Nov. 30, 1965 R. G. CORDES 3,220,207

ICE CUBE MAKER WITH SLUSH PREVENTING MEANS

Filed July 13, 1964 4 Sheets-Sheet 1

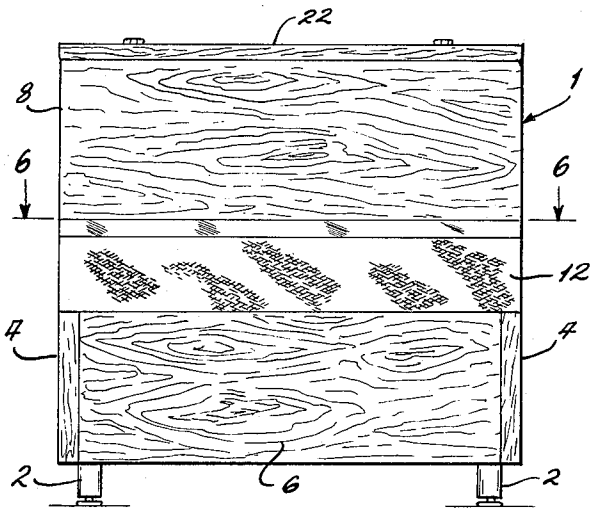


FIG.1

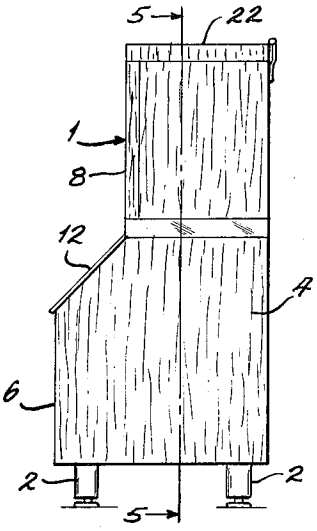


FIG.2

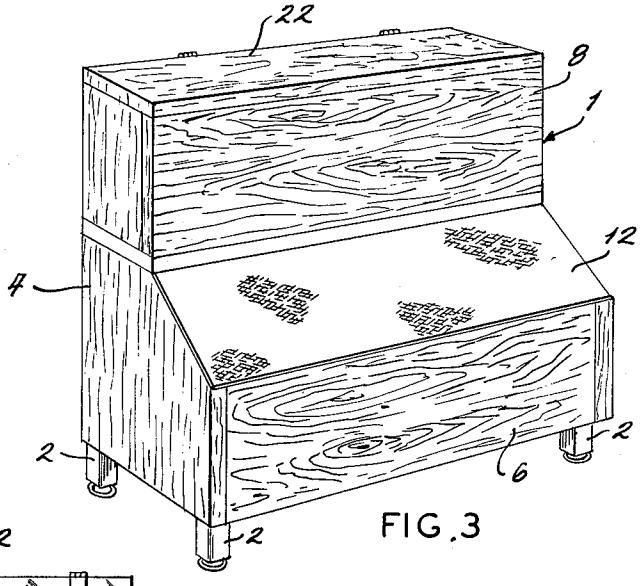


FIG.3

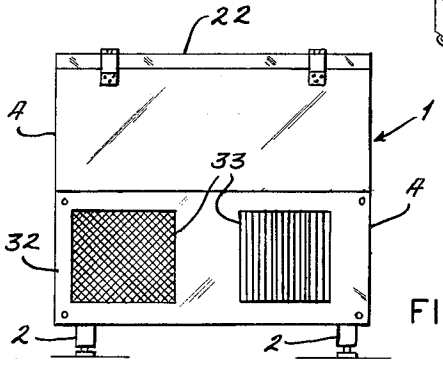


FIG.4

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ICE CUBE MAKER WITH SLUSH PREVENTING MEANS

Filed July 13, 1964 4 Sheets-Sheet 2

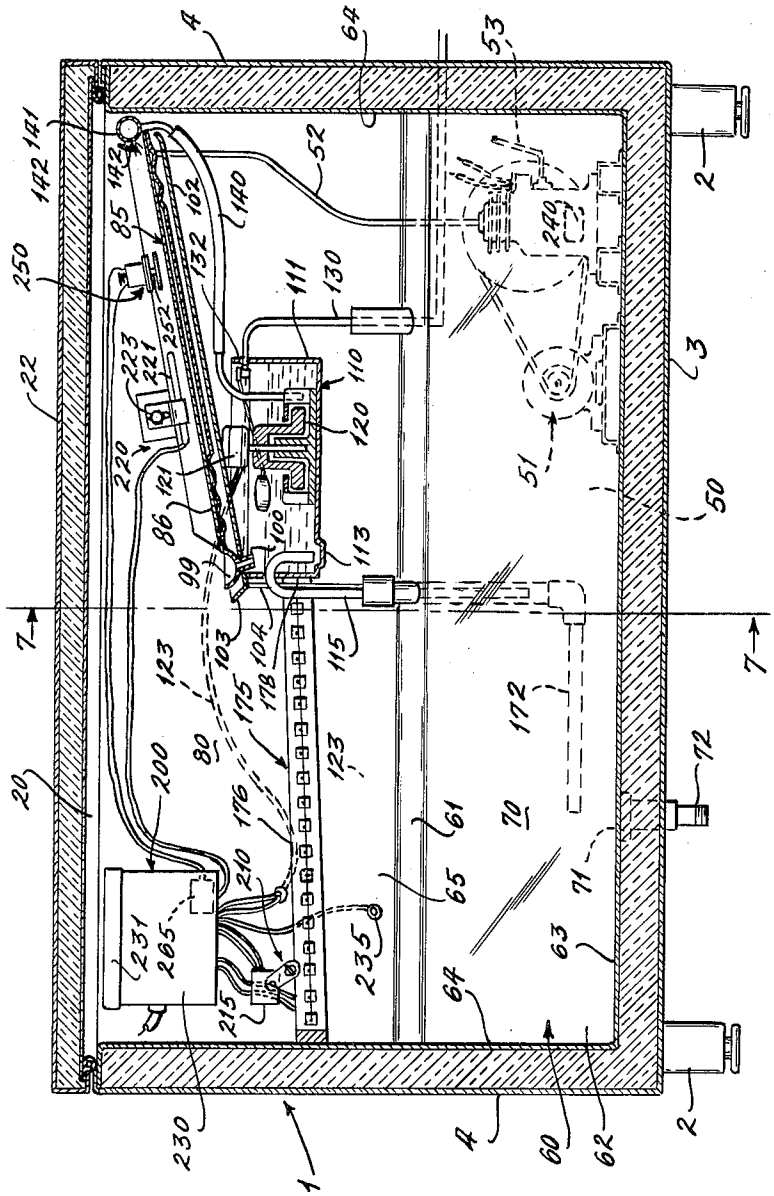


FIG.5

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ICE CUBE MAKER WITH SLUSH PREVENTING MEANS

Filed July 13, 1964 4 Sheets-Sheet 3

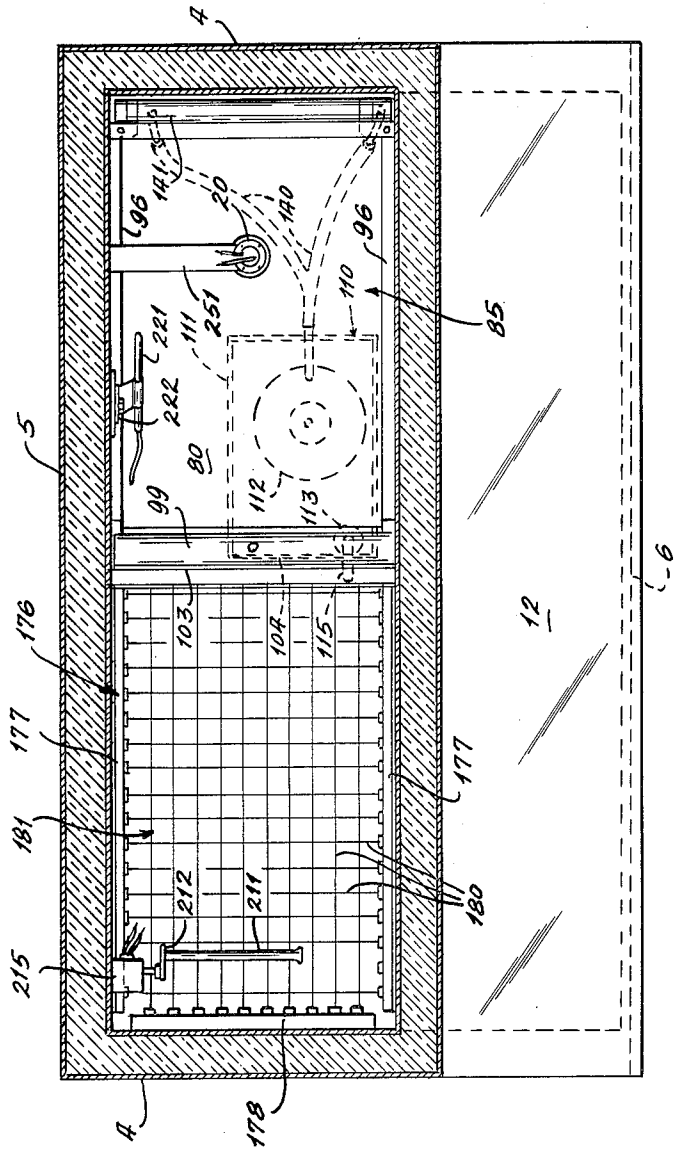


