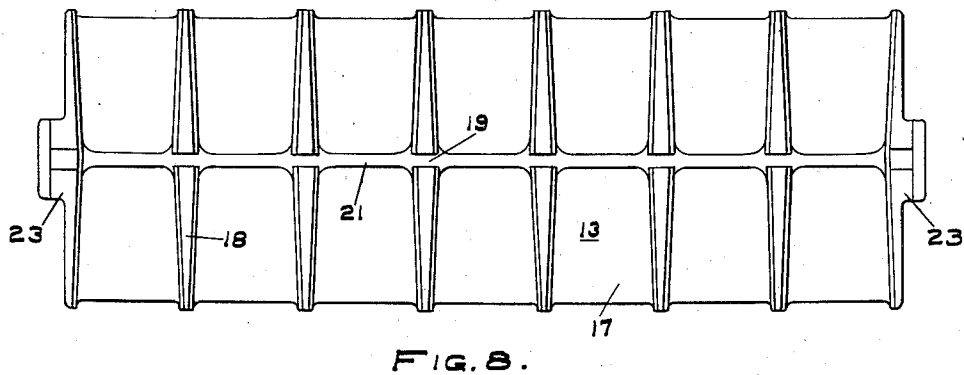
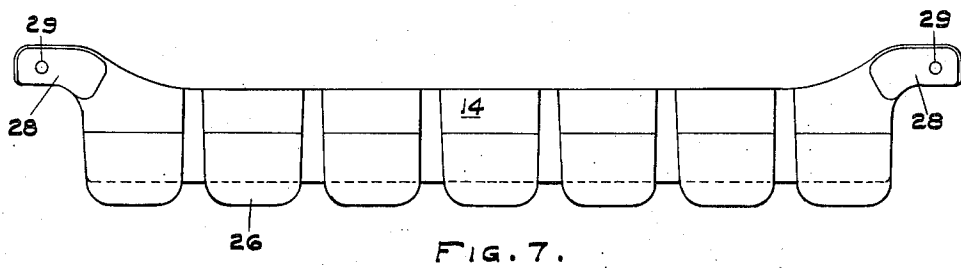
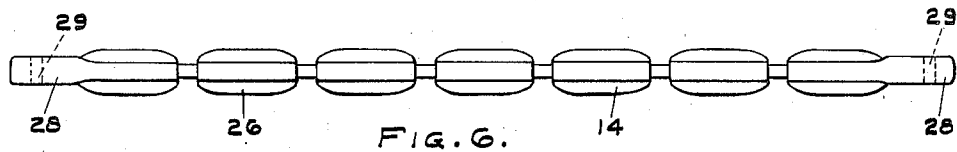
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LIQUID CONGEALING APPARATUS AND PROCESS OF TREATING SAME

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2 Sheets-Sheet 2



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2,135,022

LIQUID-CONGEALING APPARATUS AND
PROCESS OF TREATING SAME

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Application May 16, 1935, Serial No. 21,825

8 Claims. (Cl. 62—108.5)

My invention relates to the ice trays for the formation of ice particles, and more specifically to a process for treating ice trays to facilitate removal of ice particles therefrom.

It is an object of my invention to provide a process for treating ice trays which will facilitate the removal of congealed liquid therefrom, and which will preserve the surfaces of the trays.

It is another object of my invention to improve the performance of ice trays of the type wherein congealed liquid may be removed from the ice tray by mechanical force, without the application of heat.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a plan view, with portions thereof broken away, of an ice tray of the type designed for the mechanical ejection of congealed liquid, to which my process may be applied;

Fig. 2 is a sectional view of the ice tray taken on line II—II of Fig. 1;

Fig. 3 is another sectional view of the ice tray taken on line III—III of Fig. 1;

Fig. 4 is a sectional view of the center elevator bar of the ice tray shown in Figs. 1 to 3;

Fig. 5 is a view of apparatus for treating an ice tray in accordance with my invention;

Fig. 6 is a plan view of the aforesaid center elevator bar;

Fig. 7 is a side elevation of the center elevator bar;

