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2,962,877

MACHINE FOR MAKING AND FLAKING ICE

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2 Sheets-Sheet 1

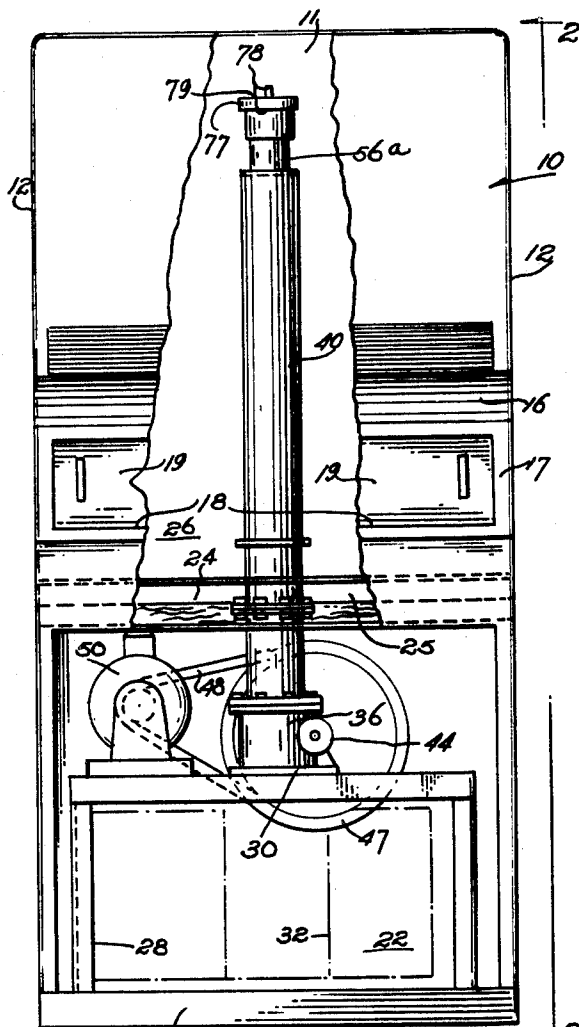


Fig. 1.

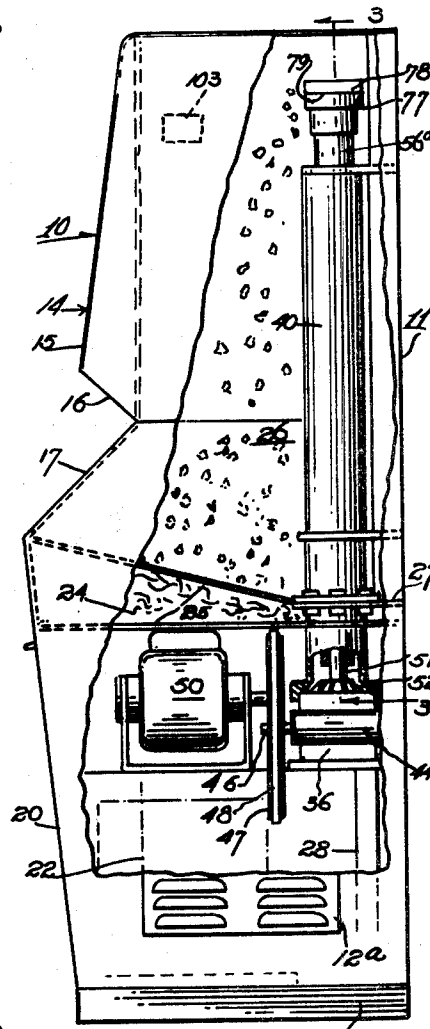


Fig. 2.

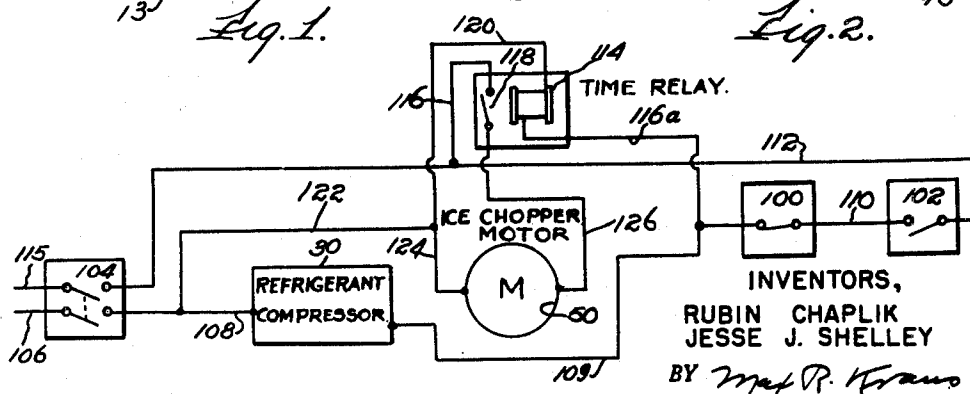


Fig. 6.

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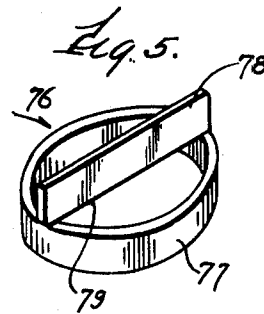
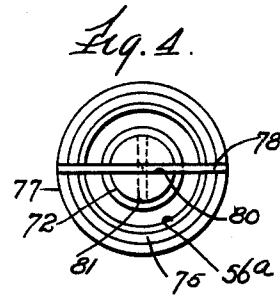
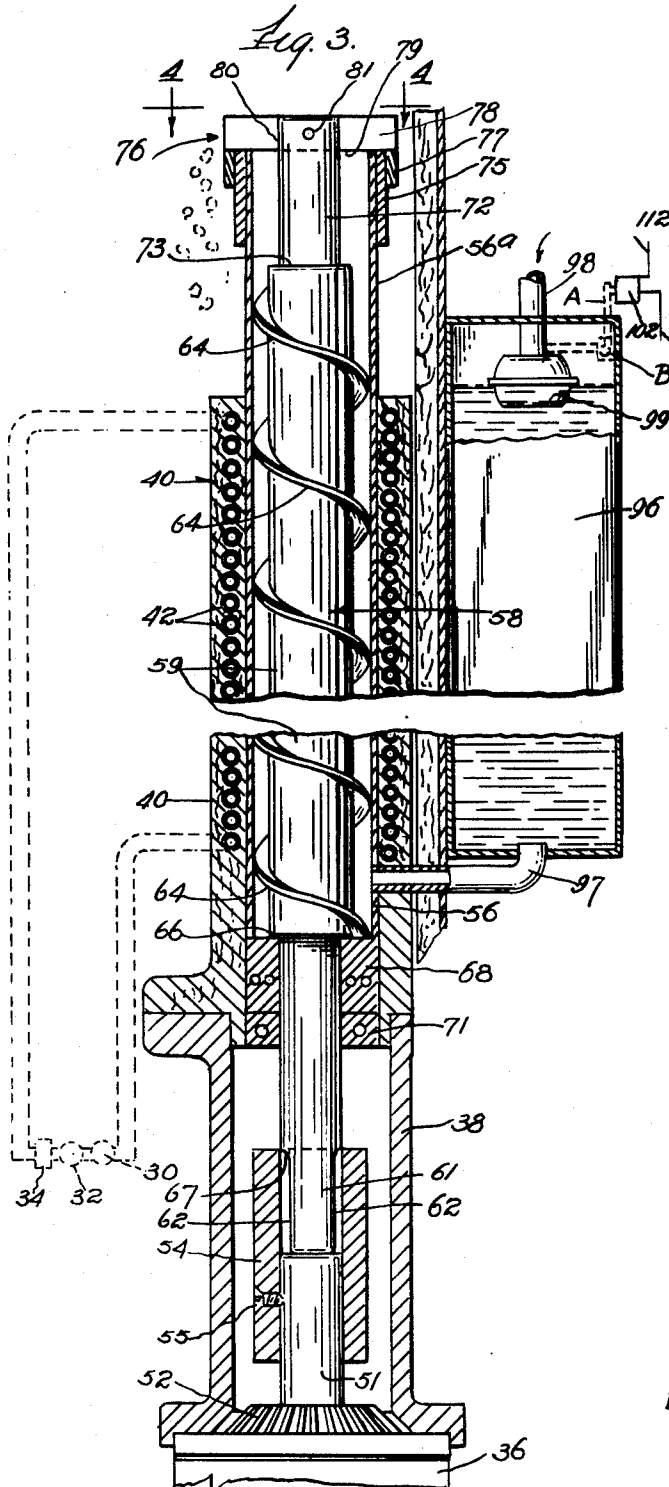
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MACHINE FOR MAKING AND FLAKING ICE

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2 Claims. (Cl. 62—320)

This invention relates to a machine for making and flaking ice.

This invention is an improvement on the pending application S.N. 507,950, now Patent No. 2,877,632, filed May 12, 1955 by applicants as co-inventors.

One of the objects of this invention is to provide a machine for making and flaking ice which utilizes a rotatable ice shearing unit which rotates with the rotation of the screw shaft. The rotatable ice shearing unit serves to shear the column of ice as it moves upwardly and to cause the ice to drop in flake form into the storage cabinet of the machine.

Another object is to provide a freezing column having an ice discharge outlet and a rotating screw member therein for advancing the ice, with means secured on the rotating screw member and rotating therewith and in the path of the advancing ice for breaking the ice and discharging it through the discharge outlet.

Another object is to provide a machine in which the freezing column is provided with an upper open end over which is mounted a rotatable blade for shearing and distributing the ice discharged from the open end of the freezing column.

Other objects will become apparent as this description progresses.

In the drawings:

Fig. 1 is a front view of the machine with a portion broken away to show the interior of same.

Fig. 2 is a view taken on line 2—2 of Fig. 1.

Fig. 3 is a view partially in cross section taken on line 3—3 of Fig. 2.

Fig. 4 is a top plan view taken on line 4—4 of Fig. 3.

Fig. 5 is a perspective view of the shearing device.

Fig. 6 is a schematic view of the electrical circuit.

The cabinet generally indicated at 10 and best shown in Figs. 1 and 2 is of the upright shape having a rear 11, sides 12, base 13, and a front generally indicated at 14. One of the sides is provided with louvers 12a. The upper front portion of the cabinet inclines forwardly as at 15 and then rearwardly as at 16. The midsection inclines forwardly as at 17 and is provided with a pair of rectangular spaced openings 18 into which are fitted sliding doors 19 for access into the interior of the cabinet. The lower front section then inclines inwardly as at 20 towards the base. The interior of the cabinet is divided into a lower compartment 22 and an upper compartment 24 by a partition 25 which forms the bottom wall for the flaked ice compartment generally indicated at 26. The partition 25 inclines downwardly from adjacent the lower end of the midsection to a horizontal position as at 27 adjacent the rear wall 11. The flaked ice as will be subsequently explained piles up in the upper compartment 24 on the partition 25 and is readily removable therefrom by opening the doors 19. The midsection of the cabinet which is accessible through the doors 19 permits a person in standing upright position to remove the ice very readily and easily without stooping or bending. Furthermore the ice is scooped up from the bottom thus the old ice is used up first.

A supporting frame generally indicated at 28 is suitably secured to the base 13 of the cabinet in the lower compartment 22 and a conventional refrigerant compres-

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sor 30, condenser 32 and expansion valve 34 all hermetically sealed are enclosed within the frame.

Supported and secured on the top of the frame 28 centrally and rearwardly thereof is a tubular member 36 on which is secured a riser block 38 best shown in Figs. 1 and 3 which extends upwardly through an opening in the partition 25 and into the upper compartment 24. Supported on the riser block 38 is a tubular insulated freezing column 40 which supports a freezing coil or evaporator 42 which is connected at the lower end through suitable pipes (shown diagrammatically in Fig. 3) to the compressor 30 and at its upper end to the expansion valve 34. The compressor 30, condenser 32 and expansion valve 34 being connected in series as is well understood in the art and as is best shown in Fig. 3.

The tubular member 36 supports a speed reducer generally indicated at 44. The speed reducer shaft 46 carries a pulley 47 which is driven by a belt 48 in turn driven by an electric motor 50 mounted on top of the frame 28. The speed reducer 44 drives the screw shaft to be presently described. Supported within the tubular member 36 is a rotatable post 51 supporting a gear 52 which is driven by the speed reducer 44. The post 51 supports a coupling sleeve 54 which is secured to the post 51 by a set screw 55. A sleeve 56 is stationarily supported in the column 40. The sleeve 56 extends upwardly above the freezing column portion and said upwardly extending sleeve portion is designated at 56a. A screw shaft generally indicated at 58 is confined in said tubular column 40 and supported on the post 51. The screw 58 has a main cylindrical body 61 which has opposed flat sides 62 confined in the coupling sleeve. A spiral fin 64 is formed integrally with said main body portion 59. The screw shaft 58 has a shoulder 66 and a shoulder 67 with the latter shoulder resting on the top of the coupling sleeve. A bearing block 68 is secured inside the lower end of the freezing column 40 adjacent the shoulder 66 and the lower end of the column is closed with a seal 71 adjacent the bearing block. The upper end of the screw shaft 58 has a reduced cylindrical section 72 having a shoulder 73.

As best shown in Figs. 3 to 5 inclusive, the upper end of freezing column 40 which includes the sleeve 56a is open and it is through this opening that the ice is discharged from the freezing column into the top compartment of the cabinet.

Fixedly secured to the outside of the upper portion of the sleeve 56a adjacent the top thereof is a sleeve 75 made preferably of metal, the top of which is substantially flush with the top of the freezing column or sleeve 56a.

A rotating ice shearing unit generally indicated at 76 is mounted on the top of the freezing column for the purpose of shearing the ice as it is advanced upwardly. The shearing unit comprises a metal ring member 77 to which is fixedly secured a cross member or blade 78 extending across the top thereof. The blade 78 is of substantially uniform thickness in cross section having a flat bottom edge 79.

The upper end of the reduced cylindrical section 72 of the screw shaft 58 is provided with a transverse slot 80 which receives the blade 78. A pin 81 secures the blade 78 to the cylindrical section 72 of the screw shaft. It will be seen that bottom 79 of the blade 78 is supported slightly above and out of contact with the top of the sleeve 75 and sleeve 56a. The rotating ring 77 fits around the sleeve 75 and rotates about said sleeve or bearing surface. The blade 78 extends radially of the cylindrical section 72 on the opposite sides thereof.

It will be seen that the bottom of the blade 78 is spaced a substantial distance from the end of the main body of the screw shaft, that is the upper end of the spiral fin 64

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of the screw shaft is spaced a substantial distance from the lower edge of the blade 78. As the screw shaft rotates, the ice shearing unit 76 rotates with it, that is ring 77 of the shearing unit rotates about the sleeve 75 on the freezing column with the transverse member or blade 78 rotating on a horizontal plane over the top of the freezing column to shear off the ice which is advancing upwardly from the screw shaft.

Supported adjacent the rear of the cabinet is a water tank 96 which has an outlet pipe 97 at the bottom thereof leading into the interior of the tubular freezing column 40 adjacent the lower end of the screw portion of the screw shaft. An inlet pipe 98 leading into the tank is connected to a suitable source of water supply. A water level float 99 is contained within the tank 96. The float is connected so that when the float drops below a certain prescribed level it will open the electrical circuit to prevent operation of the machine. Any conventional means may be used for said purpose. For example an L-shaped arm A is pivotally supported as at B in the tank 96. The upper end of the arm extends through an opening in the top of the tank to operate the shutoff switch 102 to open the electrical circuit to the refrigerant compressor 30 to arrest operation of the refrigerant compressor. Normally the shutoff switch 102 is closed so that the refrigerant compressor will operate, however when the float 99 drops, the arm A will pivot to open the switch in the shutoff 102 shutting off the refrigerant compressor. The shutoff switch is connected in the circuit as described in connection with Fig. 6. The thermostatic shutoff 100 is used for the purpose of controlling the electrical circuit to operate the refrigerant compressor 30. Any conventional means may be used for operating the thermostatic shutoff and same is shown diagrammatically in Fig. 2 and indicated by the numeral 103. The said means is positioned inside the upper portion of the upper compartment of the cabinet so that when the upper compartment is filled with ice the thermostat will be operated to open the electrical circuit to the refrigerant compressor to arrest operation of said compressor. Normally the switch in the thermostatic shutoff 100 is closed.

The freezing column 40 will be filled with water equal to the level of that in the water tank 96. After the refrigerating unit is in operation the water in the freezing column will be frozen to a semi-solid form and with the rotation of the screw shaft 58 will be advanced upwardly where it will engage the rotating blade 78 of the ice shearing unit 76 which will cause the ice to break off and fall into the storage compartment of the cabinet.

The schematic view shown in Fig. 6 will now be described. Assuming the thermostatic shutoff 100 and low water pressure shutoff 102 are closed, the manually operated double pole starting switch 104 when closed will permit the current to flow through line 106 through conductor 108 to operate the refrigerant compressor 30 through conductor 109 to the thermostatic shutoff 100, through conductor 110 to the lower water pressure shutoff 102 through conductor 112 to starting switch 104 to line 115. The thermostatic shutoff 100 and low water pressure shutoff 102 being connected in series with the refrigerant compressor 30. The above comprises the compressor circuit and places the compressor 30 in operation. Opening of the switch in either the thermostatic shutoff 100 or the lower water pressure shutoff 102 will open the circuit through the conductors 109 and 110 leading from the refrigerant compressor 30 and shut off the refrigerant compressor.

The time relay 114 is connected in shunt through conductors 115 and 116 to conductors 112 and 109 of the compressor circuit and the time relay 114 is energized to close switch 118, the current flowing from line 106 through conductors 108, 109, 116a through relay 114, conductors 120, 122 and back to line 106. When the switch 118 is closed the motor 50 will be operated by current flowing through line 106, through conductors 122 and 124 to the

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motor 50, conductor 126, switch 118, conductor 116, conductor 112 and back to line 115. The time relay switch 114 will hold the switch 118 closed for a predetermined interval even though the thermostatic shutoff 100 opens to open the compressor circuit and shut off the refrigerant compressor. The motor 50 operates the screw shaft 58.

Briefly described, the motor 50 continues to operate screw shaft 58 for a period of time after the refrigerant compressor 30 has been shut off to allow all the ice in the freezing column to be discharged, thus no ice is formed or left in the freezing column. Also when either the switch of the thermostatic shutoff 100 or the switch of the low water pressure shutoff 102 is open the refrigerant compressor 30 ceases to operate although the motor 50 for operating the screw shaft 58 continues to operate.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

We claim:

1. In a machine for making and flaking ice comprising a vertically positioned freezing column having a discharge opening at the upper portion of said column, a rotatable screw member vertically positioned within said freezing column for advancing the ice formed therein upwardly toward said discharge opening, an ice disintegrating member secured to said rotatable screw member adjacent the upper discharge opening and rotatable with said rotatable screw member and directly in the path of movement of the advancing ice for breaking up said ice and discharging it through said discharge opening, said ice disintegrating member having blade means connected to a ring, said blade means having opposite vertically extending parallel planar surfaces and a lower cutting edge, said blade means directly engaging the ice from said screw member without any intervening element between said screw member and said blade means, and said ring engaging the upper end of the freezing column to rotate thereabout as a bearing surface for supporting the upper end of the rotatable screw.

2. In a machine for making and flaking ice comprising a vertically positioned freezing column having a discharge opening at the upper portion of said column, a rotatable screw member vertically positioned within said freezing column for advancing the ice formed therein upwardly toward said discharge opening, blade means supported by said rotatable screw member adjacent the upper discharge opening and rotatable with said rotatable screw member and directly in the path of movement of the advancing ice for breaking up said ice and discharging it through said discharge opening, said blade means having opposite vertically extending parallel planar surfaces and a lower cutting edge, said blade means being positioned adjacent the upper end of said freezing column to engage said freezing column and support the upper end of said rotatable screw member, said blade means directly engaging the ice from said screw member without any intervening element between said screw member and said blade means, and a ring secured to said blade means, said ring engaging the upper end of the freezing column and rotatable thereabout as a bearing surface for supporting the upper end of the rotatable screw.

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