FIG. 6

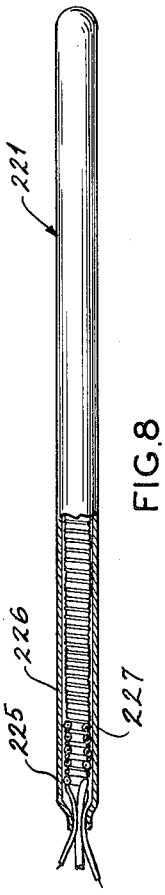


FIG. 8

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ICE CUBE MAKER WITH SLUSH PREVENTING MEANS

Filed July 13, 1964 4 Sheets-Sheet 4

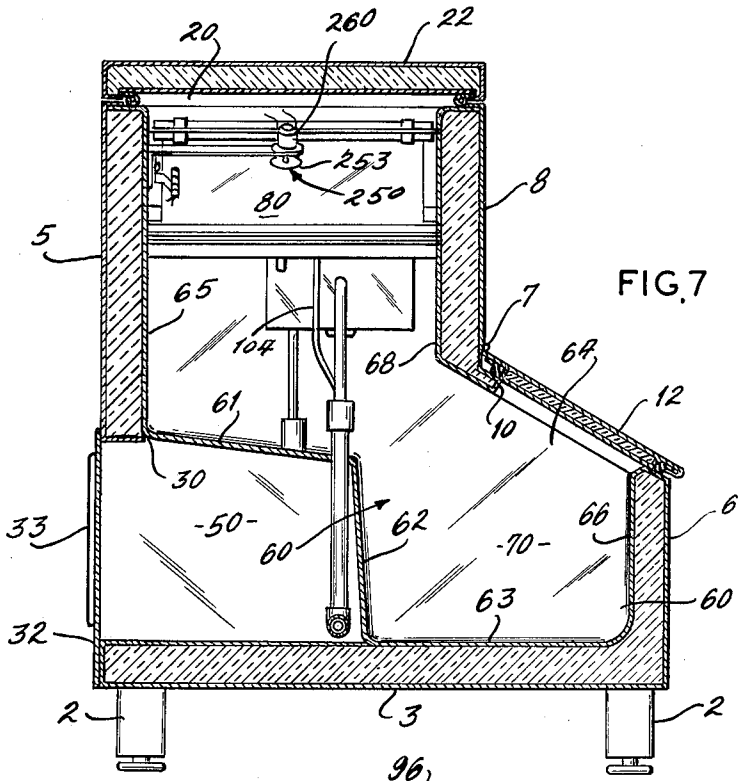


FIG.7

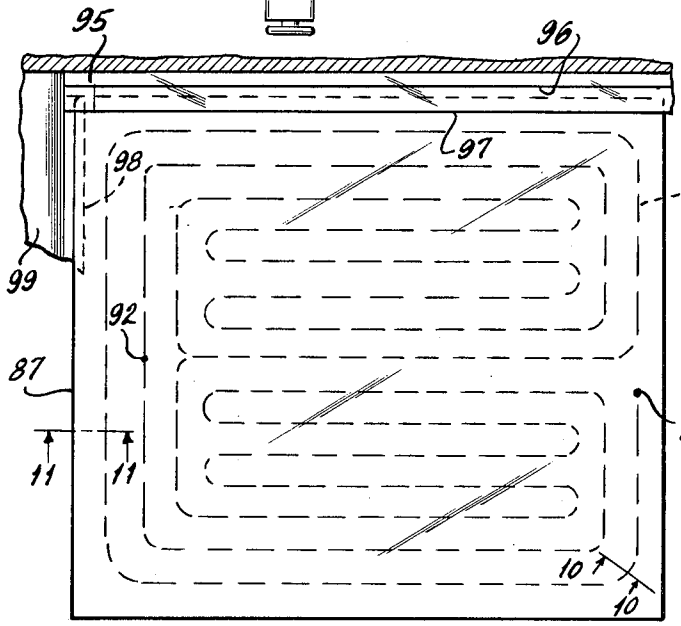


FIG.9

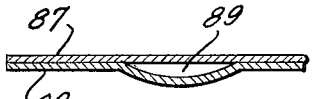


FIG.10

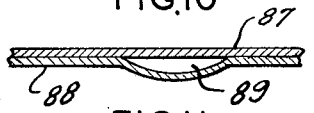


FIG.11

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United States Patent Office 3,220,207 Patented Nov. 30, 1965

3,220,207

ICE CUBE MAKER WITH SLUSH PREVENTING MEANS

Robert G. Cordes, Des Peres, Mo., assignor to Star Cooler Corporation, St. Louis, Mo., a corporation of Missouri

Filed July 13, 1964, Ser. No. 382,324
6 Claims. (Cl. 62—138)

This invention relates to ice machines. It has particular application to and will be described with respect to an ice machine of the character in which a slab of ice is frozen on an inclined plate, is thereafter released, and slides onto a grid of wires by which it is cubed, and the cubes fall into a storage bin. However, various elements of the invention may have application to other forms of machines.

Machines of this general character are illustrated and described in patents to Ayres et al., Nos. 2,682,155 and 2,995,905, Cocanour, No. 2,891,387, and Swanson and Swanson et al., Nos. 2,959,026, 2,860,027 and 2,999,369.

