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Canter

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[54] **ICE-MAKER CONTROL CIRCUIT WITH SLAB LIMITING CONTROL**

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[51] **Int. Cl.**[2] **F25C 1/12**

[58] **Field of Search** 62/320, 138, 348

[56] **References Cited**

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2,784,563	3/1957	Baker	62/138
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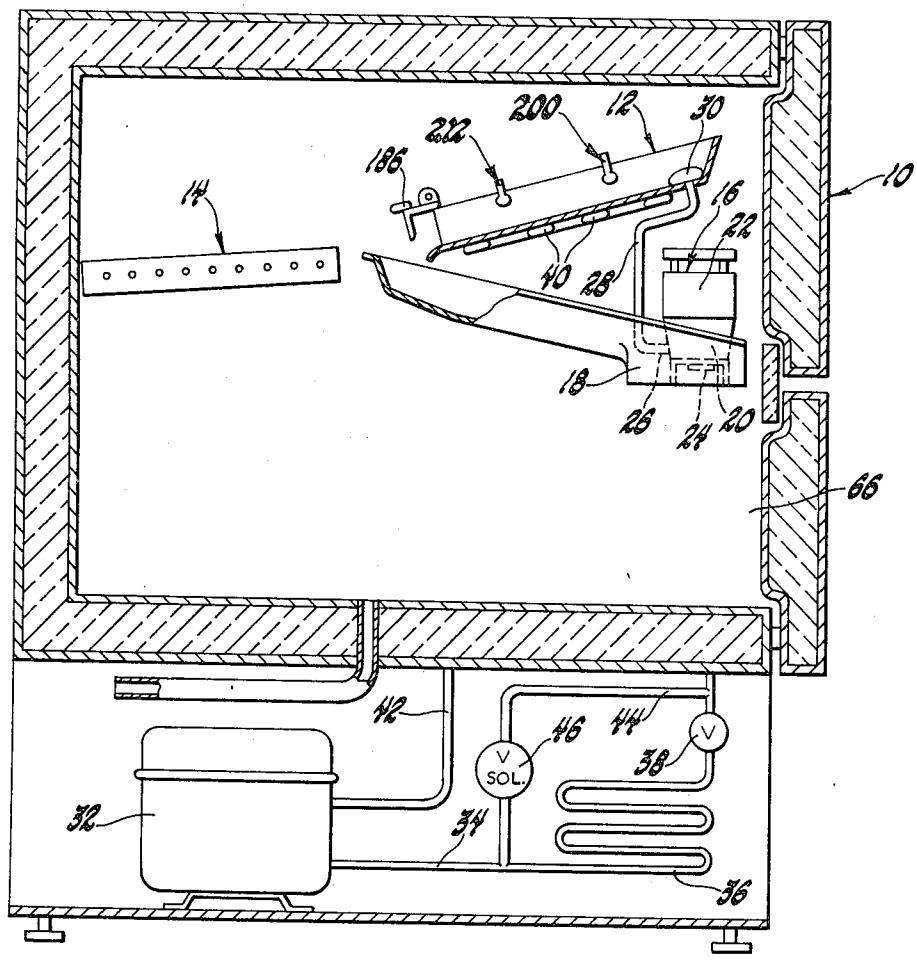
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[57] **ABSTRACT**

An ice maker control circuit for use with an ice maker of the type including an inclined refrigerated plate which is energized during a slab formation cycle during which water is continually circulated across the inclined refrigerated plate and wherein ice slabs released from the plate are directed to a cutting grid for melting the slab into a plurality of cubes of ice; the control circuit including a pair of ice thickness sensing thermostats each being associated with a transistorized control switch for selectively energizing first and second relay control switches in the water circulating pump circuit of the unit; the sensing thermostats being sequentially conditioned to terminate the recirculation of water across the slab under conditions wherein a slab release cycle fails to initiate because of the presence of a previously formed slab on the ice cutting grid.

