Sept. 28, 1965 W. J. LINSTROMBERG 3,208,233

HOME ICE CUBE MAKER AND UNITARY CONTROL

Filed Nov. 13, 1962

3 Sheets-Sheet 1

Fig. 1.

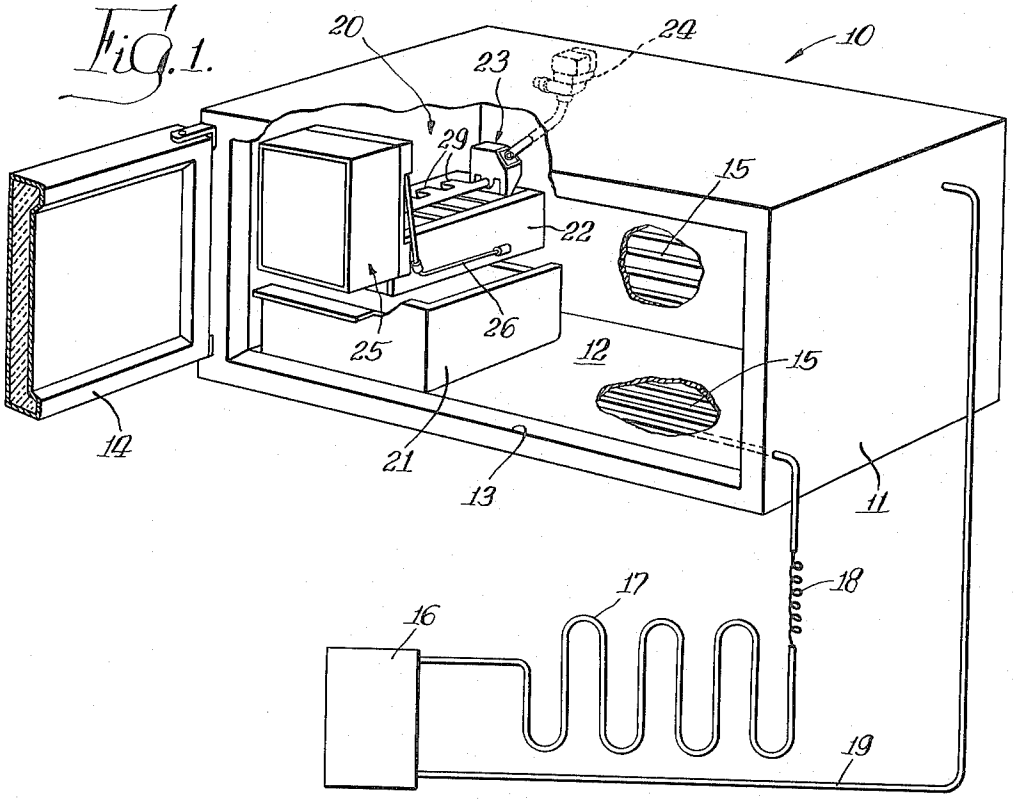

Fig. 2.

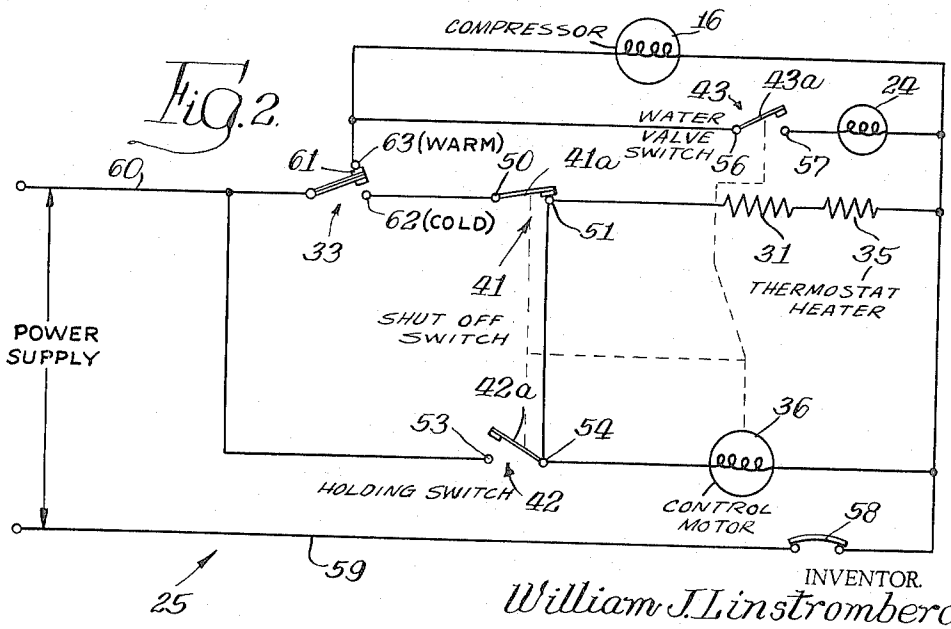

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Fig. 3.