The patent to Ayres et al., No. 2,682,155, illustrates the common elements of this type of machine. These include, besides the plate on which the ice slab is formed, a water circulating pump driven by an electric motor, a sump into which the unfrozen water runs from the plate during the ice making process and from which the water is pumped, a distributing pipe by which a film of water is spread over the plate, refrigerant-carrying conduit beneath the plate, and means for selectively directing hot gas through the refrigerant conduit. The machine also includes a sensing element in the storage compartment which acts to shut down the machine when the storage bin has received all of the ice cubes it can accommodate.

Another essential element of all these machines is a thickness sensing device, which is connected to stop the flow of water over the plate and start the flow of hot gas through the refrigerant conduit.

One of the objects of this invention is to provide an ice machine in which circulation of the water over the inclined plate is facilitated.

Another object is to provide such a machine with an improved thickness sensing device.

Still another object is to provide such a machine with a refrigerant conduit system of increased efficiency.

Other objects will become apparent to those skilled in the art in the light of the following description and accompanying drawings.

In accordance with this invention, generally stated, an ice machine is provided in which ice is formed on an inclined plate with refrigerant conduit of a construction which provides increased efficiency in freezing. Positioned above the plate is a thickness sensing device which is simple but effective to sense the desired thickness of the ice slab and to act to release the slab of ice and quickly to re-establish the freezing cycle after the slab has slid from the inclined plate. The thickness sensing device is calibrated to permit setting to an indicated thickness.

The margins of the plate are preferably defined by plastic rims or walls, a type which provides immediate release of the ice slab without heating.

One of the continuing difficulties with present machines is that, at a fairly constant interval after the freezing cycle has started, a layer of slush forms over the surface of the plate as the water becomes supercooled. This slush is not firmly bonded to the plate, and tends to be washed off into the sump, where it interferes with the circulation of the water. One of the features of this invention is the provision of a slush preventer, preferably in the form of a mechanical dam which acts to stop or slow the flow of water over a small portion of the plate sufficiently to form a locus of solid freezing, which quickly spreads over the surface of the plate and effectively eliminates the formation of slush. Still another method of preventing this slush is to introduce a non-toxic crystalline material, the crystals of which serve as nucleii of formation of ice crystals.

The prevention of the slush serves to keep the sump free of obstruction. Another part of this invention is the provision of a dimple in the sump. A siphon tube opens contiguous the sump dimple, which has been found to facilitate elimination of sediment from the circulating water.

The machine of this invention preferably has an interior constructed entirely of fiber glass, the interior including not only the storage container but the walls of the ice-making compartment. With the construction of this invention, a generous radius is provided at all of the corners, to meet the standards of sanitary codes, which conventionally have not been met.

The electrical components of the machine of this invention have been so arranged with respect to the grid and cabinet, as to provide ready accessibility from the top of the cabinet, and to increase the useful space available within the cabinet for ice storage and the like.

In the drawing FIGURE 1 is a view in front elevation of one embodiment of machine of this invention, showing the exterior thereof;

FIGURE 2 is a view in end elevation of the machine shown in FIGURE 1;

FIGURE 3 is a view in perspective of the machine shown in FIGURE 1;

FIGURE 4 is a view in rear elevation, somewhat reduced in size, of the machine shown in FIGURES 1–3;

FIGURE 5 is a sectional view taken along the line 5—5 of FIGURE 2;

FIGURE 6 is a sectional view taken along the line 6—6 of FIGURE 1;

FIGURE 7 is a sectional view taken along the line 7—7 of FIGURE 5;

FIGURE 8 is an enlarged detail view, partly broken away, of an ice thickness sensing device of this invention;

FIGURE 9 is a top plan view of one embodiment of inclined freezing plate of this invention, with the center lines of conduit beneath the surface of the plate indicated in dotted lines;

FIGURE 10 is a sectional view taken along the line 10—10 of FIGURE 9; and

FIGURE 11 is a view taken along the line 11—11 of FIGURE 9.

Referring now to the drawing for one illustrative embodiment of the machine of this invention, reference numeral 1 indicates a cabinet, supported on legs 2. The cabinet 1 has a base 3, end walls 4, a back wall 5, and a front wall 6. The end walls 4 slope back and up from the front wall 6, to define sloping shoulders 7 which are integral, at their upper ends, with an intermediate front wall 8. The intermediate front wall 8 is carried by the end walls 4, as shown particularly in FIGURE 6. The free edges of the front wall 6 and the shoulders 7, and the lower outer edge of the intermediate wall 8 define a rectangular ice bin opening 10, closed by an ice bin cover 12, hinged along its upper edge to the intermediate wall 8, as shown in FIGURE 7. At the top of the cabinet 1, the upper edges of the back wall 5, end walls 4 and intermediate wall 8 define a rectangular freezer access opening 20, which is closed by a top 22, hinged at its back edge to the back wall 5, as shown in FIGURE 7.