4 Claims, 4 Drawing Figures



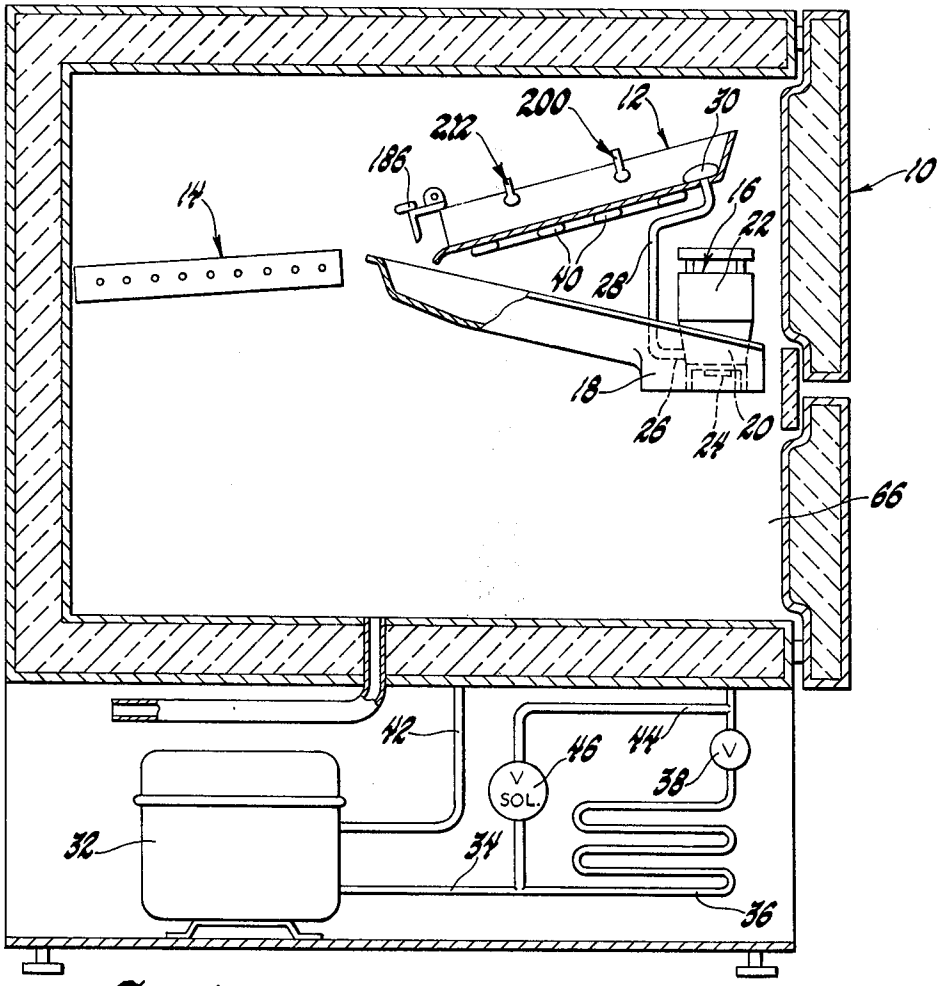


Fig. 1

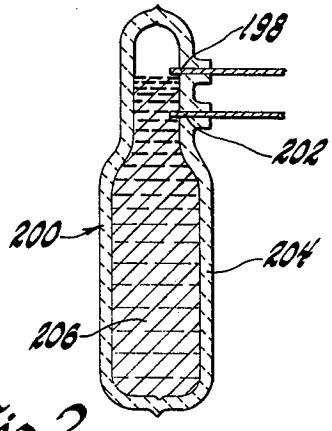


Fig. 2

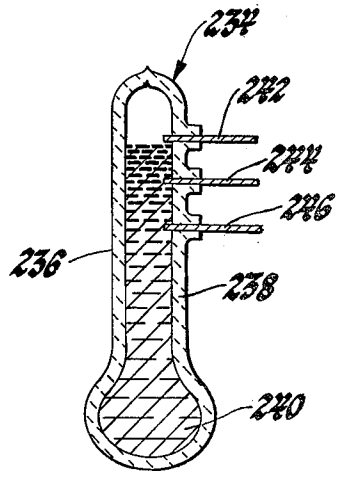


Fig. 3

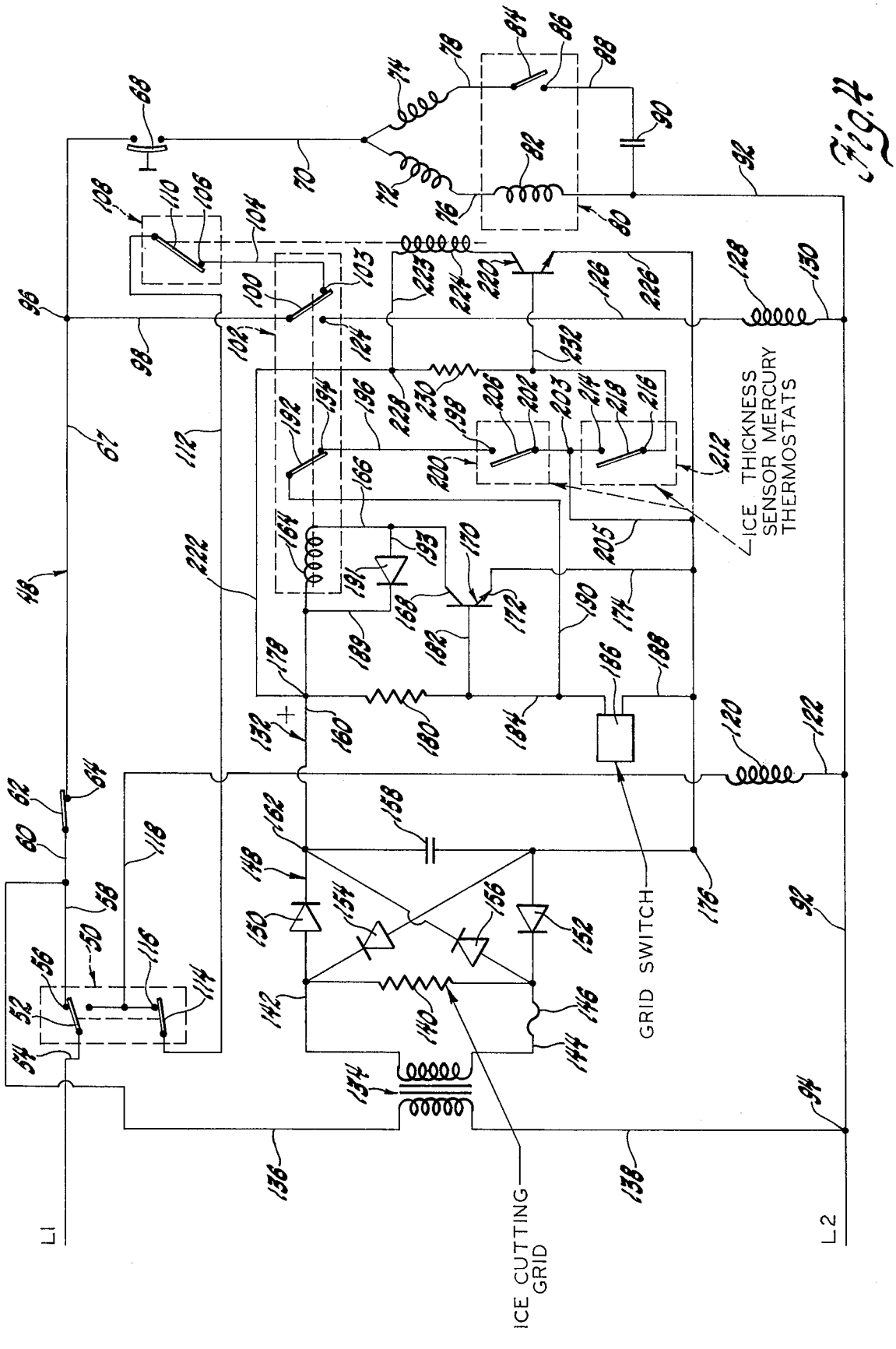

ICE THICKNESS SENSOR MERCURY THERMOSTATS
GRID SWITCH
ICE CUTTING GRID
L1
L2

Fig. 2

ICE-MAKER CONTROL CIRCUIT WITH SLAB LIMITING CONTROL

This invention relates to ice maker control circuits and more particularly to circuits for selectively controlling ice slab making and ice slab releasing cycles of operation in an inclined plate ice maker wherein means are included to prevent the excessive buildup of thickness on an ice slab formed on the refrigerated plate during the ice slab making cycle of operation.

U.S. Ser. No. **416,681** filed Nov. **16, 1973,** now U.S. Pat. No. **3,859,813** to James A. Canter discloses an improved control circuit for selectively energizing the drive motor of a water recirculation pump for directing water across a refrigerated plate during an ice slab formation cycle of operation in an automatic ice maker. The ice slab formation cycle is terminated in response to operation of an ice thickness sensor mercury thermostat that is located above the refrigerated plate which has an ice slab built-up thereon as water circulates thereacross. When a desired ice thickness is approached, the temperature of the sensor is reduced below a predetermined temperature — for example, in the range of **35.5°F**. Under these condition a biasing circuit for a semiconductor switching device is conditioned to operate a relay controlled switching device that deenergizes the energization circuit for the drive motor of the water recirculation pump and concurrently completes an energization circuit for a solenoid operating a hot gas recirculation valve in the refrigerant circuit for the refrigerated plate thereby to initiate a defrost cycle of operation.

