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F. H. SCHABERG ET AL
AUTOMATIC ICE CUBE MAKER

2,493,900

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3 Sheets-Sheet 2

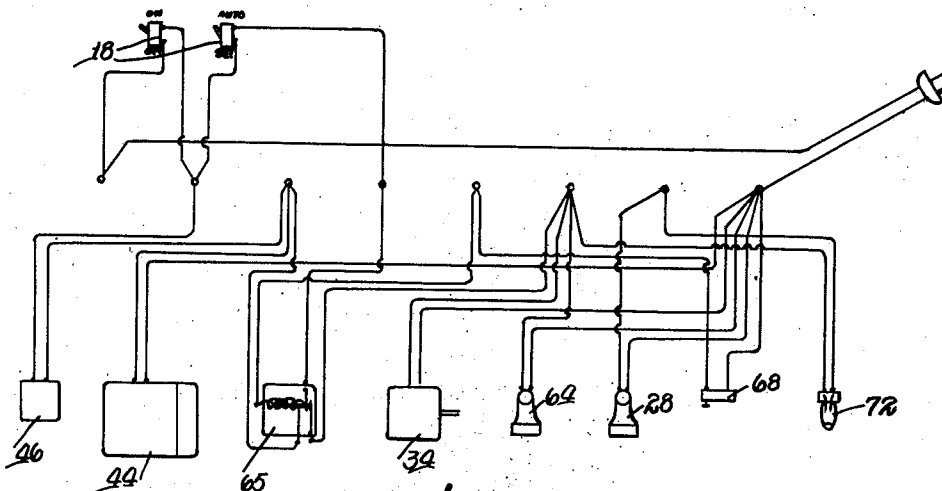


Fig. 7.

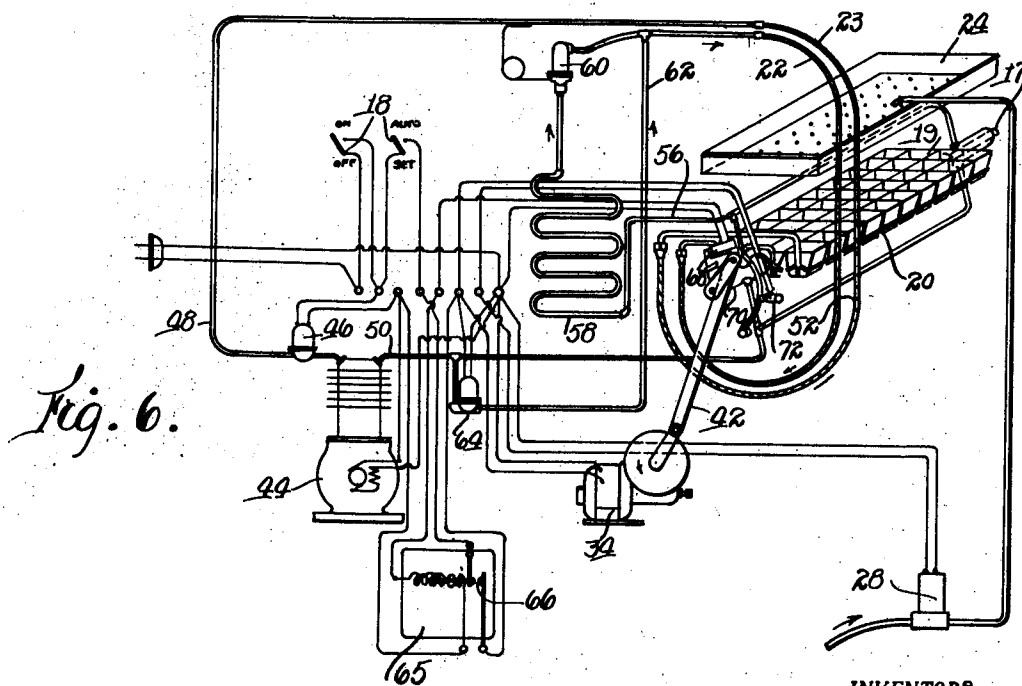


Fig. 6.