The back wall 5 is provided with a compressor access opening 30, which is closed by a compressor access door 32, removably mounted on the back wall 5 by any suitable means such as thumbscrews as shown in FIGURE 7.

All of the base 3, end walls 4, back wall 5, front wall 6, intermediate wall 8, and top 22 are double-walled, the

space between the walls being filled with polyurethane foam. The ice bin cover 12 is also double-walled through the entire area of the opening 10.

The access door 32 is uninsulated, and is provided with suitable openings 33, to permit the dissipation of heat.

Except within a compressor compartment 50, the entire inside of the cabinet 1 is lined with a molded fiber glass liner 60. The liner 60 conforms generally to the contours of the inside surfaces of the walls defining the interior of the cabinet, except through the lower half of the back wall 5 and the rear part of the base 3. The liner 60 stops short of both of these areas, and is provided with a forwardly downwardly sloping top baffle 61, and a bin defining baffle 62, integral with the rest of the liner 60. The baffle 62, a bottom wall 63, end walls 64 and a front wall 66 of the liner, define an ice receiving storage bin 70. The top baffle 61, a back wall 65, a front intermediate wall 68, and end walls 64 of the liner define a freezing and cubing compartment 80.

A drain well 71 in the bottom wall 63, communicates with a drain pipe 72.

A compressor unit 51, with the usual electric motor, compressor, radiator and fan, is mounted within the compressor compartment 50.

Above the compressor compartment 50, and within the freezing and cubing compartment 80, are mounted a freezing element assembly 85, a water circulating system 110, a heating grid system 175, a slush preventer system 250, and a control system 200.

The freezing element assembly 85, in the embodiment shown, includes an inclined freezing plate 86, a plastic frame 95, a gutter 99 and a drip pan 102. The freezing plate 86 is inclined downwardly toward the grid section 175. The freezing plate 86 includes a flat, heat conductive metal sheet 87, the upper surface of which constitutes the freezing surface, and a lower sheet 88, bonded in a pattern to the upper sheet 87, and expanded in a direction away from the upper sheet 87, between the bonded areas, to form refrigerant gas passages 89 interconnected to constitute an evaporator coil 90.

Refrigerant gas enters the evaporator coil through a port 91, from a tube 52 from the compressor, and leaves the evaporator coil through an outlet 92, communicating with a return tube 53.

As will be observed from FIGURES 9, 10 and 11, the passages 89 are not uniform in cross-sectional area. At each of the turns, the passage 89 is at least 30% wider than it is in the straight reaches between the turns. This facilitates the uniform flow of refrigerant gas through the evaporator coil, and the uniform freezing of water running over the plate.

The plastic frame 95 is preferably made from or coated with a smooth plastic to which ice does not normally adhere, such as polyvinyl fluoride (e.g. Teflon, a product of Du Pont). The plastic frame 95 includes two side walls 96 of a height somewhat greater than the anticipated depth of ice to be frozen on the plate, flanges 97 extending substantially at right angles from the side walls 96, and a cross lip member 98, of which the gutter 99 is a continuation and a drain spout 100 in the bottom of the gutter 99 is a part. The opposite long edges of the inclined freezing plate 86 are held in longitudinal channels in the flanges 97. The transverse edge of the freezing plate 86 adjacent the outlet 92 abuts the upper edge of the lip 98, to form a smooth surface. No part of the lip and gutter extends above the level of the plane of the upper surface of the plate 86.

The drip pan 102 is preferably made of material which does not tend to sweat, and is positioned immediately below the lower surface of the freezing plate 86 to catch condensate which drips from the plate. The drip pan 102 has a lower upturned rim 103 to form a condensate catching trough, which has a drain hole which communicates with a drip tube 104.

The drain spout 100 opens at its lower end into a sump 111 which forms part of the water circulating system 110. The sump 111 is a rectangular, open topped tank, with a bottom 112 which is substantially flat, except for a dimple 113 near the end of the sump 111 adjacent the drain spout 100. The sump 111 is supported from the liner by suitable brackets, not here shown.

A siphon pipe 115 has an open end positioned immediately above the dimple 113 at approximately the level of the upper surface of the rest of the bottom 112. The siphon pipe 115 has an inverted U-shaped bend, in the middle of which it passes through an opening in an end wall of the sump, in which the siphon pipe 115 is sealed liquid tight. After the siphon pipe 115 passes outside the sump 111, it empties below the level of the sump into a common drain 172, into which the drip tube 104 also empties. The drain pipe 172 and the drain pipe 72 from the bin 70 both lead to a sewer or other disposal means, not here shown.

A pump 120 is mounted on the upper surface of the bottom 112. The pump 120 is shown somewhat schematically, and, in the embodiment shown in FIGURE 5 is illustrated as having an impeller driven by an electric motor 121, mounted on top of the pump casing. Electrical conductors 123 are connected to the motor 121, and to controls in the control system 200.