The release of the ice slab is detected by a tilt plate mercury switch mounted on an energized grid that receives the release slab for cutting it into a plurality of individual cubes by melting the slab along the points of contact of the slab with the energized grid plate. The individual cubes are then directed into a bin storage system. In the aforesaid control system the grid switch is connected in circuit relationship with a base electrode of the semiconductor switching device and is operative when the slab of ice has slipped from the inclined refrigerated plate onto the grid to turn off the semiconductor switching device to thereby condition the relay control switch into an ice making mode of operation wherein the hot gas solenoid energization circuit is open and the energization circuit for the drive motor of the recirculating water pump is closed to produce a subsequent ice slab forming cycle of operation.

While the aforesaid circuit is suitable for its intended purpose, under certain operating conditions a slab of ice released from an inclined refrigerated slate may become lodged in a manner to maintain the tilt type mercury switch in a closed position. This will condition the semiconductor switching device to retain the semiconductor switching device biased to remain off notwithstanding the operative condition of the ice thickness sensor mercury thermostat. Thus, in a subsequent sequence of operation, the ice thickness sensor thermostat is initially returned to a closed position by heating the refrigerated plate by the hot gas defrost phase of operation and as the recirculated water passes over the refrigerated plate, ice thickness will build up thereon to a point where the ice thickness sensor mercury thermostat temperature will indicate an ice thickness at which an ice release operation will occur.