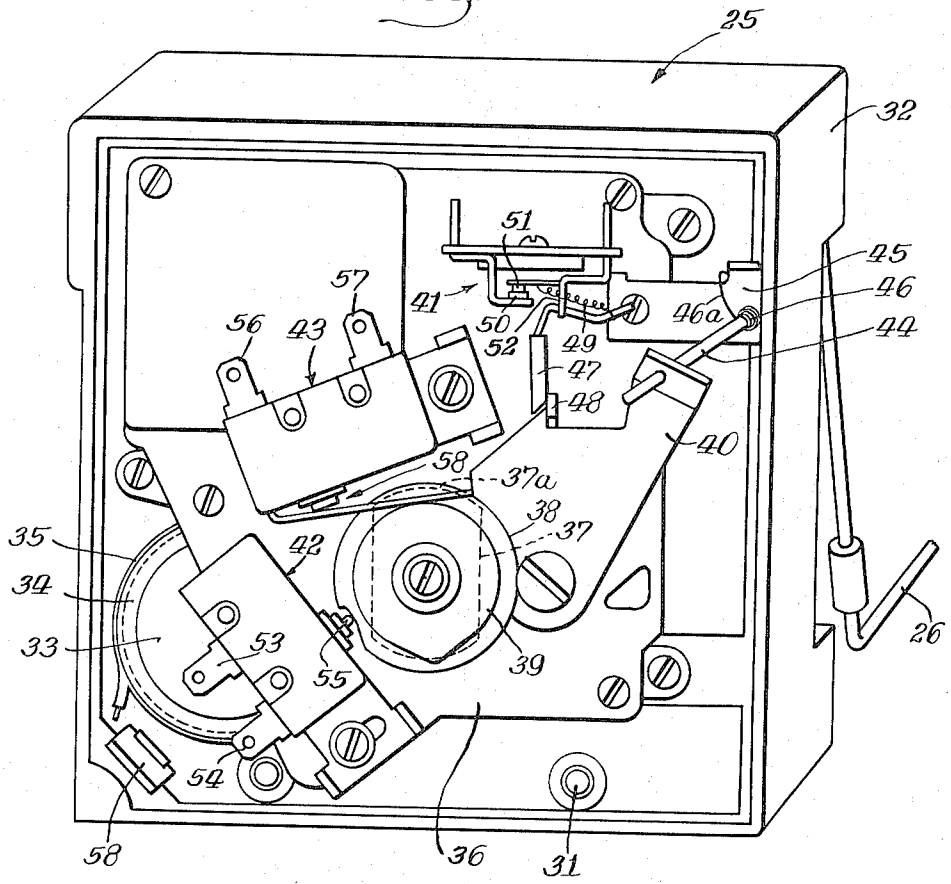

Fig. 4.

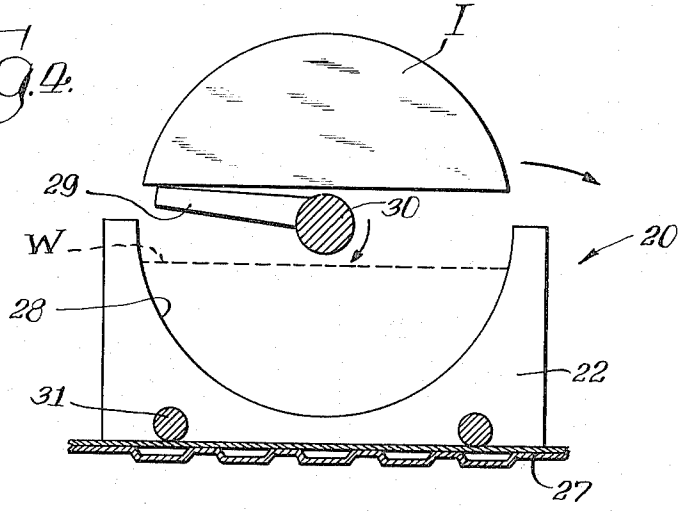

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Fig. 5.

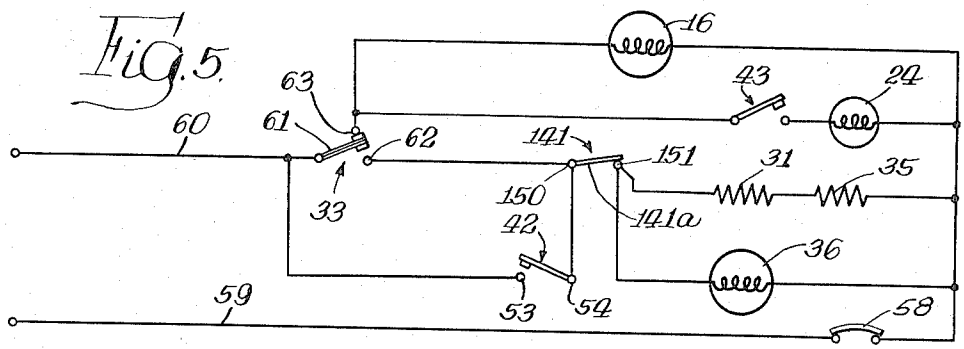


Fig. 6.