A fresh water supply pipe 130 is connected at one end to a source of fresh water, not here shown, and opens at its other end into the sump 111, through a float valve 132. The float valve 132 is of conventional construction, with a float connected to the outer end of a rod which, in turn is hingedly connected to the valve body in such a way as to open the valve when the float is below a predetermined level, and to close the valve when the float has risen to a level just below the top of the bend of the siphon pipe 115.

Two water circulating lines 140 are connected at one of their ends to the discharge side of the pump 120, and at their other ends to opposite ends of a distributing header 141, positioned transversely of the freezing plate 86 and along its upper edge. A distributing baffle 142 extends along and parallel with the header 141. The header 141 has a series of radially extending holes, from which water isues to strike the distributing baffle 142 when the pump is in operation.

In the illustrative embodiment shown, the heating grid system 175 includes a plastic frame 176 with side members 177 and end members 178. In each of the frame members 177 and 178, there is a multiplicity of equally spaced, longitudinally aligned square holes. Square insulators, each with a small taper rise framing both broad faces, are mounted in the holes with the two rises of each insulator on opposite sides of the frame wall in which the insulator is mounted. Resistance wires 180 are strung through the insulators, and form a grid 181, as best shown in FIGURE 6. The resistance wires are held taut by resilient biasing means, usually springs, to accommodate their expansion and contraction, and to protect them against breakage from sudden localized loads or blows.

The resistance wires 180 are connected electrically to a source of electricity, not here shown, through the control system 200, as shown in FIGURE 5. The frame 176 is also supported by means of suitable brackets, not here shown, by the liner.

The slush preventer system 250 in this embodiment includes a supporting arm 251, fixed to the liner at one end with its other end projecting over the inclined plate 86. At its outer end, the arm 251 carries a dam shaft 252 which in turn carries at its lower end a dam 253 of plastic which will not scratch or dent the surface of the plate 86, and a solenoid 260. The solenoid 260 is adapted and arranged to move the dam shaft toward and the dam against the upper surface of the plate 86 when the solenoid is energized. The solenoid 260 is electrically connected to a timer switch 265 which is part of the control system 200.

The control system **200** includes a bumper switch **210**, an ice thickness gauging device **220**, a bin control switch **235**, a gas flow reversing solenoid **240**, the slush preventer solenoid **260** which is part of the slush preventer system **250**, and the slush preventer solenoid timer switch.

The bumper switch **210**, in the embodiment shown, consists of a bumper arm **211**, a crank **212**, to which the bumper arm is attached, a biasing spring, not here shown, which biases the crank and bumper arm to the position shown in FIGURE 5, and a mercury switch **215**, electrically connected to a circuit within an electrical component-containing chest **230**. The mercury switch **215** is normally biased to open position, and is closed when the crank **212** is rocked clockwise as viewed in FIGURE 5, against the bias of the spring.

The ice thickness gauging device **220**, in this embodiment, includes a probe **221** carried by an adjusting plate **222**. The adjusting plate **222** has a slot in it, through which a threaded stud fixedly mounted in the liner **60**, extends. A knurled knob **223** is threaded on the stud, and serves manually releasably to clamp the adjusting plate **222** in any desired position. The adjusting plate **222** has a pointer projecting from one side. A fixed indicia plate or decal **224** with graduations **229** identified in terms of distance of the probe **221** from the surface of the inclined plate **86**, is provided between the adjusting plate and the liner, so that the height of the probe above the inclined freezing plate can be read directly.

The probe **221** consists of an outer heat conducting metallic packet **225**, a helically coiled capillary tube **226**, closed at one end inside the jacket **225**, and a heating coil of resistance wire **227** helically interwound with the capillary **226**, as shown in FIGURE 8. The other end of the capillary tube **226** extends out of the jacket, as do two ends of the resistance wire. One end of the jacket **225** is closed tightly. The other end is open initially to receive the helically intercoiled capillary tube and resistance wire, and then is crimped to prevent the accidental dislodgement of the resistance wire and capillary tube from the jacket, but not enough to constrict the projecting end of the capillary tube or damage the resistance wire. Both the resistance wire leads and the capillary tube are connected to parts of an electrical circuit, all of the components of which except for the probe **221**, the mercury switch **215**, a bin control switch **235**, a gas flow reversing solenoid **240**, and the slush preventer solenoid **260** are within the chest **230**.

The electrical circuit does not form a part of this invention. Suitable circuits are well known to the art. In the present embodiment, the circuit consists essentially of a step down transformer connected to a conventional source of A.C. current on one side, and, on the secondary side, to the ice cutting grid resistance wires, and, through an external resistance, to the resistance wire **227** in the probe **221**. The mercury switch **215** is connected in parallel with the outside resistance, so that, normally, the resistance is in the circuit between the transformer and the probe. However, when the mercury switch is closed, by rocking of the rocker arm **212**, the switch by-passes the external resistance, thus increasing the current to the resistance wire **227**.