However, since the tilt-type grid switch is maintained closed by the blocking slab of ice the semiconductor switching device will remain reversely biased and as a result water recirculation will continue across the ice slab to produce an excessive ice slab thickness.

An object of the present invention is to provide an improved control circuit for preventing the buildup of excessive ice thickness when a tilt-type mercury switch for turning off a semiconductor switching device in the circuit is blocked closed by a partially released slab of ice by the provision of means for sensing an excessive buildup of ice on the refrigerated plate and operative to deenergize the drive motor energization circuit for a water recirculating pump independently of the operation of the tilt-type mercury switch for sensing the presence of a slab of ice on the ice melting grid of the ice maker.

Still another object of the present invention is to provide an improved solid state control device for sensing the buildup of a predetermined thickness in a slab of ice including a first ice thickness sensor mercury thermostat cooled by the predetermined ice thickness and operative to condition a first solid state switching device to operate a first plurality of relay control switches to concurrently open an energization circuit for the drive motor of a water recirculating pump while completing an energization circuit for a hot gas solenoid operated valve to direct hot gas refrigerant to an evaporator coil on the refrigerated plate to initiate a slab release phase of operation and wherein the circuit includes a trip type mercury switch for sensing the release of the slab as it moves onto a slab cutting, electrically energized grid of the ice maker and wherein a second ice thickness sensor mercury thermostat is operative to detect a buildup of ice above a desired predetermined thickness under conditions where the released slab of ice blocks the trip type mercury switch into a closed position so as to maintain the first semiconductor switching device biased to condition the relay operate switch continuously in an ice slab making position, a second solid state switching device being forwardly biased when the second ice thickness sensor detects an excessive buildup of ice on the plate to energize second relay control means for terminating recirculation of water across refrigerated plate until the switch blocking ice slab is dislodged thereby to condition the tilt type grid switch to a normally open position for resuming normal cycles of ice slab formation and subsequent defrost cycles for release of ice slabs from the refrigerated plate.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

FIG. **1** is a diagrammatic view of an inclined refrigerated plate ice maker with cutting grid for dividing the slab into individual cubes including the present invention;

FIG. **2** is an enlarged, vertical cross-sectional view of an ice-thickness sensor mercury thermostat used in the present invention;

FIG. **3** is another embodiment of a sensor in vertical section;

FIG. **4** is a circuit diagram including the electrical components of a preferred embodiment of the present invention.

Referring now to the drawings, an ice maker **10** is illustrated in FIG. **1** of the type including an inclined re-

frigerator plate assembly **12** located above and to one side of a grid assembly **14** which receives an ice slab from the refrigerated plate assembly **12** following an ice slab formation cycle of operation thereon. During the slab making cycle a water recirculation system **16** is operated to recirculate water across the inclined refrigerated plate **12** to be frozen into ice that adheres to the plate **12.** Water not frozen into ice during the recirculation over the refrigerated plate assembly plate **12** returns to a water reservoir **18** and is recirculated therefrom by a pump **20** driven by an electric motor **22.** The water recirculation circuit is from the reservoir **18** through a pump inlet **24** thence through a pump outlet **26** connected by a water supply conduit **28** to a distributor header **30** on the inclined refrigerated plate assembly **12.**

During the freeze cycle wherein an ice slab is built up on the plate assembly **12** a refrigerant system is operated to cool the plate assembly **12.** More particularly the refrigeration system includes a compressor **32.** The compressor **32** is connected by an outlet conduit **34** to one end of a condenser **36** for cooling hot discharge refrigerant gas from the compressor **32.** The cool gas is expanded across a suitable restrictor valve **38,** or equivalent capillary tube, and the refrigerant is thence passed through an evaporator coil **40** on the bottom of the inclined plate assembly **12** for reducing the temperature thereof below freezing. The return conduit **42** from the evaporator **40** is connected to an inlet of the compressor **32.** The refrigerant circuit further includes a hot gas bypass conduit **44** having a solenoid valve **46** therein which is under the control of a solenoid coil to connect the outlet conduit **34** from the compressor **32** across the condenser **36** and valve **38** thereby to direct hot gas through the evaporator coil **40** during a slab release or defrost cycle of operation.

The above illustrated ice maker apparatus **10** is representative of automatic ice making apparatus of a type more particularly set forth in the U. S. Pat. No. **2,784,563** issued Mar. **12, 1957,** to Baker wherein detail explanation of the configuration and component makeup of such ice maker **10** is more specifically set forth. The above explanation, however, will suffice for an understanding of the control circuit of the present invention.

