Feb. 2, 1971 M. L. NELSON 3,559,424

ICEMAKING APPARATUS

Original Filed Sept. 12, 1967 3 Sheets-Sheet 1

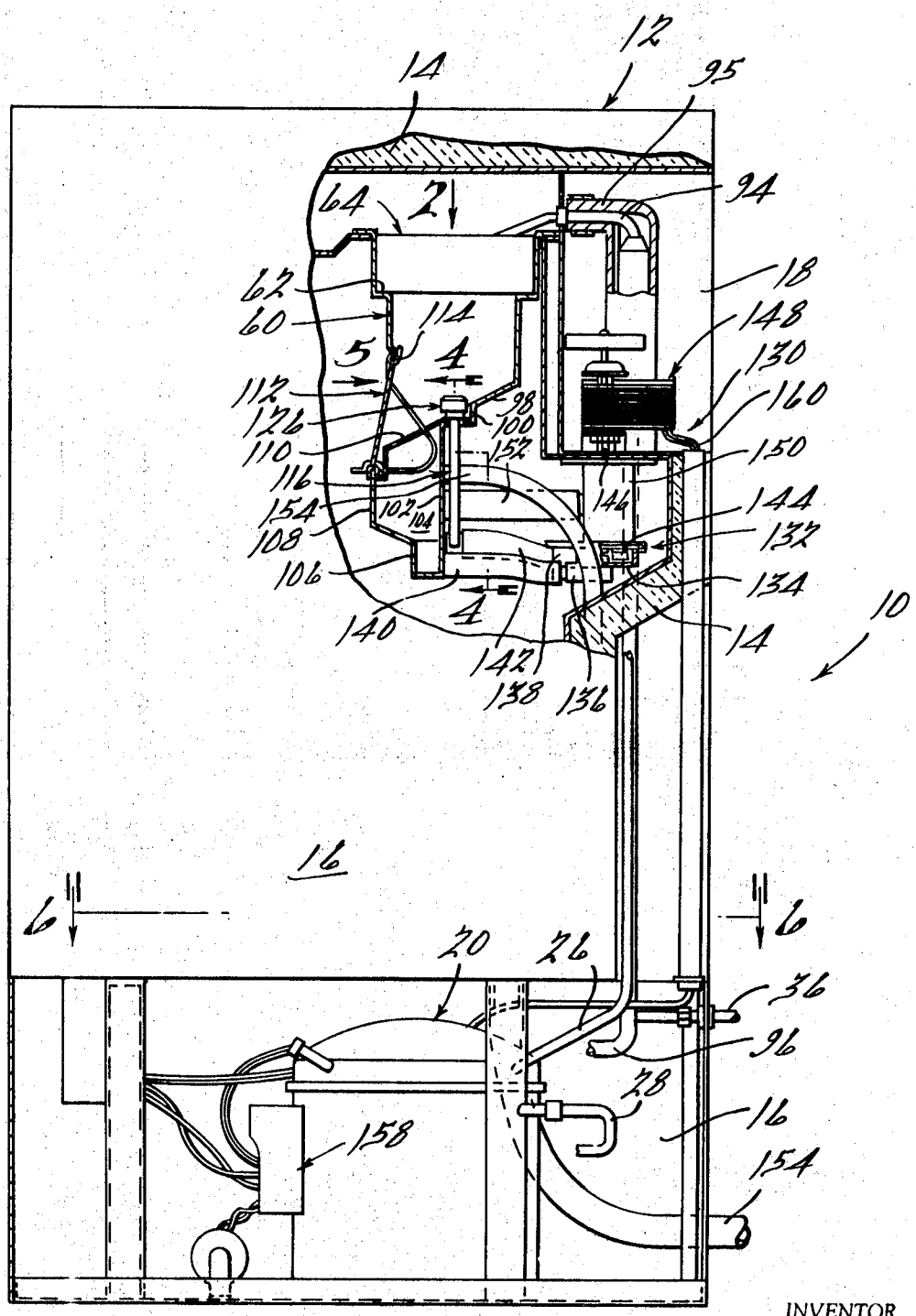

FIG. 1.

INVENTOR.
Marcus L. Nelson
BY
Harness, Dickey & Pierce.
ATTORNEYS

Feb. 2, 1971 M. L. NELSON 3,559,424

ICEMAKING APPARATUS

Original Filed Sept. 12, 1967 3 Sheets-Sheet 2

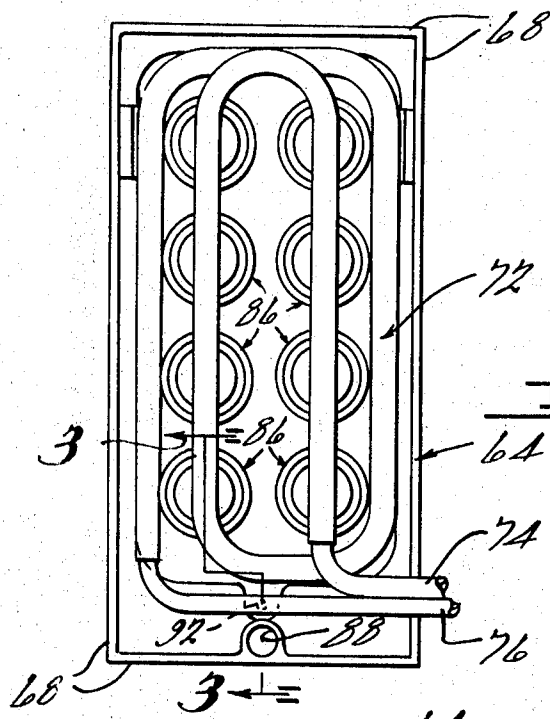

FIG. 2.