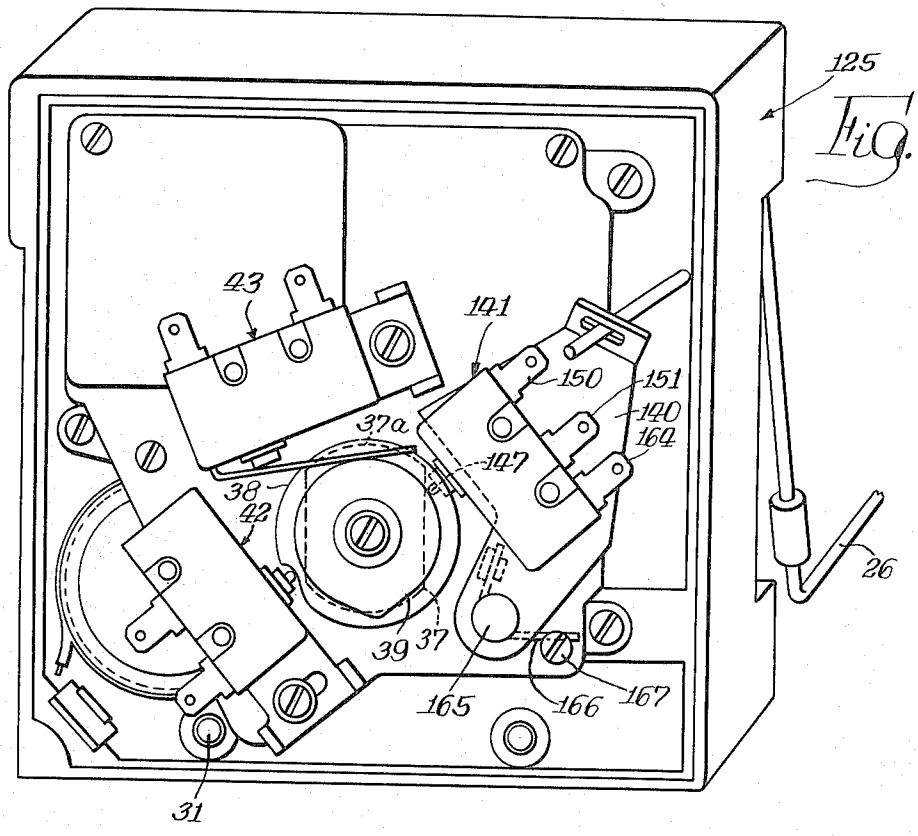
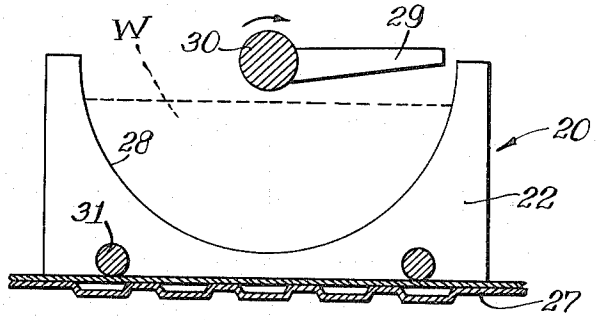


Fig. 7.



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3,208,233

HOME ICE CUBE MAKER AND UNITARY CONTROL

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Filed Nov. 13, 1962, Ser. No. 237,011
15 Claims. (Cl. 62—137)

This invention relates to refrigeration apparatus and particularly to ice maker apparatus.

In one well-known form of ice maker apparatus, a mold is provided in which water is frozen by suitable refrigerating means. The resultant ice body is forced from the mold and delivered to a suitable collecting bin by suitable ejecting means. Such an ice maker may be associated with a cabinet defining a refrigerated chamber and may be arranged to utilize the refrigeration unit in conjunction therewith. Conventionally a thermostatic control is provided for sensing the temperature of the chamber and controlling the operation of the refrigerating unit to maintain the temperature between preselected maximum and minimum values.

The present invention comprehends an improved refrigeration apparatus generally of the type discussed above wherein the ice maker is arranged in a novel manner for improved coaction with the chamber refrigerating means and refrigerating unit. Thus, a principal feature of the present invention is the provision of a new and improved refrigeration apparatus.

Another feature of the invention is the provision of such a refrigeration apparatus having new and improved means for controlling the operation of an ice maker and associated refrigerated chamber means.

Another feature of the invention is the provision of such an apparatus having a novel control arrangement utilizing a single thermostat to control both the ice body forming cycle and the chamber refrigerating cycle.

Still another feature of the invention is the provision of such a refrigeration apparatus wherein the thermostat is arranged to cause continuous operation of the refrigerating unit during the formation of ice bodies in the mold.

Yet another feature of the invention is the provision of such a refrigeration apparatus wherein the thermostat is arranged to preclude operation of the refrigerating unit during ejection of the ice bodies from the mold.