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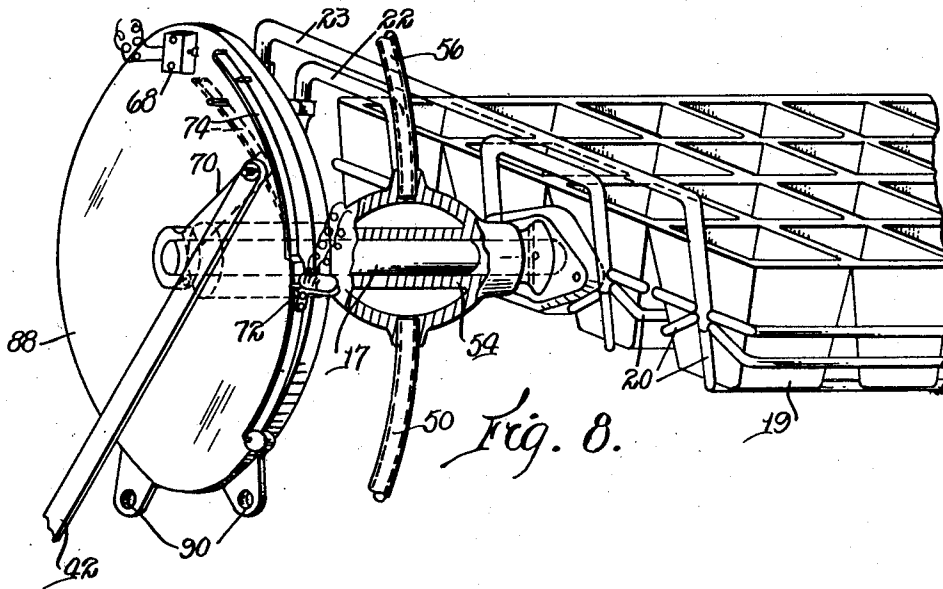
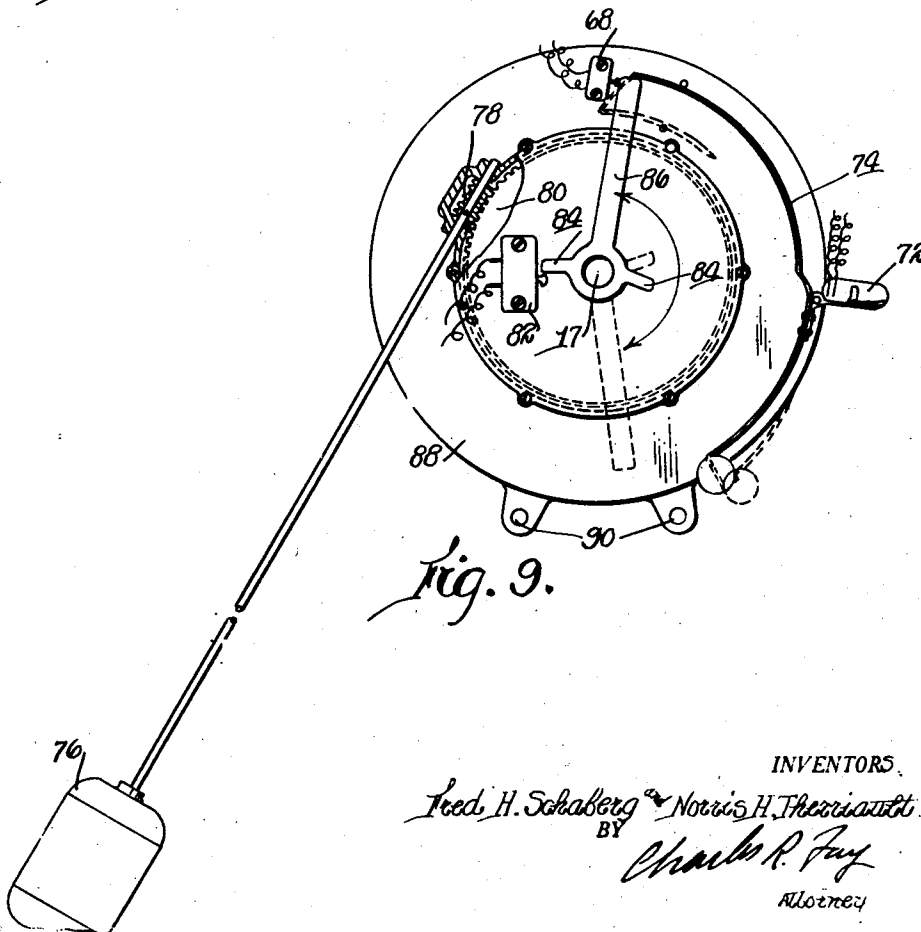
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AUTOMATIC ICE CUBE MAKER