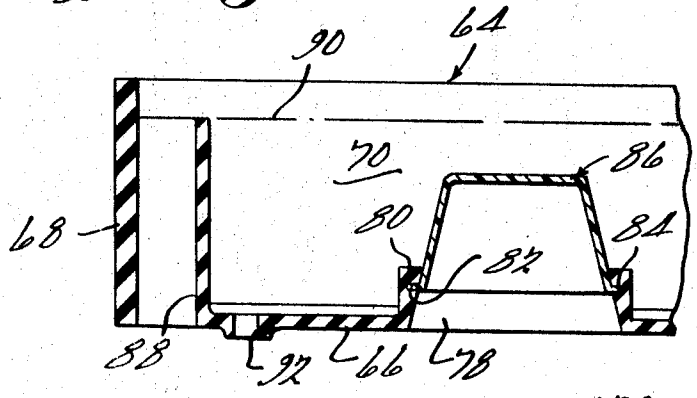

FIG. 3.

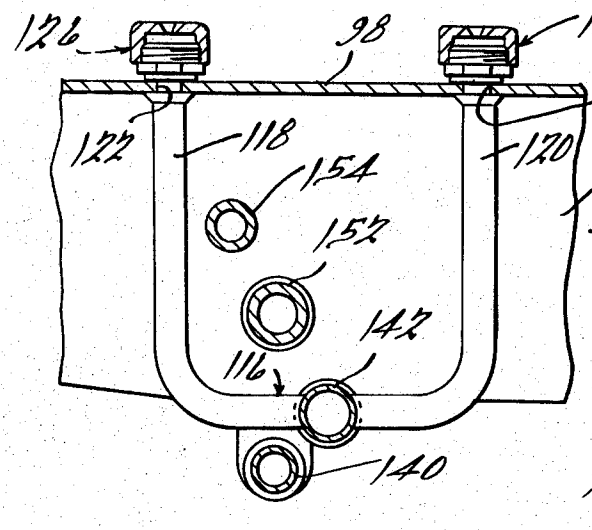

FIG. 4.

INVENTOR.
Marcus L. Nelson
BY
Harness, Dickey & Pierce.
ATTORNEYS.

Feb. 2, 1971 M. L. NELSON 3,559,424

ICEMAKING APPARATUS

Original Filed Sept. 12, 1967 3 Sheets-Sheet 3

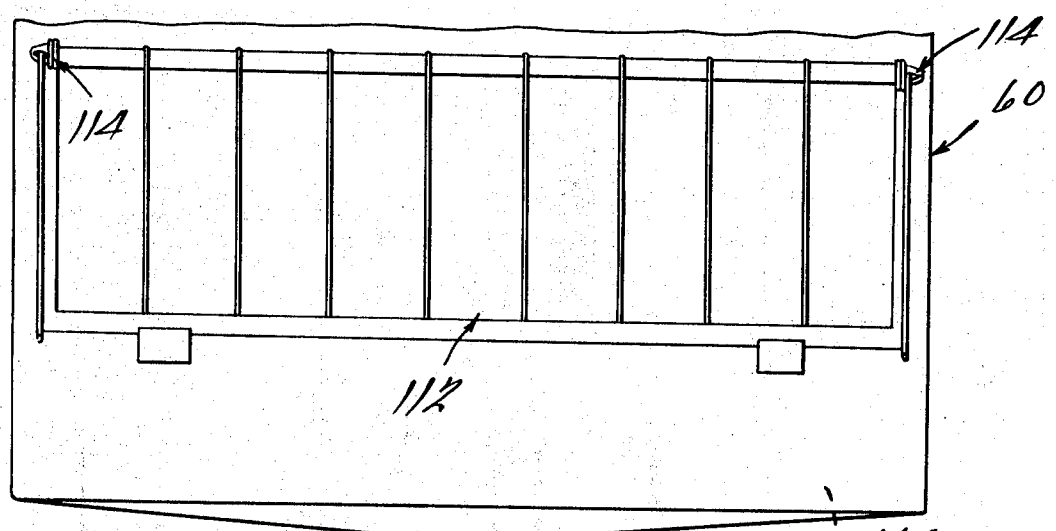

FIG. 5.

