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LIQUID CONGEALING APPARATUS AND PROCESS OF TREATING SAME

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11 Claims. (Cl. 62—108.5)

My invention relates to liquid congealing apparatus, and particularly to a process for treating liquid congealing apparatus of the type utilized in mechanical refrigerators for producing ice cubes suitable for domestic and table use.

It has been found that liquid congealing apparatus is subject to corrosion when certain kinds of water are used, even though the apparatus is formed of a relatively corrosion resistant material, such as aluminum.

I have found that, if the liquid congealing apparatus is formed of a metal such as aluminum, improved results may be obtained by first anodizing the congealing apparatus and then treating it with a lubricating material. Other metals and metal alloys which may be anodized are also included in the scope of my invention. When the liquid congealing apparatus is anodized, an appreciable oxide film is formed on the metallic surfaces, such process materially increasing the corrosion resistance properties of the congealing apparatus. When lubricating material is applied to the anodized surfaces, it will fill the interstices and pores of the metal and of the oxide film of the congealing apparatus and provide a uniform surface. The combination of anodizing and treatment with a lubricating material results in liquid congealing apparatus having excellent corrosion resisting properties, and, also provides the proper surface for facilitating removal of frozen liquids therefrom by the mechanical ejection method.

It is an object of my invention, therefore, to provide a process for treating liquid congealing apparatus which imparts better corrosion resisting properties thereto than has heretofore been obtainable.

It is another object of my invention to provide an improved process for treating liquid congealing apparatus of the type in which frozen liquid may be removed by mechanical ejection, and to improve the operation of such liquid congealing apparatus.

It is a further object of my invention to provide a process for treating metal liquid congealing apparatus which results in smooth, lubricated and highly corrosive resistant surfaces from which the frozen liquids may be readily removed.

These and other objects are effected by my invention as will be apparent from the following description and claims forming a part of this application.

Liquid congealing apparatus of the type utilized in mechanical refrigerators for producing ice cubes suitable for domestic and table use, generally comprise a pan member preferably formed of aluminum and a removable grid member which forms, with the pan member, cells for forming ice cubes. In liquid congealing apparatus of the mechanical ejecting type, the grid member may be rigid or flexible, and is preferably formed of aluminum or of some other suitable material such as, for example, a zinc alloy. In liquid congealing apparatus of the mechanical ejecting type, suitable means are provided for forcibly breaking the bond between the frozen liquid and the pan and grid structure so that frozen liquids may be readily obtained therefrom without the use of heat. An example of such apparatus may be found in Patent No. 2,037,518 issued to Jules N. Saler for Liquid congealing apparatus.

The parts of the liquid congealing apparatus described above which are formed of aluminum or of aluminum alloys or other anodizable metals are, in accordance with my invention, first anodized. This treatment results in the formation of an appreciable oxide film on the surfaces of the metal, which protects the metal from corrosion. There are many anodizing methods, and the patent to Fulton D. Flick, No. 1,526,127 for Coating aluminum articles is referred to as an example of an electrolytic anodizing process which may be utilized in practicing my invention.

After the anodizing treatment, the parts are treated with a material such as oil or wax. The parts may be preheated to a temperature of, for example, 750 to 800° F. to prevent cooling of the quenching fluid, and are then quenched in a fluid, such as oil, carnauba wax or paraffin at a temperature of approximately 250° F., and are allowed to remain therein from 15 to 30 minutes. The parts are maintained at a temperature of about 300° F. from 10 to 15 minutes after removal from the quenching bath to permit excess lubricating material to drain off. The above process results in coating, permeating or impregnating the surfaces of the apparatus, the carnauba wax, for example, being hard at normal room temperture. It is obvious that, as the mass of the object to be treated, and the amount of fluid used are varied, the above temperatures and times will also be varied to suit the conditions so that proper treatment is insured.

The material applied in the above manner enters the interstices and pores of the oxide film and of the metal parts below the oxide film. This results in smooth surfaces to which frozen liquids

do not readily adhere. By utilizing the wax or oil treatment with the anodizing treatment, breaking the ice bond between the frozen liquids and the treated parts of the congealing apparatus requires but a small amount of force, because the liquid to be frozen does not enter the interstices of the liquid contacting surfaces. Furthermore, the wax or oil treatment in addition to the anodizing treatment, increases the corrosion resisting properties of the liquid congealing apparatus and, therefore, improves the operation of the apparatus, particularly if it is of the mechanical ejection type, because the surfaces of the apparatus are not readily roughened by corrosion.

From the foregoing, it will be apparent that I have provided an improved process for treating aluminum or other anodizable metallic liquid congealing apparatus which results in highly corrosion resistant, smooth and well lubricated surfaces, and that the process materially aids in the mechanical ejection of congealed liquids from such apparatus.

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 aluminum or an alloy thereof, the process of treating the aluminum portion of 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 subjecting said porions to an anodizing treatment to provide an ice-engaging surface which is corrosion-resistant but having minute irregularities disposed therein, immersing the anodized surface of the member in a material heated to a temperature of approximately 250° F. and having oily or greasy properties at such temperature, and maintaining such immersion for a period of 15 to 30 minutes so as to impregnate the surface thereof with the material and fill the irregularities, in which the ice upon freezing would otherwise adhere, and thereby provide a relatively smooth ice-engaging surface bonded to the anodized surface and capable of withstanding said repeated separations, said material being innocuous to the taste of the ice.