Fig. 8 is a plan view of the separable grid member of the ice tray; and,

Fig. 9 is a side elevation of the separable grid member;

Referring specifically to the drawings for a detailed description of my invention, numeral 11 designates generally an ice tray which includes a pan member 12 having a removable grid member 13 and a center elevator bar 14 disposed therein. Handle members 15 are pivotally attached to the center elevator bar 14 at points 16 for a purpose hereinafter described. The pan 12, removable grid member 13, center elevator bar 14, and handles 15 are all preferably die-cast aluminum, although it is obvious that other materials may be substituted for aluminum, and other methods of forming the various parts of the ice tray may be employed.

Referring now to Figs. 1, 2, 3, 8, and 9, the grid member 13, preferably formed of die-cast aluminum, comprises a flat bottom portion 17 having

spaced upwardly-extending fins 18. The fins 18 are preferably cast integrally with the bottom portion 17 and are arranged transversely of the grid member 13 in two complementary rows with a space 19 therebetween. A raised ridge 21 extends longitudinally of the grid member 13, filling the space 19 at the bottom thereof. Lugs 22 are provided at the top of the grid member 13 and provide bearing surfaces 23 on a plane coinciding with the horizontal plane of the top of the grid member. The dimensions of the grid member 13 are such that it fits loosely in the pan member 12, as shown in Figs. 1, 2, and 3.

The pan member 12 is formed with outwardly-extending shoulders 25 which provide bearing surfaces 20 on a plane coinciding with the top of the pan member (Fig. 2). Recesses are formed in the bearing surfaces 20 for the reception of the lugs 22 of the grid member 13, so that the planes of the bearing surfaces 23 and 20 substantially coincide.

Referring now to Figs. 1, 2, 3, 4, 6, and 7, the center elevator bar 14 is provided with spaced and flared lugs 26 on each side thereof, which form recesses 27 at the bottom of the elevator bar 14. The lugs 26 are so spaced that they extend outwardly between the fins 18 of grid member 13, while the remainder of the elevator bar 14 fits into the space 19 between the transverse fins 18 on the grid member 13, and the recesses 27 receive the longitudinal ridge 21 formed in the grid member 13. The elevator bar 14 is provided with integral ears 28 having apertures 29 therein for the reception of pivot pins 31, whereby the handle members 15 are pivoted, as shown at 16.

The handle members 15 are preferably formed in the shape of bars, and are provided with forked extensions 30 which fit on either side of the ears 28 of the elevator bar 14, and through which the pivot pins 31 extend. Rounded toe portions 32 are provided on the forked extensions 30 adjacent the pivot points 16. Protuberances 33 are provided on the under part of the handle members 15 to prevent freezing of the handle members to the grid member 13. When the ice tray 11 is assembled as shown in Figs. 1 to 3, cells 34 are formed for the reception of liquid to be congealed or frozen, the walls of the grid, pan, and center elevator bar constituting ice contacting surfaces.

The operation of the ice tray is as follows: When the tray 11 is filled with liquid and heat is extracted therefrom, the liquid in the cells 34 congeals. As is well known, ice adheres to metal so that considerable force is necessary in order

to break the bond between the frozen liquid and the metallic surfaces of the container in which the ice is made. The usual method of removing ice particles from an ice tray is to subject the tray to heat in order to melt some of the ice, so that it may be easily removed from the tray. In the ice tray shown in the drawings, however, the ice particles are removed from the tray by the use of mechanical force rather than by the application of heat.

After the ice has been frozen in the cells 34, the handles 15 may be grasped and rotated simultaneously about the pivot points 16. The toe portions 32 of the handles 15 first engage with the bearing surfaces 20 provided on the pan member 12. The center elevator bar 14 and grid member 13, being frozen together, are simultaneously lifted because of the cam action of the toe portions 32 with respect to the pan member 12. The flared lugs 26 on the elevator bar 14 force the ice particles upwardly of the pan 12 thus breaking the ice bond between the pan member 12 and the ice particles.