Referring now to FIG. **4,** a control circuit **48** is illustrated which includes a **115** volt power supply indicated by lines L-**1** and L-**2.** The circuit includes a double pole, double throw service switch **50** having a first movable conduit **52** connected by a conductor **54** to line L-**1.** The movable contact is engageable with a first fixed contact **56** connected via conductors **58, 60** to an ice collecting bin thermostat electric switch having a movable contact **62** and a fixed contact **64.** The bin thermostat switch is maintained normally closed until a predetermined level of ice is accumulated in a bin storage region such as the storage cavity **66** illustrated in FIG. **1.** A conductor **67** connects the fixed contact **64** of the bin switch to one side of an overload thermostat **68** that is connected by means of a conductor **70** to the electric motor windings **72, 74** of motor compressor unit **32.** Leads **76, 78** connect the winding **72,** 74, respectively, to a conventional start relay **80** including a coil **82** and a movable contact **84** that is operatively associated with a fixed contact **86** connected by a conductor **88** to a motor start capacitor **90** thence through a conductor **92** to a terminal **94** energized by the line L-**2** of the **115** volt power source. **8**

Additionally the circuit includes an energization circuit for the pump drive motor **22** which runs from the service switch contact **52** through the previously described circuit including conductor **67** to a terminal **96** that is connected by a conductor **98** to a movable switch component **100** of a relay controlled multiple switch device **102** that will be operated in accordance with the formation of ice slabs on the assembly **12** to selectively energize the pump drive motor **22** and the solenoid operated hot gas solenoid **46** to control both the ice slab buildup freeze cycle and slab release or defrost cycle of operation.

The movable contact **100** is illustrated as being operatively engaged with a fixed contact **103** connected by a conductor **104** to a second fixed contact **106** of a normally closed relay operated switch **108** that serves as an ice thickness control switch in a manner to be discussed. The movable contact **110** of the switch **108** is in turn electrically connected by a conductor **112** to a second movable contact **114** in the service switch **50** that is connected by a fixed contact **116** to a power conductor **118** from the switch **50** to one side of the motor winding **120** of the pump motor **22** having the opposite side thereof connected by means of a conductor **122** to the power conductor **92** and line L-**2.**

The relay control switch **102** further includes a back contact **124** that is in contact with the movable contact **100** which is moved from the fixed contact **103** to interrupt the power circuit to the winding **120** during a slab release or defrost cycle of operation. When contact **124** is engaged by contact **100** an energization circuit for the hot gas solenoid valve **46** is completed from wire L-**1** through the aforementioned circuit leading to the movable contact **100** thence from the fixed contact **124** through a conductor **126** connected to one side of a coil **128** that, when energized, will open the solenoid valve **46.** The opposite side of the coil **128** is connected by a conductor **130** to the power conductor **92** thence to line L-**2.** Thus the movable contact **100** of the relay switch **102** serves to selectively energize the pump during the freeze or slab formation cycle of operation and to open that circuit and complete a circuit through the coil **128** so as to condition the valve **46** to direct hot gas through the evaporator **40** to release a form slab therefrom during a slab release or defrost cycle of operation.

The aforesaid basic switching operation of the movable contact **100** is under the control of a switching and sensing circuit **132** that includes a step-down transformer **134** having its primary connected by wires **136,** 138 to the power lines L-**1** and L-**2.** The transformer **134** steps down the line voltage to a reduced voltage in the order of **14** volts suitable for heating the cutting wires **140** of the grid **14** such that when a slab of ice slides automatically onto the cutting grid **14** following a slab release or defrost cycle it will be cut into a plurality of ice cubes which will fall through the grid into the storage bin cavity **66.** An example of this cutting operation is more specifically described in the above mentioned U.S. Pat. No. **2,784,563** to Baker.

The electric grid wires **140** are energized by conductors **142, 144** connected across the secondary of the transformer **134.** Line **144** is shown fused at **146.** A small amount of current is drawn from the secondary of the transformer to produce a low-voltage requirement for feeding the wires of the grid cutting wires **140**

at a reduced voltage level that is also suitable for use in the control of the relay control switch **102** for establishing the freezing and defrost cycles of operation in the ice making sequence. The secondary of the tranformer is connected to a full wave bridge rectifier **148** having diodes **150, 152, 154, 156** as well as a filter capacitor **158** to produce a direct current voltage for the control circuit **132.** A full wave rectified power supply is illustrated but it will be appreciated that a half wave rectification of the transformer secondary could also be used in the control circuit **132** within the scope of the present invention.

The control circuit **132** includes a wire **160** that connects one terminal **162** of the bridge **148** to one side of an operating coil **164** in the switch **102.** The opposite terminal of the coil **164** is connected by a conductor **166** to the collector electrode **168** of an npn transistor **170.** The transistor **170** further includes its emitter electrode **172** connected by means of a conductor **174** to a terminal **176** of the bridge **148** opposite to the terminal **162.**

The biasing circuit to the base of the transistor **170** is connected from the conductor **160** at a junction **178** thereto and includes a base resistor **180** in series connection with the conductor **182** to the base of the transistor **170.** A second conductor **184** connects the biasing circuit to one side of an ice grid switch **186** having the opposite side thereof connected by means of a conductor **188** to the terminal **176.**