The end of the capillary tube **226** which leads to the chest **230**, is connected with a pressure responsive switch which controls the reversing switch (hot gas solenoid) **240**. Normally, the pressure responsive switch is in a position to send cold refrigerant gas through the evaporator coil **90**. When the temperature of the capillary tube within the probe **221** falls to a predetermined level, the pressure responsive switch is actuated to energize the solenoid **240**, and send hot gases through the evaporator coil, in a manner well known to the refrigerating art. The actuation of the pressure responsive switch in response to the fall of temperature of the capillary tube also acts to stop the water pump motor **121** and reset the slush preventer timer switch.

The bin control switch **235** is connected to by-pass the hot gas solenoid controlling portion of the pressure responsive ice thickness control switch circuit, so that when the bin **70** fills with ice and actuates the bin control switch, the bin control switch actuates the hot gas solenoid **240**, causing the hot gas to pass through the evaporator coils and to release any ice which may have formed on the surface of the freezing plate **86**, regardless of its thickness.

The slush preventer timer switch **265** is connected to be energized when the water pump motor is re-energized by the action of the pressure responsive switch. When the timer is energized, it acts, after a preset time, to energize the solenoid **260**, to move the dam **253** against the surface of the plate **86**. After a short interval, the timer switch opens and permits the dam to return to its normal position above the level to which the surface of ice to be formed can reach.

The resistance wire making up the grid, remains energized as long as the machine is in operation. It is rated to maintain a temperature, under the usual ambient conditions, of 100–140° F.

As can be seen particularly in FIGURE 5, the chest **230** is mounted high within the freezing and cubing compartment **80**, and is, therefore, immediately accessible when the top **22** is raised. The chest **230** is provided with an easily removable cover **231**.

The compressor motor can be electrically energized separately from the rest of the system, and is designed to operate continuously.

In operation, assuming that the compressor **51** has been in operation, so that the interior of the cabinet is cold and the freezing plate **86** is ready for the freezing of water, that water is running into the sump **111**, which presupposes that the level of water is below the top of the siphon tube **115**, that the bin **70** is empty, that there is no ice on the freezing plate **86**, and that the control system is energized, the pressure-responsive switch connected to the capillary of the ice thickness control probe **221** will be closed to energize the pump **121**, causing the water in the sump **111** to be pumped through the circulating lines **140**, and header **141**, thence down the upper surface of the freezing plate **86** to the gutter **99** and back to the sump **111** through the drain spout **100**.

With continued circulation, the circulating water becomes super cooled, and would ordinarily form a layer of slush over the plate **86**. However, before this can happen, generally about five minutes after the circulation begins, the timer switch acts to move the dam **253** against the surface of the plate, causing a momentary disruption in the flow of the water down the plate. This has been found sufficient to cause the water to begin to freeze solidly on the plate **86**, with the dam site as the locus of freezing. The dam **253** need only be held against the surface of the plate **86** for a very short time. With the commerical embodiments of machine of this invention, a period of a second or less is sufficient. However, for various other machines, the dwell time can be adjusted to suit the characteristics of the machine. In any case, however, the dwell time is very short.

The resistance wire **227** has been energized constantly, but through the external resistance. As the ice sheet builds up on the surface of the freezing plate **86**, the water flowing over the surface of the ice ultimately begins to lap the probe jacket **225**. When this happens, the conductivity of the jacket and the low temperature of the water combine to chill the capillary tube, in spite of the flow of current through the resistance wire. The chilling of the capillary tube **226** causes the pressure responsive switch to which the capillary tube is connected, to cut off the pump motor **121** and to energize the hot gas solenoid **240**. The effect of deenergizing the pump motor **121** is to permit the water from the circulating line **140**, as well as the water which has been flowing down the surface of the block of ice, to return to the sump **111**, causing the level of the water in the sump to rise above the top of the

siphon tube 115. This then starts the siphoning action of the siphon tube 115, which empties the sump 111, in spite of the fact that, when the level of the water in the sump 111 falls below the level at which the float valve 132 opens, the fresh water begins to flow into the sump. In other words, the capacity of the siphon tube 115 is greater than the capacity of the fresh water conduit 130 through the valve 132. When the level of the water in the sump falls below the open end of the siphon tube 115, the siphon action of the tube 115 stops, and the sump begins to fill with fresh water.

In the meantime, the passage of hot gas through the evaporator coil 90 causes the block of ice on the freezing plate 86 to break loose and slide down onto the grid wires 181, striking the bumper arm 211, and causing the mercury switch 215 to close to by-pass the external resistance in the circit to the resistance wire 227. This causes the resistance wire 227 to heat rapidly, heating the capillary tube 226, throwing the pressure responsive switch to energize the pump motor 121, de-energize the hot gas solenoid 240, and start the timer switch. The cycle will now repeat itself.