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11 Claims. (Cl. 62—105)

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This invention relates to automatic ice cube makers wherein water is frozen in a tray in the form of cubes and the tray is periodically dumped into a receptacle and refilled and refrozen, this operation continuing indefinitely as long as the machine is energized for the purpose of accumulating a continuous flow of ice cubes or producing a single batch of ice cubes and holding them in cold storage until needed.

The principal object of the invention resides in the provision of an automatic ice cube maker of the class described comprising a casing having pivotally mounted therein a compartmented tray made in the form of cubes, there being disposed immediately above the tray a reservoir for water, said reservoir being in the nature of a pan and being provided with drip holes, one for each cubed compartment of the freezing tray; in combination with a compressor which may be of the usual type, however, automatically controlled so as to freeze the water in the tray and having control valves to stop and start the flow of water, the coolant gases, etc., and a motor for the tray itself, so that automatically in the required sequence, the ice in the tray will become frozen, the tray tilted, and the ice cubes deposited in a receptacle and the tray then returned to original position for the further operation of the ice cube maker.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which

Fig. 1 is a perspective view showing how the machine looks on the outside;

Fig. 2 is a vertical cross sectional view through the machine;

Fig. 3 is an enlarged detail view illustrating the freezing tray and the dumping action thereof;

Fig. 4 is a perspective view of the freezing tray;

Fig. 5 is a perspective view of the water reservoir;

Fig. 6 is a diagrammatic representation of the operating parts of the device;

Fig. 7 is an electrical diagram of the controls;

Fig. 8 is an enlarged perspective view of one end of the ice tray; and

Fig. 9 is an end view of a modification.

As shown in Fig. 1, there is provided a casing 10 and a receptacle 12 for the ice cubes, the same issuing from a slot 14 in the casing 10 or progressing down an incline or chute 16. The controls or switch buttons for the device may be placed at 18 as, for instance, for "on" or "off" and for automatic or one cycle operation only.

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Pivotally mounted inside the housing which is preferably well insulated, there is mounted a rod or axle 17 carrying a freezing tray 19 made up into cube-like compartments which taper as clearly shown in Figs. 4 and 8. The compartments are tapered for ease in dumping the cubes and also to better receive the freezing conduits 20 which run along each row of compartments as clearly shown. These conduits are connected at each end to flexible conduits 22 and 23 providing for circulation of expanding and cooling gases and, at the same time, allowing the tray to be tilted, as shown in Fig. 3.

Mounted above the freezing tray in fixed relation thereto, there is a water reservoir in the form of a pan 24 provided with a series of holes or spouts 26, there being one of these holes or spouts directly above each one of the compartments in the freezing tray 19 so that when there is water in the reservoir 24, it will flow downwardly into the compartments of the freezing tray to charge the same for freezing a batch of cubes. A solenoid-operated valve or the like 28 controls the water supply as will be described below.

A periodically operated motor 34 controls the operation of means for dumping the freezing tray and this motor is provided with a worm 36 driving a wheel 38 arranged to rotate a crank 40 operating an arm 42 to dump the tray from the full line position to the broken line position of Fig. 3 over the chute 16 so that the cubes will slide down the chute into the receptacle 12.