As the handle members 15 are rotated a greater distance about the pivot 16, the toe members 32 of the handles 15 engage with both the bearing surfaces 23 formed by the extensions 22 on the grid member 13 and the bearing surface 20 formed by the extensions 25 on the pan member 12, thus raising the elevator bar 14 relative to the grid member 13 and breaking the ice bond between the elevator bar and the grid member, the lugs 26 on the elevator bar 14 forcing the ice cubes upwardly relative to the grid member 13. The ice particles are therefore broken away from all the ice contacting surfaces of the pan member 12 and grid member 13 so that they may be easily removed from the ice congealing apparatus. The ice cubes may be removed from the ice congealing apparatus separately, or the handles 15 may be utilized to lift the grid member 13 and elevator bar 14 together with the ice cubes out of the pan 12 so that all the ice cubes may be readily removed therefrom if desirable.

As stated hereinbefore, all of the parts of the tray are preferably formed of die-cast aluminum, although other materials and methods of forming them may be utilized. In any case, it has been found that the surfaces of the ice tray with which the ice contacts may embody microscopic rough spots and depressions so that it requires great force to effect relative movement between various parts of the tray in order to break the ice bond between the contacting surfaces of the tray and the ice frozen therein. Although an extremely high polish overcomes this difficulty temporarily, such a process is prohibitive insofar as cost is concerned. Furthermore, whether the trays are highly polished or not, it has been found that the ice contacting surfaces oxidize or corrode to such an extent that considerable force is required to break the ice bond between the congealed liquid and the ice contacting surfaces of the tray after the tray has been in service a relatively short time.

I have found that impregnating the ice contacting surfaces of the ice tray 11 with an oily substance prevents corrosion or oxidation of the ice tray, provides a lubricated surface from which frozen liquid in the ice tray is easily removed and fills in the microscopic rough spots and pores in the surfaces of the ice tray. The process which I preferably employ for the purpose of impregnating the ice contacting surfaces of the tray is illustrated in Fig. 5 of the drawings and

constitutes the following treatment. First the ice tray is heated to a relatively high temperature, for example, 800° F. and is then immersed in a lubricating fluid such as, for example, mineral oil or carnauba wax for a considerable time, for example, 30 minutes, which mineral oil or wax is maintained at a relatively high temperature, such as, for example, 450° F., at which temperature the wax is liquefied. The effect of this treatment is to impregnate the ice contacting surfaces of the tray with a lubricant film which is a corrosion preventive, provides a surface lubricant, and fills the microscopic pores and rough spots in the ice tray surfaces. After such treatment, the lubricant film adheres to the ice tray surfaces for a long period of time, materials such as carnauba wax, for example, being hard at normal room temperature. As shown in Fig. 5, the ice tray, after it has been heated to a high temperature, is immersed preferably in mineral oil or wax, shown at 36, which is contained in a pan 37 and is maintained at a high temperature by a gas burner 38.

It has been found that, if after such impregnation, a slight polish is given to the tray, ice cubes may be even more easily removed from the tray.

Although it has been suggested heretofore to coat the surfaces of metals with oily substances for the purpose of preventing corrosion, I am not aware that impregnation has been used for impregnating the metallic portions of ice trays to facilitate removal of ice particles therefrom. I have also found that, by processing trays of the mechanical ejection type in the manner described, ice cubes may be readily removed therefrom over long periods of time without the use of excessive force to break the bond between the congealed liquid and the tray.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In the manufacture of an ice tray embodying a pan member and a grid member disposed in the pan member for forming ice cubes, one of said members being composed at least in part of a metal which is predominantly aluminum or an aluminum alloy and which member has inherent minute irregularities in the ice engaging surfaces thereof, the process of treating said one member so as to facilitate repeated separation of the ice cubes therefrom by manual effort as distinguished from the application of heat, which process includes maintaining a body of liquid material having greasy properties, applying said material to the metallic ice engaging surfaces of the member, and applying heat to the material and the member so as to substantially impregnate the ice engaging surfaces thereof and fill the irregularities in which the water upon freezing would otherwise adhere and thereby provide a relatively smooth ice engaging surface joined to the metal of said member and capable of withstanding said repeated separations, said material being innocuous to the taste of the ice.