2. The process as claimed in claim 1 wherein, upon completion of the step of immersion, the excess material is removed from the member while the latter is maintained at an elevated temperature.

3. The process as claimed in claim 1 wherein, upon completion of the step of immersion, the temperature of the member is raised to approximately 300° F. for a period of approximately from 10 to 15 minutes and excess material is removed therefrom at such temperature.

4. 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 metal, the process of treating the metallic portions of 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 subjecting the metal surface of said member to an anodizing treatment to provide an ice-engaging surface which is corrosion-resistant but having inherent minute irregularities disposed therein, maintaining a heated body of water-shedding material having a wax-like constituent in liquefied form, and subjecting the anodized surface to the action of such material at such a temperature and for such a time as to substantially impregnate the anodized surface and fill the irregularities, in which the water upon freezing would otherwise adhere, with such material and thereby provide a relatively smooth ice-engaging surface bonded to the anodized surface and capable of withstanding said repeated separations, said water-shedding material being innocuous to the taste of the ice.

5. 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 aluminum or an alloy thereof, the process of treating the aluminum portions of 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 subjecting said portions to an anodizing treatment to provide an ice-engaging surface which is corrosion-resistant but having minute irregularities disposed therein, maintaining a heated body of water-shedding material having an oily or greasy constituent in liquefied form, and subjecting the anodized surface of the member to the action of such material at such a temperature and for such a time as to substantially impregnate the surfaces thereof and fill the irregularities in which water upon freezing would otherwise adhere and thereby provide a relatively smooth ice-engaging surface bonded to the anodized surface and capable of withstanding said repeated separations, said water-shedding material being innocuous to the taste of the ice.

6. 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 metal, the process of treating the metallic portions of 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 subjecting the metal surface of said member to an anodizing treatment to provide an ice-engaging surface which is corrosion-resistant but having inherent minute irregularities disposed therein, immersing the anodized surface in a bath of water-shedding material having a wax-like constituent at such a temperature and for such a time as to substantially impregnate the anodized surface and fill the irregularities, in which the water upon freezing would otherwise adhere, with such material and thereby provide a relatively smooth ice-engaging surface bonded to the anodized surface and capable of withstanding said repeated separations, said water-shedding material being innocuous to the taste of the ice.

7. 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 aluminum or an alloy thereof, the process of

treating the aluminum portions of 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 subjecting said portions to an anodizing treatment to provide an ice-engaging surface which is corrision-resistant but having minute irregularities disposed therein, maintaining a heated body of water-shedding material having an oily or greasy constituent in liquefied form, said constituent including a substantial percentage of paraffin, and subjecting the anodized surface of the member to the action of such material at such a temperature and for such a time as to substantially impregnate the surfaces thereof and fill the irregularities in which water upon freezing would otherwise adhere and thereby provide a relatively smooth ice-engaging surface bonded to the anodized surface and capable of withstanding said repeated separations, said water-shedding material being innocuous to the taste of the ice.

8. 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, the process of treating the aluminum portions of 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 subjecting said portions to an anodizing treatment to provide an anodized ice engaging surface which is corrosion-resistant but having minute irregularities disposed therein, maintaining a body of liquid material having greasy properties, applying said material to the ice engaging surfaces of the member and applying heat to the material and the member so as to substantially impregnate the ice engaging surfaces of the member with the material to fill the irregularities in which the water upon freezing would otherwise adhere and thereby provide a relatively smooth surface joined to said anodized surface and capable of withstanding said repeated separations, said material being innocuous to the taste of the ice.

9. 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, the process of treating the aluminum portions of 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 subjecting said portions to an anodizing treatment to provide an anodized ice engaging surface which is corrosion-resistant but having minute irregularities disposed therein, maintaining a body of heated liquid having greasy properties, applying said heated liquid to the anodized ice engaging surface of the member so as to substantially impregnate said surface with said liquid to fill the irregularities in which the water upon freezing would otherwise adhere and thereby provide a relatively smooth surface joined to the anodized surface of said member and capable of withstanding said repeated separations, said liquid being innocuous to the taste of the ice.

10. A freezing device comprising: a container member for holding the liquid to be frozen, and a partitioning member for dividing the frozen contents into blocks, one of said members having a uniform minutely-porous ice-engaging surface of anodized aluminum having pores so minute as to be invisible under the microscope, said anodized aluminum surface being thoroughly impregnated with a strongly-adhering thin coating of a water-shedding material which is hard at normal room temperatures and 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, said material being innocuous to the taste of the ice.

11. A freezing device comprising: a container member for holding the liquid to be frozen, and a partitioning member for dividing the frozen contents into blocks, one of said members having a uniform minutely-porous ice-engaging surface of anodized aluminum having pores so minute as to be invisible under the microscope, said anodized aluminum surface being thoroughly impregnated with a strongly adhering thin 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 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.

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