A further feature of the invention is the provision of such a refrigeration apparatus wherein the thermostat is arranged further to cycle a refrigerating unit seriatim on and off whenever the operation of the ice body maker is terminated in response to a full condition of the collecting bin.

A yet further feature of the invention is the provision of such refrigeration apparatus wherein the control is arranged to terminate the operation of the ice maker as a result of a full condition of the collecting bin only when the ice maker mold is empty, thereby to provide improved correlation between the temperature sensed by the thermostat and the temperature of the chamber to be refrigerated.

Still another feature of the invention is the provision of such refrigeration apparatus which is simple and economical and which provides substantially trouble-free functioning.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a fragmentary isometric view of a refrigeration apparatus embodying the invention with portions thereof broken away and with portions thereof shown schematically;

FIGURE 2 is a schematic electrical wiring diagram thereof;

FIGURE 3 is a front elevation of the control thereof, with the front cover removed;

FIGURE 4 is a vertical transverse section of the mold illustrating the disposition of the ejector blade as at the end of the ejection cycle;

FIGURE 5 is a schematic electrical wiring diagram of another form of refrigeration apparatus embodying the invention;

FIGURE 6 is a front elevation of the control assembly of the modified embodiment; and

FIGURE 7 is a vertical transverse section of the mold of the second embodiment illustrating the disposition of the ejector blade as at the end of the ejection cycle.

In the exemplary embodiment of the invention as disclosed in FIGURES 1–4 of the drawing, a refrigeration apparatus generally designated **10** is shown to include an insulated cabinet **11** defining a chamber **12** to be refrigerated. The cabinet **11** is provided with a front opening **13** selectively closed by an insulated door **14**. Refrigeration of the chamber **12** is provided by means of an evaporator **15** disposed within the walls of the cabinet **11**. A suitable compressor **16** is provided for delivering refrigerant to evaporator **15** through a conventional condenser **17** and capillary **18**, the refrigerant being returned to the compressor **16** by means of the return duct **19**.

An ice maker generally designated **20** is disposed within chamber **12** for making ice bodies which may be collected in a suitable bin **21** accessible through cabinet opening **13**. The ice maker **20** includes a mold **22** to which water is delivered through a suitable inlet **23** controlled by a solenoid operated water valve **24** connected to a suitable water supply line (not shown). The operation of the refrigeration apparatus **10** is controlled by a control **25** disposed within chamber **12** adjacent the front end of the mold **22**. As shown in FIGURE 1, control **25** includes a sensing arm **26** which extends downwardly to the collecting bin **21** and which, as discussed more fully subsequently, functions to control the operation of the ice maker **20** in accordance with the level of ice bodies collected in bin **21**.

Mold **22** may be refrigerated by any suitable means such as by conventional forced air refrigeration; herein as shown in FIGURE 4, ice maker **20** illustratively includes a roll-bond evaporator portion **27** forming a shelf for supporting and refrigerating the mold **22**. The ice bodies I are formed in suitable cavities **28** in mold **22** and, as discussed more fully subsequently, are ejected from the cavities **28** by an ejector blade **29** carried on a selectively rotatable shaft **30** to sweep through the cavities **28** and force the ice bodies upwardly therefrom as shown in FIGURE 4. To facilitate the removal of the ice bodies from the cavity a mold heater **31** is provided adjacent the evaporator **27**.

Referring now to FIGURES 2 and 3, the control **25** controls the operation of the refrigeration apparatus to provide improved refrigeration of chamber **12** and formation of ice bodies in ice maker **20**. More specifically, control **25** includes a housing **32** which encloses a bimetallic thermostat **33** in thermal contact with the mold **22** closely adjacent the forward cavity **28** thereof to sense the temperature of the water W within cavity **28**. The thermostat **33** is carried on a support **34** around which extends an electric heater **35**. Also within housing **32** is provided a drive motor **36** driving shaft **30** to make one revolution during each ejection cycle wherein the ice body is swept from the cavity **28** and delivered to the collecting bin **21**. The motor **36** further drives three cams **37**, **38** and **39** which may be formed integrally as by molding.

As shown in FIGURE 3 cam **37** coacts with a shutoff plate **40** to control a shutoff switch **41**. Cam **38** con-

trols a holding switch 42 and cam 39 controls a water valve switch 43. The sensing arm 26 is provided with an upper horizontally extending portion 44 pivotally carried on a support 45 and is biased by a coil spring 46 thereon and having a free end 46*a* engaging the support 45 to urge the sensing arm 26 downwardly and urge the shutoff plate 40 in a counter-clockwise direction as seen in FIGURE 3 to bear against the cam 37. Switch 41 includes an actuator 47 which is biased against a flange 48 on the shutoff arm 40 by means of a spring 49. The switch further includes fixed contacts 50 and 51 and moving contact 41*a* which as shown in FIGURE 3 closes across contacts 50 and 51 when the sensing arm 26 is in the lower position. However, when cam 37 is positioned so as to permit rotation of the shutoff plate 40 in a clockwise directions, the actuator 47 moves in a counter-clockwise direction about a pivot 52 until spring 49 moves to an overcentered position thereby causing contacts 50 and 51 to become separated. When the sensing arm 26 returns to the downward position the spring 49 is again moved to the arrangement of FIGURE 3 causing the contacts to engage each other.