Referring now more particularly to Fig. 6, a compressor is indicated at 44, this compressor being electrically driven and controlled in intermittent operation by means of a low pressure valve-operated switch 46 located in a return line 48 of the cooling system. The compressor pumps the compressed gases out through a pipe 50, this pipe, of course, being warm and leading to a branch 52 which provides warm gases going into each end of the bearings or trunnions 54 of the axle 17 for the tray 19, so that the bearings for the tray will not have become frozen and stick. From the bearings of the tray, the gases proceed through a pipe 56 to a condenser 58 where the gases are cooled and from there the gases are led through an expansion valve 60 through pipe 22, conduits 20, and return pipe 23, which connects with pipe 48 leading back into the compressor.

A bypass pipe indicated at 62 contains a hot gas valve 64 which is intermittently operated as will be described below. This hot gas valve is ordinarily closed but momentarily opens when the freezing cycle is finished and allows the pas-

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sage of hot gases bypassing the condenser directly into the pipe 22 so as to loosen the cubes in the compartmented ice tray. The water valve 28 is set so as to close when the freezing cycle starts and to open when the tray has reached a vertical or slightly more than vertical position so that water from the reservoir will not fall directly on the ice cubes but will help the hot gases to loosen the ice cubes by falling upon the bottom of the ice tray.

The reference numeral 65 indicates a normally energized relay. Energization of this relay opens the contacts indicated at 66 so that when current is shut off, the contacts 66 close. When these contacts are closed the dump motor 34 is energized, the water valve 28 is operated to open, and the hot gas valve 64 is opened. The low pressure electric switch 46 is the instrumentality which energizes or deenergizes the coil of the relay 65. When the freezing cycle is finished, the low pressure in the return line to the compressor operates switch 46 to shut off the compressor and energize the relay 65, starting the dump motor, the water valve, and the hot gas valve. When the pressure builds up again the switch 46 is actuated so as to again start the compressor. For this reason, there is provided a microswitch 68 against which an arm 70 fixed to the axle 17 normally engages so as to close the microswitch to insure energization of the relay 65. However, when the dump motor starts, the arm 70 moves away from the microswitch 68 and interrupts the current to the relay, thus insuring that the contacts 66 will remain closed so that even if the pressure builds up and the compressor starts, the dump motor will continue its cycle of operation until the arm 70 again moves back to its original position and closes switch 68 at that time, causing the contacts 66 to open and shut off the dump motor.

In order to delay the action of the water valve 28, a mercury switch 72 is provided and this switch is actuated by the arm 70 also during its movement to dump the tray. In other words, the mercury switch is in the water valve circuit and prevents it from being turned on for a quarter of a turn or until the arm 70 strikes the strip 74 and moves it as clearly shown in Fig. 8, so as to at that time turn on the water valve, the circuit up to the mercury switch 72 being closed because of the relay 65.

Fig. 9 illustrates an alternative form of mechanism for dumping the tray and this comprises a motor 76 directly driving a worm 78, there being a worm wheel 80 directly connected to the axle 18. In this case, it is necessary to provide a reversing switch 82, which is actuated by arms 84 and an arm 86 actuates the microswitch 68 and the mercury switch 72 otherwise exactly as indicated above.

The switch mountings 68 and 72 may be on a plate 88 having ears 90 for connecting to the inside wall of the cabinet of the ice cube maker.

It will be clear that this invention provides a fool proof constantly acting ice cube maker which is fast but positive in operation and which will not get out of action by reason of sticking bearings or cubes, and which will operate without trouble.

Having thus described our invention and the advantages thereof, we do not wish to be limited to the details herein disclosed otherwise than as set forth in the claims, but what we claim is:

1. Apparatus of the class described comprising a tiltable ice cube tray, means operative period-

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cally to tilt the tray, a liquid reservoir for the tray, flexible conduits associated with the tray for conducting freezing fluids thereto and vapor therefrom, an electric relay for controlling the operation of the tray tilting means, a compressor, a condenser, a low pressure electric switch to operate the relay and compressor, and means operated by the relay to loosen the cubes in the tray.