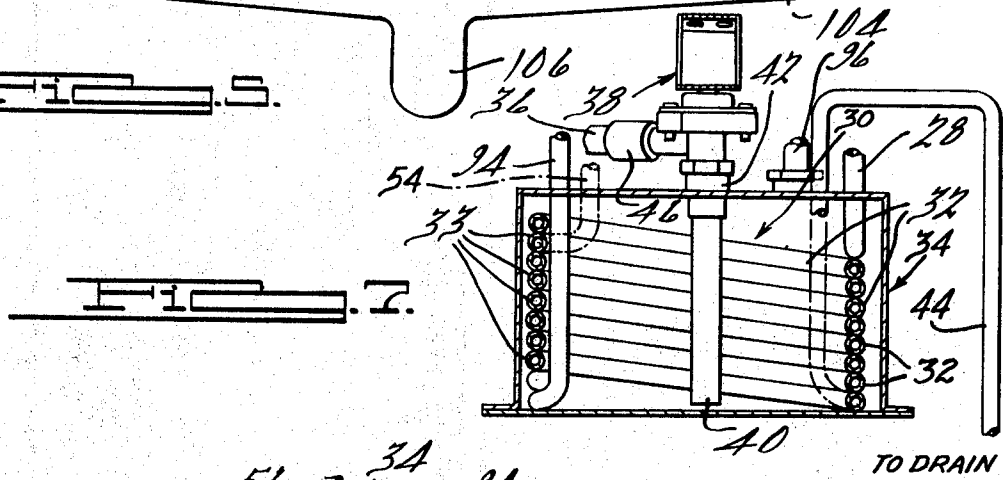

FIG. 7.

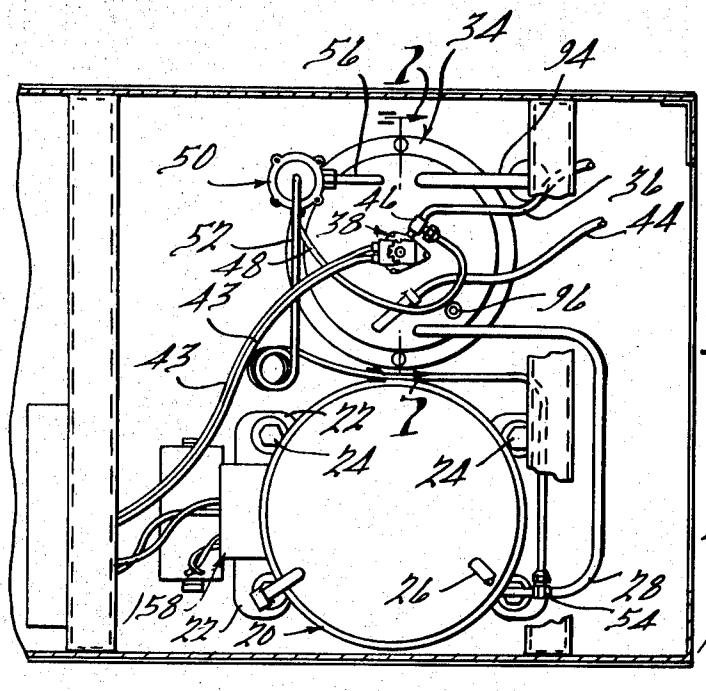

FIG. 6.

INVENTOR.
Marcus L. Nelson
BY
Harness, Dickey & Pierce
ATTORNEYS

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3,559,424

ICEMAKING APPARATUS

Marcus L. Nelson, Albert Lea, Minn., assignor to King-Seeley Thermos Co., Ann Arbor, Mich., a corporation of Delaware

Original application Sept. 12, 1967, Ser. No. 667,117, now Patent No. 3,465,537, dated Sept. 9, 1969. Divided and this application Apr. 1, 1969, Ser. No. 812,103
Int. Cl. F25c 1/04
U.S. Cl. 62—347 8 Claims

ABSTRACT OF THE DISCLOSURE

An icemaking apparatus comprising an inverted ice forming mold; a refrigeration system including an evaporator and a condenser comprising a tank containing thawing water in heat transfer relation with the hot gaseous refrigerant line of the refrigeration system; a thawing water retaining compartment adjacent the mold and adapted to contain water in heat transfer relation with respect to the evaporator; a water reservoir disposed below the form; spraying means for directing water within the reservoir toward the form; a water inlet and a water outlet and fluid circuit means communicating the inlet with the tank and the outlet with the reservoir; a pump for pumping water from the reservior to the fluid spraying means and a motor for driving the pump; the above system being adapted to use a quantity of water as a cooling medium for the condenser during the freezing cycle, wherein such water is heated a predetermined amount, thereafter using that heated water to release the ice from the ice form, and finally use the same water to make-up the ice during the next successive freezing cycle.

BACKGROUND OF THE INVENTION

This is a divisional application of the United States Letters Patent application, Ser. No. 667,117 filed Sept. 12, 1967, for Ice Making Apparatus, now Pat. No. 3,465,537, issued Sept. 9, 1969.