Switch 42 comprises a normally open switch having fixed contact terminals 53 and 54, a moving contact 42*a*, and an actuator 55 cooperating with cam 38 to close contact 42*a* across contacts 53 and 54 at preselected times. Switch 43 comprises a normally open switch having fixed contact terminals 56 and 57, a moving contact 43*a*, and an actuator 58 arranged to be operated by cam 39 for closing the switch at preselected times.

A limit switch 58 is further provided within the housing 32 which is thermostatically controlled to open at approximately 135° F. and close at approximately 95° F. As will be discussed more fully in the description of the operation of the control apparatus, the limit switch 58 is arranged in the circuitry to preclude overheating of the mold heater 31 should the circuit malfunction to otherwise continuously energize the mold heater.

Turning now to FIGURE 2, the operation of the refrigeration apparatus 10 and in particular the control 25 thereof will be considered in detail. As shown, the control 25 is connected to a suitable power supply line, such as a 115 volt 60 cycle power supply, by means of lead lines 59 and 60. Assuming that the cavities 28 on mold 22 are presently filled with water in the process of being frozen into ice bodies I and that the collecting bin 21 is not full, the control functions as follows. Thermostat 33 includes a moving contact 61 connected to lead 60 and selectively engaging a pair of fixed contacts 62 and 63. As the water in cavities 28 is not completely frozen the thermostat is arranged with the moving contact 61 in engagement with fixed contact 63. The holding switch 42 is open between contact terminals 53 and 54 and the water valve switch 43 is open between contact terminals 56 and 57. The limit switch 58 is in its normally closed position and thus the compressor 16 which is connected between contact 63 and limit switch 58 is energized through switch 58 to lead 59. Thus the ice maker is being continuously refrigerated to complete the formation of the ice bodies I therein.

When the water W is completely frozen in the cavities 28, the thermostat switch contact 61 moves from contact 63 to contact 62. This breaks the circuit to the refrigeration unit compressor 16 and establishes a circuit through the normally closed shutoff switch 41 to the mold heater 31 and reset heater 35 connected in series to the limit switch 58 and thusly through the limit switch 58 to lead 59. The motor 36 is connected in parallel with heaters 31 and 35 and thusly is concurrently energized to cause rotation of the cams 37, 38 and 39. After a small amount of rotation of cam 38 the holding switch 42 is operated to close the circuit between contact terminals 53 and 54 thereby energizing the heaters 31 and 35 and motor 36 regardless of the condition of the thermostat 33 or shutoff switch 41. The rotation of cam 37

causes the plate 40 to rotate the sensing arm portion 44 to raise the sensing arm 26 upwardly from the collecting bin 21 and simultaneously cause the actuator 47 to open the shutoff switch 41 to break the circuit between contact terminals 50 and 51.

The shaft 30 is rotated by the operation of motor 36 to cause the ejector blades 29 to engage the ice bodies in the mold cavities 28. Should the ice bodies adhere to the walls of the cavities 28, resisting the force of the ejector blades, the motor 36 will stall. However, the mold heater 31 continues to be energized through holding switch 42 thereby quickly melting the bond between the ice body and the mold to free the ice bodies therefrom and permit the motor to resume rotation of the shaft 30 to the position of FIGURE 4. The rotation of motor 36 continues until cam 37 permits plate 40 to return to the position of FIGURE 3 whereupon the sensing arm 26 returns to the position within the collecting bin 21 and the shutoff switch 41 is restored to the closed position.

The energization of thermostat heater 35 causes the thermostat 33 to reset during this time. Thus the compressor 16 is again energized. Further, the rotation of cam 39 causes the actuation of water valve switch 43 to close the circuit between contact terminals 56 and 57 and thereby open the solenoid operated water valve 24 causing water to be delivered to the mold cavities 28 through the inlet 23. After a preselected time the cam 39 has rotated sufficiently further to permit re-opening of the water valve switch 43 thereby closing the water valve solenoid 24 to terminate the delivery of water to the cavities.

When the shaft 30 is rotated to the final position of FIGURE 4, the cam 38 causes the holding switch 42 to open thereby breaking the circuit between contact terminals 53 and 54 and de-energizing the heaters 31 and 35 and motor 36, thereby re-establishing the control as shown in FIGURE 2 for subsequent cycle of operation.

The above described operation of the control 25 continues until such time as the level of ice bodies in collecting bin 21 reaches a preselected level precluding the downward movement of sensing arm 26 as discussed above and thereby maintaining the shutoff switch 41 in the open position. Thus, when the water in the mold cavities becomes completely frozen the resultant movement of the mold thermostat switch 61 to engage contact terminal 62 can not initiate a subsequent ejection cycle as the circuit is broken between contact terminals 50 and 51, thereby precluding energization of the motor 36 and the heaters 31 and 35. The ice maker 20 remains in this condition until the level of ice bodies is lowered as by removal of a portion or all thereof from the collecting bin 21 to allow the sensing arm 26 to move downwardly to the lower position shown in FIGURE 3 and thereby permit the shutoff switch 41 to close between contact terminals 50 and 51.