The ice grid switch **186,** in the preferred form, is a pivotal or tilt type mercury switch having a sealed, tubular-like glass housing with liquid mercury and electrical contact therein sealed as shown in U.S. Pat. No. **2,887,852, issued May 25, 1959,** to Thomas for an Ice Maker. As disclosed by the Thomas patent, when an ice slab slides onto the ice cutting grid **14** the switch **186** is actuated to a closed position. In the preferred embodiment the switch **186** is normally maintained open. The biasing resistor **180** of the transistor **170** is connected by a conductor **189** to the cathode of a diode rectifier **191** while a conductor **193** connects the anode of the diode to the transistor collector **168.** It should be noted that the diode is not required so long as the transistor **170** has a high enough breakdown voltage. The base circuit for the transistor **170** is further defined by a conductor **190** that is electrically connected to a movable contact **192** in the relay operated switch **102.** The movable contact **192** is movable with respect to a fixed contact **194** connected by a conductor **196** to a first electrode **198** of a mercury slab thickness temperature sensor switch **200** having a second terminal **202** thereon connected to a junction **203** thence to a conductor **205** to the terminal **176** of the bridge power source **148.** The sensor switch **200,** as best seen in FIG. **2,** includes a glass bulb **204** with a mercury pool **206** therein (represented by movable switch **206** in FIG. **3**) which is located in spaced relationship to the inclined refrigerated plate assembly **12** to sense the temperature of water flowing thereacross and which expands or contracts to control current flow between electrodes **198,** 202.

The circuit further includes a second mercury slab thickness temperature sensor switch **212** like switch **200** having a first electrode **214** connected to the junction **203** and having a second electrode **216** thereon. The switch **212** also includes a glass bulb and a pool of mercury represented by movable switch **218** in FIG. **3** located in spaced relationship from the refrigerated plate assembly **12** a greater distance than the bulb of the sensor **200** for sensing a buildup of ice slab thickness in excess of a desired ice thickness.

An npn transistor **220** controls an energization circuit to the relay operated switch **108.** More particularly, the energization circuit is electrically connected from the junction **178** by conductors **222, 223** electrically connected to one side of a solenoid coil **224** in series relationship with the collector emitter electrodes of the transistor **220.** A conductor **226** electrically connects the transistor **220** to the terminal **176.** In the illustrated arrangement the biasing circuit for the transistor **220** is from a junction **228** between the conductor **222** and the coil **224** to a base resistor **230** thence through a conductor **232** electrically connected to the second terminal **216** of the mercury thermostat switch **212.** The operation of the ice maker unit **10** includes an ice making mode wherein the pump motor **22** is energized, and the mercury ice thickness control thermostat sensor switches **200** and **212** are closed, and the mercury grid switch **186** is opened.

During this mode of operation, the relay control switches **102, 108** are in the positions shown in FIG. **4** of the drawing so as to maintain the energization circuit for the motor windings **72, 74** of the compressor **32** whereby refrigerant is circulated through the evaporator coil **40.** Thus water will be recirculated across a refrigerated plate assembly **12** by the apparatus described above and a buildup of ice will occur on the assembly until the ice slab thickness reaches a temperature where the sensor switch **200** is cooled to a desired temperature which in the preferred embodiment is in the range of about **35.5°F.**

Under these condition, the sensor switch pool **206** contracts to open the circuit across electrodes **198,** 202. This causes the emitter base junction of the transistor **170** to be forward biased by the current flow in the resistor **180.** This causes the transistor **170** to be switched on to complete an energization circuit for the coil **164** from the junction **178** through the collector emitter terminals of the transistor **170** back to the terminal **176.** Energization of the coil **164** will trip the double pole/double throw relay operated switch **102** to cause the movable contact **100** to move to the fixed contact **124** thereby to interrupt the energization circuit for the water pump motor winding **120.** Concurrently, it completes an energization circuit through the conductor **126** to the hot gas solenoid coil **128** to initiate a defrost and ice slab release cycle of operation.

At the same time, the movable contact **192** of relay operated switch **102** is shifted from the fixed contact **194** to open the circuit through the ice slab sensor thermostatic switches **200, 212** thereby to lock this control circuit in a slab release mode of operation. While the ice slab release cycle is in operation, the hot gas solenoid valve **46** will direct hot refrigerant gas through the evaporator coil **40** thereby to warm the refrigerated plate assembly **12** to cause the mercury sensor thermostatic switch **200** to warm and reclose. When the ice slab is released from the refrigerated plate assembly **12** it slides onto the cutting grid **14** to cause the mercury grid switch **186** to pivot and close thereby to reverse the bias emitter circuit of the transistor **170** so that it will not conduct. This will drop out the relay coil **164** to return the movable switches **100, 192** to the position

illustrated in FIG. 4 thereby to condition the circuit for a new ice making cycle of operation.

Under certain circumstances, a slab of ice in a previous ice release operation may be positioned so as to prevent a released slab of ice from sliding off the refrigerated plate assembly **12.** Under this circumstance, with the solenoid controlled relay operated switch **102** returned to an ice making cycle of operation, water will be recirculated across the retained ice slab on the refrigerated plate to produce an excessive buildup of ice thickness. In accordance with the present invention, the ice thickness sensor mercury thermostat switch **212** will be reduced in temperature by the excessive ice buildup on the retained slab and will eventually be cooled to a temperature in the range of **35.5**°F to reflect the presence of an excessive buildup of ice on the refrigerated plate assembly **12.** This will cause the emitter base circuit of the transistor **220** to be forwardly biased thereby to switch the transistor **220** on to complete the energization circuit for the coil **224** thus operating the relay switch **108** to an open position to deenergize the energization circuit for the water pump drive motor **22.** Thus, the ice buildup will be stopped.

When the slab of ice on the grid that blocks release of the slab of ice on the refrigerated plate assembly **12** is either melted free or otherwise removed, the slab switch **186** will reopen thereby to start a new slab release cycle of operation to place the unit back in a normal operation sequence.

The dual temperature sensor switches **200, 212** can be replaced by a single sensor unit **234** as shown in FIG. **3.** It is in the form of a single mercury column **236** having an outer glass sheath **238** around a mercury pool **240** which is spaced above plate **12** to sense slab thickness thereon. When ice slab thickness cools the pool **240** to around **35.5**°F the mercury column will contract to open a circuit between electrodes **242, 244** corresponding to electrodes **198, 202** in FIG. **2.** When the slab thickness exceeds a desired thickness the pool **240** is further cooled and the mercury column further contracts to open a circuit between electrodes **244, 246** corresponding to electrodes **214, 216** in FIG. **4.** The sequence of circuit control corresponds to that set forth with the use of two switches **200, 212** to produce initiation of defrost, ice slab release when electrodes **242,** 244 are opened, and ice build-up termination when electrodes **244, 246** are opened.

While the embodiments of the present invention, as herein disclosed, constitute a preferred form, it is to be understood that other forms might be adopted.

What is claimed is:

1. A slab thickness limiting control circuit for an automatic ice maker of the type having an inclined refrigerated plate cooled by a refrigerant circuit and with water circulated thereover by an electric motor driven pump to build up a finished slab of ice thereon and further including an inclined ice cutting grid to receive the ice slab from the refrigerated plate when released therefrom by hot gas defrost means and with the grid serving to cut the slab into individual cubes comprising; first and second mercury ice thickness control thermostatic control switches, a normally opened grid switch being closed when a slab of ice is receiver on the cutting grid from the freezing plate, a first transistor having a base, an emitter and a collector, a second transistor having a base, an emitter and a collector, a DC power source including first and second terminals thereon, means including first and second biasing resistors connected respectively to the base of said first transistor and the base of said second transistor, normally closed first switch means for connecting the base of said first transistor to said first mercury ice thickness control thermostatic control switch, means including second switch means having a normally closed contact for energizing the refrigerant circuit to cool the plate and a normally open contact operable to a closed position for defining an electrical path for conditioning the hot gas defrost means to defrost the refrigerated plate during a slab release cycle of operation, said first mercury ice thickness control thermostatic switch being positioned a first preselected distance above the refrigerated plate to detect a buildup of a first predetermined thickness of ice in the slab and operative to open to produce a bias on the base of said first transistor when the grid switch is normally open to cause said transistor to be forwardly biased, means including a coil connected in circuit relationship with the emitter and collector of said first transistor and operable when said first transistor is conductive to open said normally closed first switch means and to shift said second switch means from its normally closed contact to its normally open contact, said second ice thickness control thermostatic switch being positioned a preselected greater distance above the refrigerated plate than said first ice thickness control thermostatic switch to detect an excessive slab thickness, means including said second ice thickness control thermostatic switch for producing a negative bias on the base of said transistor to cause said second transistor to be triggered conductive, a third normally closed switch means in series with said first switch means and being maintained normally closed to complete the water pump motor circuit, means responsive to said second transistor being triggered conductive to open said third switch means to deenergize said water pump when an excessive ice buildup is detected by said second ice thickness control thermostatic switch.

2. A slab limiting control circuit for association with a solid state refrigeration control circuit of the type including a first power transistor forwardly biased by means including an ice thickness sensor mercury thermostat to selectively position a solenoid operated relay to energize either a water circulating pump motor or a hot gas recirculation valve and wherein the base circuit of the transistor is connected to a switch that detects release of a slab of ice from an evaporator to direct a reverse bias signal to the transistor to cause the solenoid operated relay to be positioned in a water circulation mode when the slab of ice has been released from the evaporator plate the improvement comprising; circuit means including a second ice thickness sensor mercury thermostat switch for detecting an excessive buildup of ice slab thickness on the refrigerated plate, a second transistor having a base collector and emitter, circuit means including a biasing resistor in circuit relationship with said second ice thickness sensor mercury thermostat, normally closed switch means for completing the energization circuit for the water pump motor, circuit means connected across the collector emitter of said second transistor including means for operating said normally closed switch means to deenergize the water pump motor when said second transistor is turned on for current flow across its collector emitter electrodes, said second ice thickness sensor mercury

thermostat being operative to trigger said second transistor to complete the conducting circuit between its collector and emitter to condition said normally closed switch means to terminate energization of said water pump motor thereby to prevent excessive build-up of ice slab thickness on the refrigerated plate when the slab switch is maintained closed during a refrigeration cycle of operation.

3. A control circuit for preventing the excessive buildup of ice slab thickness on a refrigerated inclined plate over which water is circulated by an electric motor driven recirculating pump during a refrigeration phase and wherein an electrical defrost means is associated with the refrigerated plate to remove a slab of ice therefrom, the released slab of ice being received by an energized electrical grid for cutting the slab into a plurality of cubes of ice comprising: Circuit means defining an energization circuit across a power source for the pump motor including first and second switch means, first and second electrically energizable solenoid means for positioning said first and second switch means to control the energization of said pump motor circuit, second circuit means for energizing the defrosting means including a back contact selectively engageable by said first switch means when operated to deenergize the pump motor, means for selectively controlling energization of said first solenoid means including a first transistor having a base, electrode and emitter electrodes connected in circuit with said first solenoid means, means for directing a biasing current to the base of said first transistor including a normally closed third switch actuated by said first solenoid means and further including a first ice thickness sensing mercury thermostat, means including a tilt switch responsive to movement of a slab of ice onto the cutting grid having one terminal thereof connected to the base of said first transistor and the opposite terminal thereof connected to the power source and operative when a slab of ice has been released onto the grid to terminate the base biasing signal to said first transistor to interrupt the energization circuit for said first solenoid, and means for preventing an excessive buildup of ice on the refrigerated slab including a second ice thickness sensor mercury thermostat positioned to detect an excessive buildup of ice slab thickness, a second transistor having base, collector and emitter electrodes, said second solenoid means being connected across the collector emitter electrodes of said second transistor for energization across the power source, biasing means including said second ice thickness sensor mercury thermostat for directing a signal to the base of said second transistor when an excessive ice slab thickness is detected to condition said second transistor to energize said second solenoid means thereby to condition said second switch means to terminate energization of the water pump motor when said slab switch is maintained closed following a previous defrost cycle.

4. A control circuit for preventing excessive buildup of thickness in a slab of ice on a refrigerated plate in an automatic ice maker of a type including a refrigerated plate having water recirculated thereacross by an electric motor driven pump to form an ice slab thereon and with an ice harvest cycle being initiated when a predetermined ice slab thickness occurs and including means for defrosting the refrigerated plate to cause the formed ice slab to slide onto an ice cube cutting grid, the control circuit comprising in combination: a first ice thickness control thermostat switch, a grid switch actuatable when a slab of ice slides from the refrigerated plate onto the cutting grid, a first npn transistor having a base, an emitter, and a collector, a direct current power source having first and second terminals, one of said terminals being connected to said grid switch and said first thermostat switch, means including a biasing resistor for connecting the other of said power source terminals to the base of said first transistor, normally closed first switch means connecting said transistor base through said first thermostat switch to the other power terminal, second switch means having a normally closed contact for energizing means for circulating water across the refrigerated plate and a normally open contact, means including said normally opened contact to define an energization circuit for operating the defrost means for the refrigerated plate, said biasing resistor being selected so that when a predetermined temperature is sensed by siad first ice thickness control thermostat switch a current flow will be directed through the base emitter circuit of said first transistor to cause it to be conductive between the collector-emitter circuit thereof, first solenoid means connected in circuit with the collector-emitter circuit of said first transistor and energizable when said first transistor is triggered conductive to condition said first switch means to open and to condition said second switch means to close the normally open contact thereof thereby to terminate water circulation and to initiate defrost and an ice slab harvest cycle, a normally open ice slab grid switch connected between the base of said first transistor and one of the power source terminals and operative when the slab of ice has been released to reverse bias the base emitter circuit of said first transistor to terminate energization of said first solenoid means thereby to terminate defrost of the refrigerated plate and to reinstitute recirculation of water across the refrigerated plate, and means for preventing excessive build-up of ice when the normally open slab sensing grid switch is closed by the presence of an uncut ice slab on the grid including a second ice thickness control thermostat switch located with respect to the refrigerated plate to detect an excessive buildup in the thickness of an ice slab thereon, a second npn transistor including a base, collector and emitter, circuit means for connecting the base of said second transistor across the power source terminals including a biasing solenoid means, means for connecting said second solenoid means across the power terminals including the collector-emitter of said second transistor, a normally closed switch means in the energization circuit for the water pump circuit operated by said second solenoid means when the second transistor is conductive between the collector and emitter electrodes thereof, said second thermostat switch being responsive to an excessive buildup of ice thickness as produced when the grid switch is maintained closed during a refrigerated, recirculating water phase of operation to produce a biasing signal on the base of said second transistor to trigger said second transistor conductive thereby to energize said second solenoid means and condition said second switch means to deenergize the water recirculation pump circuit thereby to terminate further buildup of ice thickness on the slab.

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