In Pat. No. Re. 26,101, reissued Oct. 11, 1966, for Icemaking Apparatus, and assigned to the assignee of this application, an apparatus is shown for producing ice cubes or the like and comprising a plurality of inverted ice cube molds or forms adapted to have water sprayed therewithin by means of a water spraying device located below the forms. Surrounding the ice cube forms is a warm water basin or platen which is adapted to be filled with thawing water after the freezing portion of the cycle has been completed, whereupon the ice cubes which were formed within the molds will drop therefrom into a chute or storage bin during a subsequent harvest portion of the operational cycle. After the ice cubes have thus been formed and released, the thawing water is transferred to a sump tank to be used for supplying water to the spraying device during the next freezing portion of the cycle. The condenser comprises a tank filled with water in heat transfer relation with the hot refrigerant line of the refrigeration system. During the freezing cycle this water serves as the primary cooling medium for the condenser and is thereby warmed. At the conclusion of the freezing cycle water from this tank is delivered to the basin or platen and serves as the thawing medium during the harvest cycle. During the freezing cycle, valve mechanism which senses the hot gaseous refrigerant pressure provides for a modulated or controlled flow of water through the tank to thereby control the cooling effect of the condenser.

The present invention is generally related to an ice making apparatus of the above described character; however, the apparatus of the present invention is an

improvement over the aforesaid apparatus. In particular, the icemaking apparatus of the present invention incorporates a novel arrangement of component parts wherein the water not used in making cubes during one freezing cycle is automatically carried away from a water reservoir by means of an overflow arrangement, thereby obviating the need for any complicated valve mechanisms and valve actuating devices. The overflow arrangement is achieved through the provision of a pair of unobstructed fluid passageways, the first of which is adapted to communicate thawing water from an ice platen into a water reservoir, and the second of which communicates the reservoir with a water outlet or drain. The passageways are designed and arranged such that a preselected quantity of water is automatically retained within the reservior, also without the use of any valves or valve actuating mechanisms.

SUMMARY OF THE INVENTION

This invention relates generally to ice making apparatus and, more particularly, to a new and improved apparatus for forming ice cubes by means of spraying water into a plurality of inverted molds, wherein the same water that is used for making the cubes is used as a condensing medium and means for releasing the cubes from the ice forming molds.

It is accordingly a general object of the present invention to provide a new and improved icemaking apparatus.

It is a more particular object of the present invention to provide an icemaking apparatus which utilizes the same water as a condensing medium, as a means for releasing the cubes from their associated forming molds, and for the water used in making the cubes.

It is another object of the present invention to provide a new and improved ice making apparatus of the above character which obviates the need for any drain valves or the like for releasing water not used in forming the cubes during the freezing portion of the operational cycle.

It is a further object of the present invention to provide an ice making apparatus of the above described character which includes a water reservoir and means for automatically controlling the water level within the reservoir such that there is sufficient water therein to make up a batch of ice cubes during the next successive freezing cycle.

It is yet another object of the present invention to provide a new and improved ice making apparatus which utilizes a novel control orifice for continually discharging thawing water from a thawing water platen to a water reservoir.

Other objects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, partially broken away, of an icemaking apparatus in accordance with a preferred embodiment of the present invention;

FIG. 2 is a top plan view of a portion of the apparatus illustrated in FIG. 1, as seen in the direction of the arrow 2 thereof;

FIG. 3 is an enlarged fragmentary view in vertical section taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary cross sectional view taken substantially along the line 4—4 of FIG. 1;

FIG. 5 is a fragmentary side elevational view of a portion of the apparatus illustrated in FIG. 1, as seen in the direction of the arrow 5 thereof;

FIG. 6 is a fragmentary view taken substantially along the line 6—6 of FIG. 1, and

FIG. 7 is a fragmentary cross sectional view taken substantially along the line 7—7 of FIG. 6.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings, an ice making apparatus **10**, in accordance with a preferred embodiment of the present invention, is shown as comprising an exterior enclosure or cabinet, generally designated **12**, that is preferably provided with insulation **14** along the exterior walls thereof and includes a lower compartment **16** and an upper compartment **18**. Generally speaking, the lower compartment **16** contains a refrigeration system consisting, except as hereinafter stated, of substantially conventional elements, and the upper compartment **18** comprises means for producing a supply of ice in cubed form, as will hereinafter be described in detail.

As best seen in FIGS. 1, 6 and 7, the refrigeration system incorporated in the icemaking apparatus **10** of the present invention comprises a usual compressor **20** that is supported by means of suitable support brackets or the like **22** that are rigidly secured to the lower end of the cabinet **12** by means of suitable screws, bolts or the like **24**. The compressor **20** is provided with an inlet conduit **26** and an outlet conduit **28**, the latter of which leads to a condenser, generally designated **30**. Condenser **30** comprises a closed tank **34**, which houses a pair of interleaved helically formed coils **32** and **33** which are soldered or otherwise bonded to each other in continuous surface engagement throughout their lengths so as to provide for efficient heat transfer therebetween. The inlet of coil **32** is directly and continuously connected to the high pressure line **28** leading from the compressor. The outlet **94** of coil **32** leads to the evaporator, as described below. Tank **34** contains a body of water which, during one freezing cycle, serves as a primary cooling medium for the condenser; during the next harvest cycle serves as thawing water for the ice cubes; and provides the makeup water for the next freezing cycle.