As discussed above the control 25 serves to maintain the refrigeration unit compressor 16 energized during the formation of the ice bodies in the mold. However, when the level of ice bodies in bin 21 is sufficient to preclude further operation of the ice maker 20, the thermostat 33 operates to cycle the compressor 16 and thereby maintain the temperature in chamber 12 between preselected maximum and minimum temperatures. More specifically, under this condition, the cycling of thermostat switch 61 between contact terminals 62 and 63 has the effect solely of energizing cyclically the compressor 16 as each of switches 41 and 43 is maintained open, as discussed above. The cycling of the thermostat switch is controlled by the temperature within chamber 12 with which the thermostat communicates as the reset heater 35 is not energized due to the open condition of switch 41. However, the ice in the mold 22 does lower the temperature sensed by the thermostat to somewhat below the temperature of the chamber and this temperature lag must be con-

sidered in setting the thermostat for the selected control temperature of the chamber. Illustratively should it be desired to maintain the chamber **12** below a temperature of 25° F. and the temperature lag caused by the ice bodies in the mold is approximately 3° F., the cut-in or reset temperature setting of the thermostat **33** would be approximately 22° F.

Referring now to the embodiment of FIGURES 5–7, a modified form of control **125** is shown to comprise a control generally similar to control **25** but arranged to eliminate the temperature lag discussed above in the control of the compressor **16** caused by the presence of the ice bodies in the mold and sensed by the thermostat. The control **125** is arranged to prevent the delivery of water to the mold when the operation of the ice maker is terminated by the sensing of a full bin condition whereby no ice bodies will form in the mold to affect the actuating temperature of the thermostat.

Control **125** differs primarily from control **25** in that the shutoff switch **141** comprises a single pole, single throw, normally closed switch in series with holding switch **42**. As shown in FIGURE 5, the holding switch contact terminal **54** is connected to the fixed contact **150** of shutoff switch **141** and the contact terminal **53** of the holding switch **42** is connected to lead **60**. The shutoff switch **141** is arranged to be opened by the cam **37** only when the level of ice bodies in the collecting bin **21** reaches the preselected level. More specifically, the sensing arm **26** functions in connection with switch **141** in the manner shown and described in U.S. Letters Patent 3,040,542 to which reference may be had for a complete and detailed description thereof. Briefly, however, the shutoff switch **141** is carried on a shutoff plate **140** pivotable about a screw **165**. The actuator **147** of switch **141** is urged against cam **37** by the action of a spring **166** acting against a stop **167**. As indicated in FIGURE 5 the switch **141** is normally closed between contact terminals **150** and **151**. Rotation of the cam **37** to engage the high point **37***a* thereof with the actuator **147** causes the shutoff plate **140** to rotate in a clockwise direction about pivot **165** thereby raising the sensing arm **26**. Movement of the cam **37** beyond the high point permits the sensing arm to move back downwardly to the position of FIGURE 6, assuming that the level of ice bodies is below the preselected maximum level. Thus the switch **141** remains closed between contact terminals **150** and **151**. If the level of ice bodies in the collecting bin, however, is at or above the preselected level, the sensing arm will be retained against movement downward to the position of FIGURE 6 thus preventing rotation of the plate **140** to the position of FIGURE 6. This permits the cam **37** to move away from the actuator **147** and permit opening of the switch **141** thereby breaking the circuit between contact terminals **150** and **151**.

The operation of control **125** is as follows. Assuming that the mold cavity **28** contains a body of water being frozen, and that the level of ice bodies is below the preselected level, the control thermostat switch will be in the warm condition as shown in FIGURE 5 whereby the circuit is open between power supply lead **60** and contact terminal **62** while the circuit is closed to contact terminal **63** thereby energizing the compressor **16**. The holding switch **42** and the water valve switch **43** are open. The ejector blade **29** is in the position shown in FIGURE 7.

With the circuit thusly arranged the compressor **16** continues to operate and thereby causes freezing of the ice bodies within the mold **22**. When this occurs the mold thermostat switch **61** moves from contact terminal **63** to contact terminal **62** thereby energizing the mold heater **31**, the reset heater **35** and the control motor **36**. Upon a small movement of motor **36**, the cam **38** causes the holding switch **42** to close thereby maintaining the circuit to the heaters **31** and **35** and control motor **36** regardless of the arrangement of thermostat switch **61**.

After a small additional rotation of motor **36** the shaft **30** has moved sufficiently to cause the ejector blade **29** to engage the ice body in the mold cavity **28**. After the mold heater **31** releases the ice body from the mold, the ejector blade will cause the ice body to be swept from the mold cavity **28** as previously discussed.