2. The process claimed in claim 1 wherein the material includes a substantial percentage of carnauba wax.

3. The process claimed in claim 1 wherein said one member is polished after impregnation with said material.

4. A freezing device comprising: a container 5 member for holding the liquid to be frozen; and a partitioning member for dividing the frozen contents into blocks, one of said members having an ice-engaging metal surface having minute pores or irregularities therein impregnated with a 10 strongly adhering thin substantially invisible coating of water-shedding material, said water-shedding material comprising a substantial percentage of a wax having such a high melting point as to be hard at normal room temperatures and 15 of such character as to facilitate and withstand repeated separations of the ice therefrom by the application of force as distinguished from the use of heat.

5. A freezing device comprising: a container 20 member for holding the liquid to be frozen, and a partitioning member for dividing the frozen contents into blocks, one of said members having an ice-engaging metal surface having minute pores or irregularities therein impregnated with 25 a strongly-adhering thin substantially invisible coating of water-shedding material, said water-shedding material comprising a substantial percentage of carnauba wax which is hard at normal room temperatures and of such character as to 30 facilitate and withstand repeated separations of the ice therefrom by the application of force as distinguished from the use of heat.

6. In the manufacture of an ice tray embodying a pan member and a separable grid member disposed in the pan member for forming ice cubes, 35 one of said members being composed predominantly of aluminum or an alloy thereof and having minute irregularities in the ice-engaging surfaces thereof, the process of treating said one 40 member so as to facilitate repeated separation of the ice cubes therefrom by manual effort as distinguished from the application of heat, which process comprises immersing the ice engaging 45 surfaces of the member in a material heated to an elevated temperature and having oily or greasy properties at such elevated temperature for a period of approximately thirty minutes so as to impregnate the surfaces thereof with the material and fill the irregularities, in which the ice upon 50 freezing would otherwise adhere, and thereby provide a relatively smooth ice-engaging surface bonded to the body of said member and capable of withstanding said repeated separations, said

material containing a substantial percentage of wax and being innocuous to the taste of the ice.

7. In the manufacture of an ice pan having side and bottom walls composed at least in part of a metal which is predominantly aluminum or an 5 aluminum alloy and which metal has inherent minute irregularities in the ice engaging surfaces thereof, said ice pan being equipped with a grid for forming ice cubes, the process of treating the ice pan so as to facilitate repeated separation of 10 the ice cubes from the pan by manual effort as distinguished from the application of heat, which process includes maintaining a heated body of water-shedding material having a wax-like constituent in a liquefied form and subjecting the 15 ice-engaging surface of the pan to the action of such material at such a temperature and for such a time as to substantially impregnate the surfaces and fill the irregularities, in which the water upon freezing would otherwise adhere with such material and thereby provide a relatively smooth ice- 20 engaging surface bonded to the metal of the pan and capable of withstanding said repeated separations, said water-shedding material being innocuous to the taste of the ice. 25

8. In the manufacture of an ice tray having a pan and a separable grid structure disposed in the pan for forming ice cubes, which grid structure embodies relatively movable elements some of which are composed of aluminum or an alu- 30 minium alloy and have inherent minute irregularities in the ice-engaging surfaces thereof, the process of treating the grid structure so as to facilitate repeated separation of the ice cubes from the grid structure by manually effected relative displacement of the parts of the grid structure as distinguished from separation of the ice 35 cubes from the grid structure by the application of heat, which process includes maintaining a heated body of water-shedding material having a 40 wax-like constituent in liquefied form and subjecting the ice-engaging surfaces of the grid structure to the action of such material at such a temperature and for such a time as to substantially impregnate the surfaces and fill the irregularities, in which the water upon freezing would 45 otherwise adhere and thereby provide a relatively smooth ice-engaging surface bonded to the metal of the grid structure and capable of withstanding said repeated separations, said water-shedding 50 material being innocuous to the taste of the ice.

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