A water inlet line **36** which is adapted to be connected with a suitable source of fresh potable water leads through a T-connection **46** and a solenoid valve mechanism, generally designated **38**, to the inlet **40** of tank **34**. Valve **38** is mounted on the top of the tank **34** by a suitable fitting **42**. The valve mechanism **38** may be of any conventional construction adapted to be actuated in response to an electrical signal communicated thereto by means of suitable electrical conductors, generally designated **43**, whereby the valve mechanism **38** will selectively communicate water flowing through the water inlet conduit **36** to the standpipe **40**, with the result that such water will flow into the tank **34**. The water outlet conduit **96** extends upwardly from the lower compartment **16** to the icemaking mechanism located in the upper compartment **18**, as will hereinafter be described.

As best illustrated in FIG. 6, the T-fitting **46** functions to connect one end of an auxiliary water conduit **48** to the supply conduit **36**. The opposite end of the conduit **48** is connected to a usual pressure responsive modulating type valve mechanism, generally designated by the numeral **50**, the sensing chamber whereof is also connected by means of a suitable pressure line **52** and T-fitting **54** with the outlet conduit **28** of the compressor **20**. Thus, valve mechanism **50** responds to the refrigerant pressure within the conduit **28** of the compressor **20**. Increases in this pressure above a predetermined minimum causes valve **50** to proportionately and progressively move from the closed position toward the open position and decreases below a predetermined maximum, cause a progressive and proportional movement toward the closed position. When the valve mechanism **50** is fully or partially open, the auxiliary water conduit **48** is connected to another auxiliary conduit **56** which opens into the previously mentioned second coil **33** in the condenser **30**. The outlet **44** of the coil **33** may lead directly to drain. Thus, in accordance with one feature of the present invention, the water in tank **34** constitutes the primary cooling medium for condenser **30**, but additional cooling effect is produced by a progressively controlled flow of water through the auxiliary coil **33**. In the event the internal pressure of the refrigerant in the compressor **20** exceeds a predetermined level this minimizes the water consumed by the apparatus **10**.

Referring now to the contents of the upper compartment **18** of the cabinet **12**, as best seen in FIGS. 1 through 3, the upper compartment **18** is provided with a generally vertically extending ice conveying chute **60** which defines a horizontally disposed shoulder or ledge **62** around the upper end thereof. Fixedly mounted on the shoulder **62** is a generally rectangular shaped water containing vessel or platen, generally designated **64**, which comprises a bottom wall section **66** and four vertically extending wall sections **68**. As shown in FIG. 3, the sections **66** and **68** of the platen **64** define a central cavity **70** within which a usual refrigeration coil or evaporator **72** is located, the evaporator **72** comprising inlet and outlet lines **74** and **76**, as illustrated in FIG. 2.

The platen **64** is preferably fabricated of a molded rubber material or the like and is formed with a plurality of symmetrically oriented openings, generally designated **78**, in the lower end thereof, which openings **78** are defined by upwardly extending tapered flange portions **80** integrally formed on the upper side of the bottom wall section **66**. The flange sections **80** define radially outwardly extending annular grooves or recesses **82** which are adapted to removably receive radially outwardly extending shoulder portions **84** formed around the lower ends of a plurality of circular ice-forming molds or cups **86**, as seen in FIG. 3.

In accordance with the principles of the present invention, the platen **64** is formed with an overflow passage **88** which is elevated above the bottom wall section **66** and is adapted to automatically communicate water out of the cavity **70** in the event the level or upper surface thereof rises above a position indicated by the line **90** in FIG. 3. The passage **88** is disposed above a water reservoir, hereinafter to be described, and is adapted to communicate water within the cavity **70** downwardly to the reservoir, whereby this water may thereafter be utilized in forming ice during the ice making portion of the operational cycle of the apparatus **10**, as will be described.

Further in accordance with the present invention, the platen **64** is provided with a discharge orifice or passage **92** that is formed in the bottom wall section **66** at a position overlying the aforesaid water reservoir. In operation of the ice making apparatus **10**, the orifice **92** is adapted to release or "dribble" water contained within the cavity **70** of the platen **64** to the reservoir. The size of the orifice **92** is carefully selected so that the rate of transfer of water from the platen **64** to the water reservoir is such that during the subsequent freezing cycle of the apparatus **10**, there will be sufficient water in the reservoir to form the ice cubes within the cups **86**. It will be noted that in practice, the freezing cycle may, if desired, be initiated somewhat prior to all of the water being communicated from the cavity **70** to the water reservoir via the orifice **92**, provided, of course, that a sufficient quantity of water is provided in the reservoir to supply the pumping means for pumping the water toward the cups **86**, as will be apparent.

A particular feature of the above described construction resides in the fact that the dribbler orifice **92** provides an unobstructed fluid passage from the cavity **70** to the reservoir and controls the rate of transfer of such water without the use of any complicated valving devices or valve actuating mechanisms. That is, water will flow automatically to the reservoir via the orifice **92** without the need for any mechanical linkages and the like usually required for opening and closing fluid valves. Another feature will be seen from the fact that there is no need to provide the platen **64** with a special drain connection since any water transmitted to the cavity **70** in excess of the water level

indicated by the reference numeral **90** will be automatically communicated via the passage **88** to the reservoir which is provided with its own drain arrangement later to be described. Accordingly, only a simple drain circuit need be provided in the apparatus **10** of the present invention.

As best illustrated in FIGS. 1 and 6, the inlet and outlet lines **74** and **76** of the evaporator **72** are connected with the high and low pressure refrigerant conduits **94** and **96**, respectively, which extend upwardly from the lower compartment **16** to the upper compartment **18**, whereby to complete a usual circuit between the condenser **30**, compressor **20** and evaporator **72**, it being understood that the connection between lines **94** and **74** includes a usual pressure reducing device such as a capillary tube or expansion valve (not shown). Thus, it will be seen that gaseous refrigerant at relatively high pressure supplied by compressor **20** to condenser **30** is cooled and liquified as it passes through condenser **30**. The thus cooled and liquified refrigerant flows from the condenser **30** upwardly through the conduit **94** and the pressure reducing device (not shown) to the inlet line **74** of the evaporator, wherein it is vaporized by the transfer of heat thereto from the water being formed into cubes. The gaseous refrigerant flows from the evaporator through the outlet line **76**, which is jointed to the inlet or suction side of the compressor. As illustrated in FIG. 1, the upper end of the conduit **94** communicating refrigerant to the evaporator **72** may be provided with suitable insulation means **95**. The previously mentioned outlet conduit **96** from tank **34** leads directly into the cavity **70** of the platen **64** and delivers water thereto during the harvest portion of the operational cycle, as will hereinafter be described.

The lower end of the ice chute **60** is formed with a converging wall portion **98** which defines a recessed shoulder portion **100** and terminates at the lower end thereof in a generally vertically extending wall section **102** of a water reservoir, generally designated **104**. The reservoir **104** is also defined by upwardly extending wall sections **106** and **108**. The lower end of the chute **60** and the upper end of the reservoir **104** are separated by a suitable downwardly inclined screen, or the like, **110** which is adapted to allow water to drop downwardly from the lower side of the platen **64** into the reservoir **104** but prevents any ice cubes which are produced during operation of the apparatus **10** from falling into the reservoir **104**. The ice cubes which are produced by the apparatus **10** pass down the chute **60** and along screen **110** and through door **112** to a suitable storage bin or ice cube reservoir (not shown) located within the cabinet **12**. Door **112** is hingedly or pivotally mounted at **114** to the chute **60**. The force of cubes falling against the inner side of the door **112** will effect opening thereof, whereby the cubes will drop downwardly into the aforementioned ice cube storage bin or reservoir.

As best seen in FIGS. 1 and 4, means for spraying water into the plurality of inverted cups **86** mounted on the platen **64** is provided by a generally U-shaped water supply conduit **116** having upwardly extending sections **118** and **120** which project through suitable sealed openings **122** and **124**, respectively, in the recessed portion **100** of the inclined wall section **98**. The upper ends of the conduit sections **118** and **120** are provided by suitable spray nozzles or the like, **126** and **128**, respectively, which are located centrally of the platen **64**, whereby the nozzles **126**, **128** are adapted to concomitantly spray water upwardly into all of the inverted cups **86**.

In order to communicate water from within the reservoir **104** to the water supply conduit **116**, a pumping assembly, generally designated **130**, is provided in the upper compartment **18** of the cabinet **12**. More particularly, the assembly **130** comprises a pump unit **132** which includes a pump housing **134** having water inlet and outlet sections **136** and **138**, respectively. The inlet section **136** of the pump housing **134** is communicable with the lowermost portion of the reservoir **104** by means of a suitable water conduit **140**, while the outlet section **138** of the pump housing **134** is communicable with the lower end of the water supply conduit **116** through a suitable conduit **142**. The pump unit **132** includes a suitable impeller **144** which is drivingly connected through a suitable vertically extending drive shaft **146** with a suitable electric pump motor, generally designated **148**, mounted directly above the pump unit **132**. The shaft **146** extends through a generally vertically disposed shaft housing **150**, the interior of which is communicable through a suitable conduit **152** with the interior of the reservoir **104**. The conduit **152** is located below the motor **148** and is thereby adapted to function in communicating any water which may tend to rise along the drive shaft **146** during operation of the pumping assembly **130** back to the reservoir **104**, thereby obviating the necessity of providing any packing, seals or the like around the upper end of the shaft **146** to prevent water from being transmitted to the pump motor **148**.

In accordance with another principle of the present invention, the reservoir **104** is provided with an overflow conduit **154** which, as best seen in FIG. 1, is communicable at one end with one side wall of the reservoir **104** and at the opposite end to a suitable water outlet or drain. The overflow conduit **154** is positioned relative to the reservoir **104** such that it is adapted to automatically maintain a predetermined volume of water within the reservoir **104**, the particular volume of water being approximately equal to that which is required to make up the next batch of ice cubes during the subsequent operational cycle. Thus, the conduit **154** automatically controls the water level within the reservoir **104** so as to assure there is a sufficient quantity of water therein to form the next batch of ice cubes, and any water transmitted to the reservoir **104** in excess of the required amount will be automatically communicated to the water outlet without requiring any drain valves or similar complex and expensive devices to be opened and closed at predetermined times during the operational cycle. It will be seen that the conduit **154** acts as a drain means for the reservoir **104**, and also for the cavity **70** via the reservoir **104**, overflow passage **88** and orifice **92**. Thus, only a single drain is required for both the reservoir **104** and cavity **70**, with such drain means also functioning to maintain sufficient water within the reservoir **104** for the next ice batch, thereby simplifying the water conveying circuit of the apparatus **10** to a minimum.

In operation of the ice making apparatus **10** of the present invention, assuming the initial conditions that the plurality of inverted ice forming molds **86** are empty, that the tank **34** and reservoir **104** are filled with water, that the valve mechanism **38** is closed and that the water inlet line **36** is connected to a suitable source of water, the freezing cycle of the apparatus **10** is initiated by starting operation of the compressor **20**, for example, by means of energizing in any usual manual or automatic (such as a bin control) manner a suitable control system which is representatively shown in FIGS. 1 and 6 and generally designated by the numeral **158**. As the compressor **20** is started, refrigerant will be forced through the conduit **28** to the condenser **30**, and thereafter through the condenser **30** and the conduit **94** and the pressure reducing device (not shown) to the evaporator **72**. The refrigerant will thereafter flow through and be vaporized within the evaporator **72** and then be returned to the compressor **20** through the outlet line **76** and compressor inlet conduit **26**. Simultaneously, the pump motor **148** will be energized by means of the aforementioned control system **158** which is operatively connected to the motor **148** by means of suitable electrical conductors **160**, whereby water within the reservoir **104** will be pumped to the water supply conduit **116** and thereafter be sprayed upwardly through the nozzles **126**, **128** into the inverted cups **86** supported on the lower side of the platen **64**.

As a result of the water being sprayed into the cups

86, ice cubes will begin to form therewithin, with any excess water dropping downwardly through the chute **60** into the reservoir **104**. During this time, the water within the tank **34** functions to cool the condenser **30**, whereby to condense the hot gaseous refrigerant into a liquid, with the result that the water within the tank **34** simultaneously becomes heated preparatory to the harvest portion of the operational cycle. In the event that and if at any time during the freezing cycle the pressure in the line **28** exceeds a predetermined value, indicating a need for more cooling of the condenser than is being accomplished by the water in tank **94**, the pressure responsive valve mechanism **50** will be partially or fully opened to allow a corresponding quantity of water to circulate through the auxiliary water coil **33**, which water will thereby flow in intimate heat transfer relation with respect to the refrigerant coil **32** of the condenser **30**, resulting in a prompt reduction of the refrigerant pressure to within acceptable limits. The water thus transmitted through coil **33** will be communicated to the drain, as above described.

When ice cubes have been formed within the cups **86**, after a time which may be controlled by any suitable temperature-sensitive or timing device, the freezing portion of the cycle will be completed and the harvest portion of the cycle will begin. During the harvest portion, the valve mechanism **38** will be opened, with the result that fresh potable water will flow into the tank **34**, which incoming water will force the water within the tank **34** that was heated during the freezing portion of the cycle, upwardly through the water outlet conduit **96** which communicates this warm water into the cavity **70** defined by the platen **64**. Any excess water conveyed to the cavity **70** will be discharged to the reservoir **104** through the overflow passage **88**. The warm water thus transmitted to the platen **64** will flow around the upper sides of the cups **86**, thereby thawing the outer surfaces of the ice cubes formed therewithin and releasing such cubes from the platen **64**, whereby the cubes will drop downwardly through the chute **60** and force the door **112** open to permit the cubes to fall into the ice cube storage bin within the cabinet **12**. The warm water which is conveyed to the cavity **70** will be slowly released (during the harvest cycle and the initial part of the next freezing cycle) through the dribble orifice **92**, wherein such water will drop downwardly into the reservoir **104** to be used during the freezing portion of the next successive cycle, the overflow conduit **154** assuring that the water level in the reservoir **104** will not rise above a preselected position.

After the harvest portion of the cycle has been completed, the valve mechanism **38** will be closed to prevent any further water from entering the tank **34**, and any of the water still remaining in the platen **64** will pass through the dribbler orifice **92** to the reservoir **104**, which water will thereafter be sprayed into the inverted cups **86** to form the batch of ice cubes produced during the next successive operational cycle which would be identical to that hereinabove described.