As the water on the plate 86 is beginning to freeze, the block of ice on the grid 181 is divided into cubes by the heat of the resistance wires 180 making up the grid, and the cubes drop into the bin 70. This happens quickly relative to the freezing of a new block, so that the mercury switch 215 opens well before the ice reaches the level of the probe 221. The provision of the sloping baffle 61 under the grid 181 permits the cubes to be directed, by means of guides, to fill the entire bin, which, in the embodiment shown, extends through the full length of the inside of the cabinet.

When the pile of ice cubes in the bin 70 reaches the bin control switch 235, the continued contact of the ice and the switch 235 causes the switch 235 to operate, opening the electrical circuit to the pump motor 121 and closing the electrical circuit to the hot gas solenoid 240. This causes the sump 111 to drain and the plate 86 to heat, which ensures that any ice which is formed on the plate 86 will slide onto the grid 181. The construction of the cabinet, with the ice bin cover above the ice bin, and the location of the bin control switch 235 ensure that the bin will accommodate the "extra" batch of ice cubes. At the same time, the heating of the plate 86 ensures that the plate will be clear when the ice making cycles resume. Without this provision, the ice on the plate at the time the bin fills might melt irregularly, slide down part way, and even obstruct the gutter 99 and drip pan trough, so that when the cycle began again, water might be directed into the storage bin 70.

Numerous variations in the construction of the machine of this invention will occur to those skilled in the art in the light of the foregoing disclosure. For example, the adjustable plate of the thickness control system can be made without a slot, if a slotted bracket is provided. The pump motor 121 can be mounted below the baffle 61, although the arrangement shown has the advantage that no packing system need be provided in the bottom of the sump nor any more holes in the baffle 61 when the motor 121 is mounted below the baffle 61, in the compressor chamber 50, however, the heat generated by the motor 121 can be confined largely to the compressor chamber 50, and dissipated through the openings 33. The insulators in the frame of the grid system 175 can be made in integral strips, one to each frame member, set into elongated slots in the frame members. The dam 253 may be replaced by a salting device, which dumps a few crystals at the appropriate time, although the dam system offers many advantages of simplicity and ease of operation. These variations are merely illustrative.

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

1. In an ice making machine of the character in which a slab of ice is frozen on an inclined plate and thereafter released, the improvement comprising electrically operated water supply means for running water over said inclined plate, ice release means associated with said plate and a thickness sensing device positioned above the said plate said thickness sensing device being electrically connected to said water supply means for stopping said water supply means and to said ice release means to actuate said ice release means when the thickness of ice on said plate reaches a predetermined height, said thickness sensing device comprising a sensing tube of heat conducting material positioned at a height slightly greater than the desired height of the ice to be formed, a resistance wire within and in heat transfer relation to the sensing tube, said resistance wire being electrically connected for continuous energizing during the operation of said machine and a capillary tube within the sensing tube and in heat transfer relation to the sensing tube and heating element, said resistance wire and said capillary tube being helically entwined within the sensing tube, and switch means operatively connected to said capillary tube and electrically connected to said water supply means and to said ice release means.

2. In an ice cube machine of the character in which a slab of ice is frozen on an inclined plate and thereafter released to slide onto a cubing device, the improvement comprising means for initiating the circulation of water over the inclined plate, means for preventing the formation of slush on said plate, said slush preventing means comprising movable means adapted to be moved into and out of engagement with the plate, and timing means, connected to be started with the water circulation initiating means and connected to operate the slush preventing means at a predetermined period of time after the circulation of water has been initiated.

3. The improvement of claim 2 wherein the slush preventing means is a mechanical dam and means for moving it into and out of engagement with the plate, said dam being normally in a position out of engagement with the plate, and said timer is connected to energize the said dam moving means to move the said dam into engagement with said plate for a predetermined length of time and thereafter to move it away from said plate a distance greater than the expected thickness of the slab.

4. The improvement of claim 2 wherein the water is circulated through a distributor pipe and a baffle is positioned between the said distributor pipe and the freezing surface of said inclined plate.

5. In an ice cube machine of the character in which a slab of ice is frozen on an inclined plate and thereafter released to slide onto a cubing device, the improvement comprising an inclined plate made up of two sheets selectively bonded together, one sheet having a plane upper surface over which water runs to be frozen, and the other being spaced at selected areas to define a coil-like passage for the reception of refrigerant gases, said passage consisting essentially of straight reaches consecutive ones of which are directed at ninety degrees from one another and are connected by bends, the cross sectional width of said passage at each bend thereof being at least thirty percent greater than the width of the passage through the straight reaches thereof.

6. In an ice cube making machine of the character in which a slab of ice is frozen on an inclined plate and thereafter released to slide onto a cubing device, the improvement comprising an inclined freezing plate of heat-conductive material and a frame of non-adherent surfaced plastic, said frame comprising side walls of a height greater than the anticipated thickness of ice to be frozen on said plate, and a cross lip having a part abutting a lower edge of said plate and a gutter part integral with said lip, said plate being supported by said frame, and said lip having all of its surfaces as low as the plane of the top surface of said plate.

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