During this movement of the ejector blade, the cam **37** acting on the switch actuator **147** causes the above discussed movement of the sensing arm **26** upwardly from and downwardly into the collecting bin **21**. Assuming that the level of ice bodies in the bin is sufficiently low to permit the return of the sensing arm to the position of FIGURE 6, the motor **36** continues operation beyond the halfway position of FIGURE 4. During this operation the thermostat switch **61** will have returned back into contact with contact terminal **63**, breaking the circuit to contact terminal **62**, and re-energizing the compressor **16**. The cam **39** operates the water valve switch **43** during this rotation of the cams to close the switch **43** for a preselected time and thereby open the solenoid water valve **24** to deliver a preselected quantity of water to the mold cavities **28** for the formation of a subsequent group of ice bodies in the mold **22**. When the ejector blade **29** has moved fully to the position of FIGURE 7, the cam **38** permits the holding switch **42** to open thereby breaking the circuit between contact terminals **53** and **54** thereof and thereby de-energizing the heaters **31** and **35** and control motor **36** to re-establish the control circuit for a subsequent cycle as discussed above.

The above cycle will be repeated until such time as the level of ice bodies in the collecting bin **21** reaches the preselected level whereupon the sensing arm **26** will be prevented from moving sufficiently downwardly to permit the pivoting of plate **140** whereby the actuator **147** becomes spaced from cam **37** and the switch **141** is opened between contacts **150** and **151** thereby de-energized the heaters **31** and **35** and control motor **36** notwithstanding the maintained closed position of holding switch **42**. This condition results when the ejector blade **29** is in approximately the position of FIGURE 4 and prior to the time that the motor **36** has rotated sufficiently to cause the cam **39** to close the switch **43**. Thus the ice bodies are removed from the mold cavity and no further water is delivered thereto. Therefore the temperature sensed by the thermostat **33** is substantially the temperature of the chamber **12**. When this condition obtains the operation of thermostat switch **61** functions similarly as described relative to control **25** in cycling the compressor **16** on and off to maintain the temperature of the chamber **12** below a preselected maximum and above a preselected minimum. In control **125** however, the cycling of the thermostat is accurately a function of the chamber temperature **12** requiring no correction of the thermostat to compensate for the temperature lag resulting from the presence of ice within the mold as was the case in the embodiment of FIGURES 1–4.

While we have shown and described certain embodiments of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating said chamber and for refrigerating water disposed in said mold means to form an ice body; means for ejecting the ice body from said mold means; thermostat means having a single switch and activating means responsive to (a) the temperature of said chamber and to (b) the formation of the ice body in said mold means; and control means connected to said thermostat switch to (a) initiate operation the ejecting means only when the tempera-

ture of said chamber is below a preselected low temperature and the ice body is fully formed in said mold and to (b) cause the chamber refrigerating means to maintain the temperature in said chamber below a preselected maximum.

2. The refrigeration apparatus of claim 1 wherein said control means includes means for maintaining the temperature in said chamber between a preselected maximum and minimum when no liquid water is in said mold means.

3. The refrigeration apparatus of claim 1 wherein said control means causes the refrigerating means to operate a greater portion of the time when liquid water is in the mold means than when it is not.

4. The refrigeration apparatus of claim 1 wherein said thermostat means is disposed within said chamber.

5. The refrigeration apparatus of claim 1 wherein said control means further includes means for heating the mold, means for heating the thermostat, and means to energize each of said heating means during the operation of the ejecting means and to de-energize each of said heating means upon termination of operation of the ejecting means.

6. Refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating said chamber and for refrigerating water disposed in said mold means to form an ice body; means for ejecting the ice body from said mold means; means for collecting the ejected ice bodies; thermostat means having a single switch and actuating means responsive to (a) the temperature of said chamber and to (b) the formation of the ice body in said mold means; and control means connected to said thermostat switch to (a) initiate operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold and to (b) cause the refrigerating means to maintain the temperature in said chamber between a preselected maximum and minimum when the level of ice bodies in said collecting means is at least a preselected level.

7. The refrigeration apparatus of claim 6 wherein said control means includes means to cause the refrigerating means to commence continuous operation during operation of the ejecting means, and means for causing the refrigerating means to maintain the temperature in said chamber between a preselected maximum and minimum during non-operation of the ejecting means.

8. The refrigeration apparatus of claim 6 wherein said control means includes means to cause the refrigerating means to commence continuous operation during operation of the ejecting means, and means for causing the refrigerating means to maintain the temperature in said chamber between a preselected maximum and minimum during non-operation of the ejecting means and when no liquid water is in said mold means.

9. Refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating said chamber and for refrigerating water disposed in said mold means to form an ice body; means for ejecting the ice body from said mold means; means for collecting the ejected ice bodies; means for delivering water to said mold means for forming seriatim ice bodies therein; thermostat means having a single switch and actuating means responsive to (a) the temperature of said chamber and to (b) the formation of the ice body in said mold means; and control means connected to said thermostat (a) for initiating operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold, and (b) for causing the refrigerating means to maintain the temperature in said chamber between a preselected maximum and minimum and preclude operation of said water delivering means subsequent to the ejection of the ice body from the mold means when the level of ice bodies in said collecting means is at least a preselected level.