While it will be apparent that the preferred embodiment illustrated herein is well calculated to fulfill the objects above stated, it will be appreciated that the present invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

I claim:

1. In an icemaking apparatus, a form disposed in a substantially horizontal position and defining a plurality of open bottomed ice freezing cells with closed tops, means positioned beneath the form and directing water to the open cells for forming ice therein, water freezing means associated with the cells, first enclosure means for retaining thawing water in heat transfer relation to said form, said first enclosure means including a wall portion in surrounding relationship with respect to said cells and extending to a height approximate said closed tops of said cells and adapted to retain a preselected quantity of thawing water around the exterior of said cells, second enclosure means defining a water reservoir, a source of thawing water adapted to be communicated to said first enclosure means to effect release of ice on said form, means for transferring thawing water from said source thereof to said first enclosure means during a harvest mode of the operational cycle, and a substantially unobstructed discharge passage for continuously discharging water from said first enclosure means to said reservoir regardless of the mode of the operational cycle, said passage being of a preselected size so as to communicate water to said reservoir at a controlled rate, whereby a preselected quantity of water can be communicated to said first enclosure means during said harvest mode and be retained therein adjacent said form for a length of time sufficient to release ice frozen therein, with said quantity of water being discharged from said enclosure means to said reservoir at a rate sufficient to supply said water transferring means with water for the next successive freezing mode.

2. An apparatus as set forth in claim **1** wherein said first enclosure means is disposed above said reservoir and said orifice is formed in the lower side of said first enclosure means in substantial vertical alignment with said reservoir.

3. An apparatus as set forth in claim **1** which includes water outlet means and means defining a substantially unobstructed flow of passage from said first enclosure means to said water outlet and including means for retaining a preselected quantity of water within said reservoir.

4. In an icemaking apparatus, a form disposed in a substantially horizontal position and defining a plurality of open bottomed ice freezing cells with closed tops, means positioned beneath the form and directing water to the open cells for forming ice therein, water freezing means associated with the cells, first enclosure means including cooperable bottom and side wall portions, said wall portions extending upwardly to a height approximate said closed tops of said cells and adapted to retain a preselected quantity of thawing water around the exterior of said cells, second enclosure means defining a water reservoir, a source of thawing water adapted to be communicated to said first enclosure means to effect release of ice on said form, water outlet means, operating means and said means positioned beneath said form and including pumping means for transferring water from said reservoir toward said form to produce a batch of ice during a freezing mode of the operational cycle, and means for transferring thawing water from said source thereof to said first enclosure means during a harvest mode of the operational cycle, and means for controlling the water level within said reservoir whereby a sufficient quantity of water is automatically maintained therewithin to supply said pumping means with enough water to form ice during each successive freezing mode of the operational cycle, said last mentioned means comprising a flow passage communicating water through said bottom wall portion of said first enclosure means, said passage being of a preselected size so as to communicate water to said reservoir at a controlled rate, whereby a preselected quantity of water can be communicated to said first enclosure means during said harvest mode and be retained therein adjacent said form for a length of time sufficient to release ice frozen therein, with said quantity of water being discharged from said enclosure means to said reservoir at a rate sufficient to supply said water transferring means with water for the next successive freezing mode.

5. An apparatus as set forth in claim **4** wherein said last mentioned means comprises an overflow conduit, one end of which is communicable with said reservoir and the other end of which is communicable with said water outlet means.

6. In an icemaking apparatus, a form disposed in a substantially horizontal position and defining a plurality of open bottomed ice freezing cells with closed tops, means

positioned beneath the form and directing water to the open cells for forming ice therein, water freezing means associated with the cells, first enclosure means for retaining thawing water adjacent said form, said first enclosure means including a wall portion disposed around the periphery of said form and extending upwardly to a height approximate said closed tops of said cells and adapted to retain a preselected quantity of thawing water around the exterior of said cells, second enclosure means defining a water reservoir, a source of thawing water adapted to be communicated to said first enclosure means to effect release of ice on said form, water outlet means, means defining a substantially unobstructed flow passage from said first enclosure means to said water outlet, said passage being of a preselected size so as to communicate water to said reservoir at a controlled rate, whereby a preselected quantity of water can be communicated to said first enclosure means during said harvest mode and be retained therein adjacent said form for a length of time sufficient to release ice frozen therein, with said quantity of water being discharged from said enclosure means to said reservoir at a rate sufficient to supply said water transferring means with water for the next successive freezing mode.

7. An apparatus as set forth in claim 6 wherein said first enclosure means is disposed above said reservoir and said orifice is formed in the lower side of said first enclosure mean in substantial vertical alignment with said reservoir.

8. An apparatus as set forth in claim 7 wherein said last mentioned means comprises an unobstructed passage communicating said water outlet with said reservoir, said last mentioned means comprising an overflow conduit, one end of which is communicable with said reservoir and the other end of which is communicable with said water outlet means.

References Cited

UNITED STATES PATENTS

2,729,070	1/1956	Ames	62—352X
2,891,387	6/1959	Cocanour	62—348X
3,048,988	8/1962	Nelson	62—347
3,218,824	11/1965	Nelson	62—348

WILLIAM E. WAYNER, Primary Examiner

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