2. Apparatus of the class described comprising a tiltable ice cube tray, means operative periodically to tilt the tray, a liquid reservoir for the tray, flexible conduits associated with the tray for conducting freezing fluids thereto and vapor therefrom, an electric relay for controlling the operation of the tray tilting means, a compressor, a condenser, and a low pressure electric switch to operate the relay and compressor, and means operated by the relay to loosen the cubes in the tray, said last named means comprising a hot gas valve to pass hot fluids directly to the said flexible conduits.

3. Apparatus of the class described comprising a tiltable ice cube tray, means operative periodically to tilt the tray, a liquid reservoir for the tray, flexible conduits associated with the tray for conducting freezing fluids thereto and vapor therefrom, an electric relay for controlling the operation of the tray tilting means, a compressor, a condenser, and a low pressure electric switch to operate the relay and compressor, and means operated by the relay to loosen the cubes in the tray, and a water supply valve electrically operated by the relay for periodic supply of water to the reservoir.

4. The apparatus of claim 3 including means delaying the supply of water to the reservoir until the tray has tilted sufficiently to receive the initial supply of water from the reservoir on the side or bottom thereof.

5. The apparatus of claim 3 including means delaying the supply of water to the reservoir until the tray has tilted sufficiently to receive the initial supply of water from the reservoir on the side or bottom thereof, said water delaying means comprising an electric switch for the water supply valve, said electric switch being positioned to be operated by the tray during the tilting cycle and at a predetermined degree of tilt.

6. Ice cube maker comprising a compressor, a connected condenser, a low pressure switch for energizing the compressor, a tilting compartmented ice cube tray, a series of compartments of the ice cube tray running along the conduits, flexible connections for the conduits to the compressor as a return and to the condenser, a relay energized by the low pressure switch and a tray tilting motor and a hot gas valve, both energized by the relay, so that when the freezing cycle is completed and the pressure falls, the relay is operated by the low pressure switch to energize the motor and open the hot gas valve, a pipe connection from the compressor directly to the tray conduits to free the cubes of ice as the motor dumps the tray, the hot gas valve being normally closed and located in said pipe connection.

7. The ice cube maker of claim 6 including an axle for the tray, and pipes from the compressor to the condenser, the pipes including the axle bearings to prevent freezing thereof.

8. The ice cube maker of claim 6 including a cabinet housing the apparatus, an axle for the tray journaled in the cabinet walls, and a pipe from the compressor to each end of the axle, said pipes leading to the condenser, the hot gas

valve bypassing the axle journals and condenser.

9. Ice cube maker comprising a cabinet, a compartmented ice cube tray therein, an axle mounting the tray for tilting movement from a horizontal freezing position to an inclined cube dumping position, flexible conduits to the tray for the freezing fluids and return vapor, a dump motor for the tray, a compressor and a condenser connected to the flexible conduits to complete the circuit for the fluids, a low pressure electric switch in the return vapor conduit, an electric relay normally energized and having contacts normally open, and a microswitch in circuit with the relay, the low pressure switch being connected to deenergize the relay to close the contacts and the microswitch being normally closed by contact therewith of the tray, so that the low pressure switch operates at low pressure to cut out the relay and allow the contacts thereof to close, to start the dump motor to tilt the tray, thus moving the latter off the microswitch maintaining the relay circuit open and the dump motor

in operation for one cycle regardless of whether the pipe fluid pressure again operates the low pressure switch.

10. The ice cube maker of claim 9 including a crank arm for the dump motor to oscillate the ice cube tray.

11. Ice cube maker of claim 9 including a worm driven by the dump motor, a worm, a wheel in mesh with said worm and mounted on the tray, and dump motor reversing switches operated by the tray in the movement thereof.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,995,124	Kolster	Mar. 19, 1935
2,443,203	Smith	June 15, 1948