10. A refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating the chamber and water disposed in said mold means to form ice bodies therein; means for ejecting the ice bodies from the mold means; a single storage receptacle for receiving the ice bodies ejected from said mold means; thermostat means having a single switch and actuating means associated with said mold means and responsive to (a) the temperature of said chamber and to (b) the formation of said ice bodies in said mold means; and a control connected to said switch including first control means for preventing operation of said injection means whenever the level of ice bodies in the storage receptacle is above a preselected level, and second control means responsive to operation of said thermostat switch (a) for initiating operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold, (b) for causing the refrigerating means to operate continuously during the formation of ice bodies in said mold means, and for (c) cycling the refrigerating means on and off as a function of the temperature within the chamber whenever the operation of said ejection means is prevented by said first control means.

11. A refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating the chamber and water disposed in said mold means to form ice bodies therein; means for ejecting the ice bodies from the mold means; a storage receptacle for receiving the ice bodies ejected from said mold means; thermostat means having a single switch and actuating means associated with said mold means and responsive to (a) the temperature of said chamber and to (b) the formation of said ice bodies in said mold means; and a control connected to said switch including first control means for preventing further formation of ice bodies in the mold whenever the level of ice bodies in the storage receptacle is above a preselected level and second control means responsive to operation of said thermostat switch (a) for initiating operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold, (b) for causing the refrigerating means to operate continuously during the formation of ice bodies in said mold means, and (c) for cycling the refrigerating means on and off as a function of the temperature within the chamber whenever further formation of ice bodies in the mold is prevented by said first control means.

12. A refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating the chamber and water disposed in said mold means to form ice bodies therein; means for ejecting the ice bodies from the mold means; a storage receptacle for receiving the ice bodies ejected from said mold means; thermostat means having a single switch and actuating means associated with said mold means and responsive to (a) the temperature of said chamber and to (b) the formation of said ice bodies in said mold means; and a control connected to said switch including first control means for preventing ejection of subsequently formed ice bodies whenever the level of ice bodies in the storage receptacle is above a preselected level and second control means responsive to operation of said thermostat switch (a) for initiating operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold, (b) for causing the refrigerating means to operate continuously during the formation of ice bodies in said mold means, and (c) for cycling the refrigerating means on and off as a function of the temperature within the chamber whenever the ejection of

subsequently formed ice bodies is prevented by said first control means.

13. A refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating the chamber and water disposed in said mold means to form ice bodies therein; means for ejecting the ice bodies from the mold means; a storage receptacle for receiving the ice bodies ejected from said mold means; thermostat means having a single switch and actuating means associated with said mold means and responsive to (a) the temperature of said chamber and to (b) the formation of said ice bodies in said mold means; and a control connected to said switch including first control means for preventing operation of said ejection means whenever the level of ice bodies in the storage receptacle is above a preselected level, and second control means responsive to operation of said thermostat switch (a) for initiating operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold, (b) for causing the refrigerating means to operate continuously during the formation of ice bodies in said mold means, (c) for causing the refrigerating means to be de-energized during operation of the ejecting means whenever the temperature sensed by said thermostat is below a preselected upper temperature, and (d) for cycling the refrigerating means on and off as a function of the temperature within the chamber whenever the operation of said ejection means is prevented by said first control means.

14. Refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating said chamber and for refrigerating water disposed in said mold means to form an ice body; means for ejecting the ice body from said mold means; thermostat means having a single switch and actuating means responsive to (a) the temperature of said chamber and to (b) the formation of the ice body in said mold means; control means connected to said thermostat switch to (a) initiate operation of the ejecting means only when the temperature

of said chamber is below a preselected low temperature and the ice body is fully formed in said mold and to (b) cause the chamber refrigerating means to maintain the temperature in said chamber below a preselected maximum; and means for delivering heat to said thermostat means during operation of said ejecting means to quickly reset said thermostat switch for maintaining the temperature in said chamber.

15. Refrigeration apparatus comprising: means defining a chamber; mold means; means for refrigerating said chamber and for refrigerating water disposed in said mold means to form an ice body; means for ejecting the ice body from said mold means; thermostat means having a single switch and actuating means responsive to (a) the temperature of said chamber and to (b) the formation of the ice body in said mold means; control means connected to said thermostat switch to (a) initiate operation of the ejecting means only when the temperature of said chamber is below a preselected low temperature and the ice body is fully formed in said mold and to (b) cause the chamber refrigerating means to maintain the temperature in said chamber below a preselected maximum; means for heating said mold means for freeing the ice body therefrom during the ejection operation; and means for cyclically interrupting energization of said heating means to preclude overheating of said mold means.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,208,233 September 28, 1965

William J. Linstromberg

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 71, for "activating" read -- actuating --; line 75, after "operation" insert -- of --; column 8, line 7, strike out "single"; line 14, for "injection" read -- ejection --.

Signed and sealed this 20th day of September 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents