March 17, 1959 R. CHAPLIK ET AL 2,877,632

MACHINE FOR MAKING AND FLAKING ICE

Filed May 12, 1955 2 Sheets-Sheet 1

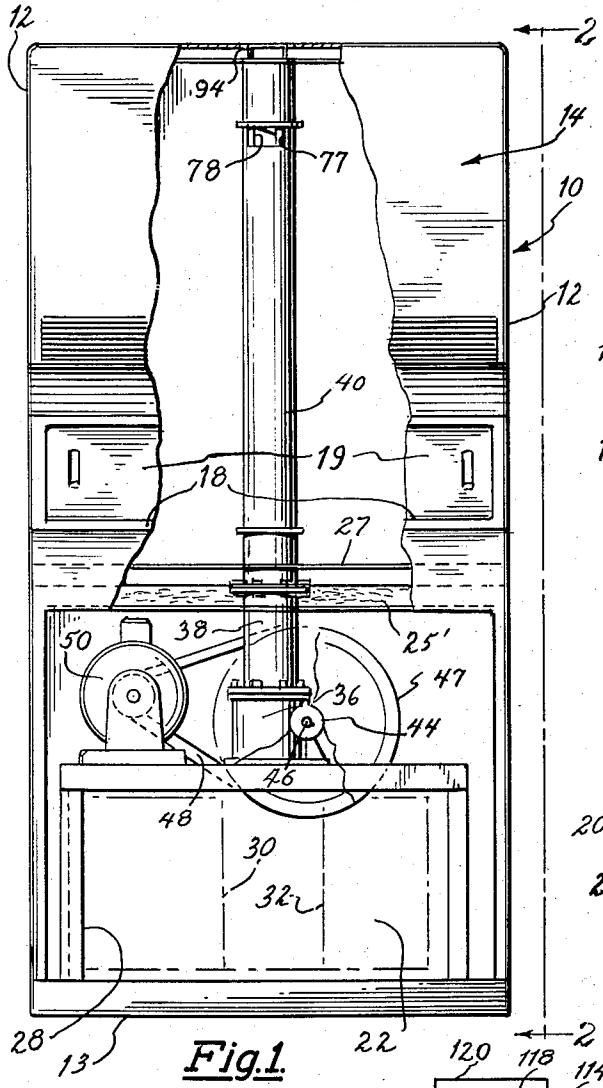

Fig.1.

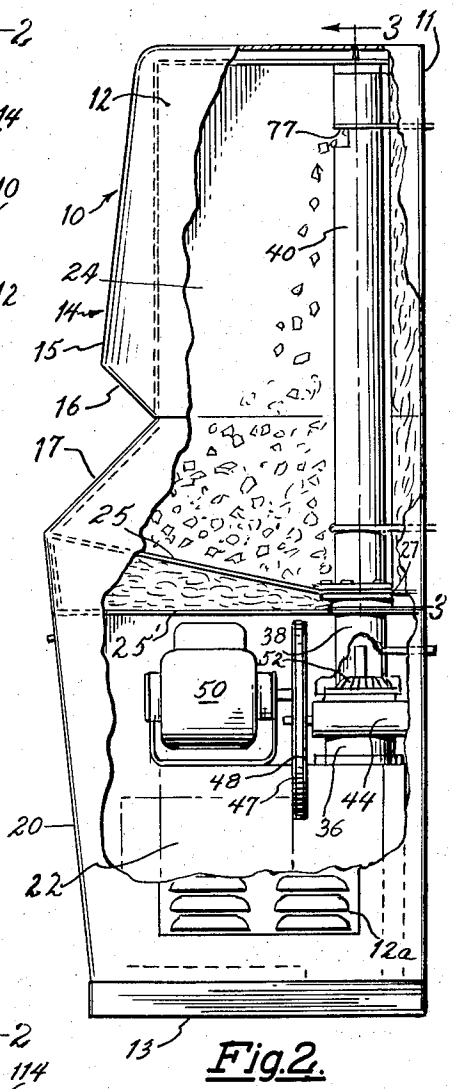

Fig.2.

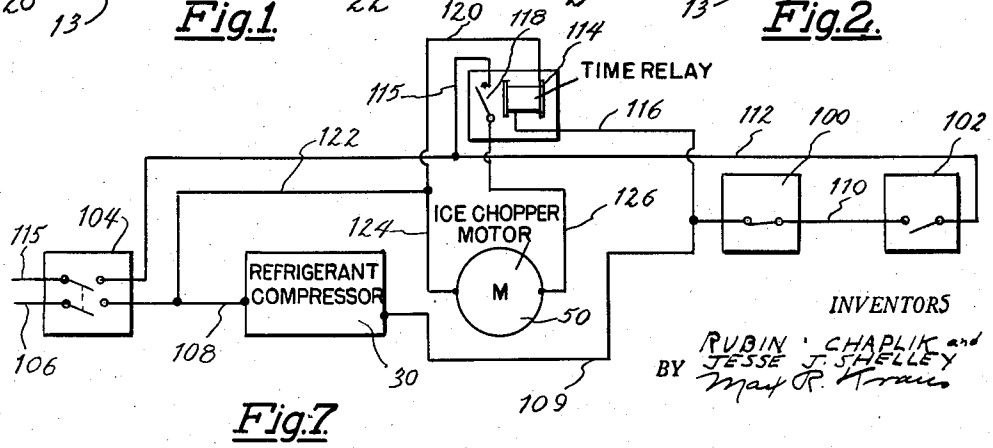

Fig.7.

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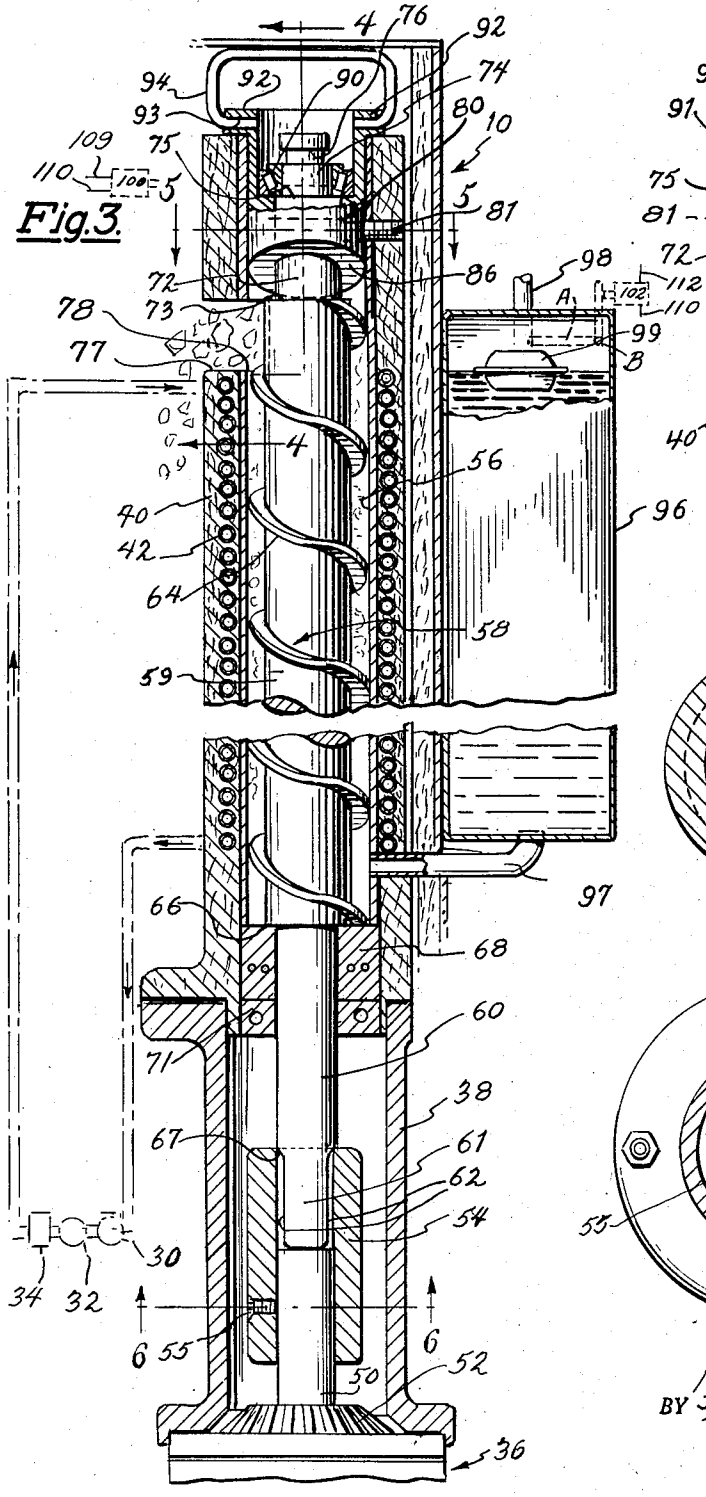

Fig.3.

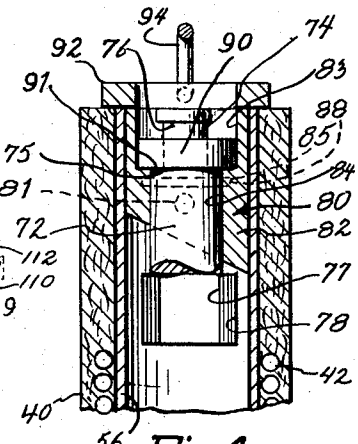

Fig.4.

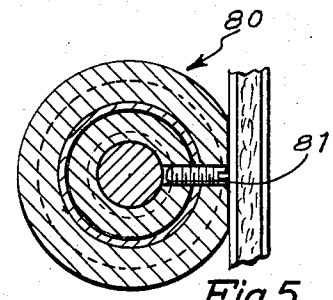

Fig.5.

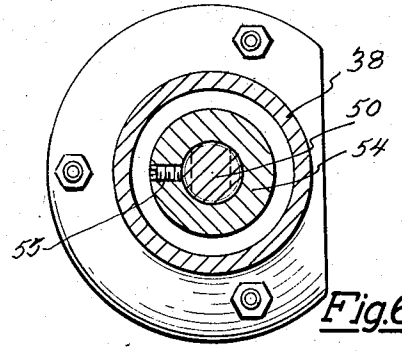

Fig.6.

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United States Patent Office 2,877,632
Patented Mar. 17, 1959

2,877,632

MACHINE FOR MAKING AND FLAKING ICE

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Application May 12, 1955, Serial No. 507,950

2 Claims. (Cl. 62—320)

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

One of the objects of this invention is to provide a machine which makes ice and flakes same and deposits same in the compartment of a cabinet of a height such that a person may remove same without bending or stooping.

Another object is to provide a machine which shuts off the refrigerant compressor and prevents the freezing of the water contained in the freezing chamber when the source of water supply is shut off or the water level in the supply tank drops below a prescribed level.

Another object is to provide a machine in which the ice will continue to be expelled from the freezing chamber for a period of time after the refrigerant compressor has been shut off and ice has ceased to form in the freezing chamber thus expelling all the ice until the freezing chamber is reduced to a non freezing temperature.

Another object is to provide a machine which utilizes comparatively little floor space and which permits the flaked ice to be conveniently stored and removed by a person without stooping or bending, and which permits the old ice to be first used.

Another object is to provide a structure of the foregoing characteristics in which the freezing unit is formed as an integral assembly independent of the cabinet structure, which permits the freezing unit to be readily installed and removed from the cabinet and which also eliminates any vibration from the freezing unit from being imparted to the cabinet.

Other objects will become apparent as this description progresses.

In the drawings:

Fig. 1 is a front view of the device 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 cross sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a cross sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a cross sectional view taken on line 6—6 of Fig. 3.

Fig. 7 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 **12***a*. The upper front portion of the cabinet inclines forwardly as at **15** and then rearwardly as at **16**. The mid-section 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 **24**. 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 horizontal panel or additional partition **25'** extends across the cabinet below the partition **25**.

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 compressor **30**, condenser **32** and expansion valve **34** all heremetically sealed are enclosed within the frame.

Supported and secured on the top of the frame **28** centrally and rearwardly thereof is a subular 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 therewithin 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 **50** supporting a gear **52** which is driven by the speed reducer **44**. The post **50** supports a coupling sleeve **54** which is secured to the post **50** by a set screw **55**. A sleeve **56** is stationarily supported in the column **40**. A screw shaft generally indicated at **58** is confined in said tubular column **40** and supported on the post **50**. The screw **58** has a main cylindrical body section **59**, a lower reduced cylindrical section **60** and an end section **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** and a further reduced cylindrical section **74** defining a shoulder **75**. An annular channel **76** is provided in the section **74** adjacent the end thereof.

The freezing column **40** as well as the sleeve **56** therebetween are provided with aligned openings **77** and **78** respectively through which the flaked ice is discharged from the screw shaft **58** into the top compartment of the cabinet.

Secured in the freezing column **40** adjacent the top thereof is an ice chipper generally indicated at **80** which is stationarily secured against rotation by a set screw **81**. The ice chipper has a tubular body portion **82**, which has an enlarged bore section **83** and a reduced bore section **84** which is provided with a circumferential

groove 85. The lower end of the ice chipper has an angular or beveled wall 86 with the rear wall extending substantially below the front wall and terminating adjacent the shoulder 73.

The upper sections 72 and 74 of the shaft are confined within the bores 84 and 83 respectively of the ice chipper so that the screw shaft rotates within the ice chipper.

A sealing ring 88 is confined in the groove 85 and engages the section 72 of the screw shaft. A roller bearing 90 rests on the shoulder 91 of the ice chipper 80 and engages the wall of the screw shaft so that the screw shaft may rotate with respect to the ice chipper. The ice chipper 80 has a flange portion 92 which extends over freezing column 40 and same is provided with a pair of spaced openings 93 to receive a handle 94 which may be used to remove the ice chipper after the set screw 81 has been loosened. The top of the screw shaft 58 may be provided with means to support a sign so that the rotation of the screw shaft may likewise rotate a sign.

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. 7.

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 are shown diagrammatically in Fig. 3. The said means are 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 ice chipper 80 and will be expelled exteriorly through the openings 77 and 78 into the storage compartment of the cabinet.

The schematic view shown in Fig. 7 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 low water pressure shutoff 102 through conductor 112 to starting switch 104 to line 115. The thermostatic shutoff 100 and low water pressure shutoff 102 are 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 low 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, 116 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 motor 50, conductor 126, switch 118, conductor 115, 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 shutoff 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 authough 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 ice comprising in combination, an upright cabinet including a rear wall, side walls, a front wall and a top wall, said cabinet having a partition extending across substantially the mid section of said cabinet and defining an enclosed ice storage chamber extending from approximately the mid section of said cabinet to the top of said cabinet and formed from said partition and rear, side and front walls of said cabinet, a freezing column vertically mounted inside said ice storage chamber, means for supplying water to the inside of said freezing column, means for cooling the wall of said freezing column to freeze ice on the inside surface thereof, a spiral shaft rotatably mounted within said freezing column to elevate and expel the ice formed within said freezing column, an ice chipping member supported at the upper end of said freezing column to disintegrate the ice fed from said freezing column before expulsion into said ice storage chamber, said freezing column being confined within said ice storage chamber so that the ice storage chamber encircles and encloses the freezing column whereby ice discharged into said ice storage chamber will be deposited on said partition and pile up and be positioned around said freezing column to the rear, sides and front walls of said ice storage chamber while in said ice storage chamber, an opening in said front wall adjacent said partition for access to the interior of said ice storage chamber to permit the ice deposited immediately adjacent said partition to be first removed without stooping, a closure for said opening, and means located in said cabinet below said partition for operating said freezing column and rotating said spiral shaft.

2. In a machine for making ice comprising in combination, an upright cabinet including a rear wall, side walls, a front wall and a top wall, said cabinet having a partition extending across substantially the mid section of said cabinet and defining an enclosed ice storage chamber extending from approximately the mid section of said cabinet to the top of said cabinet and formed from said partition, rear, side and front walls of said cabinet, a freezing column vertically mounted inside said ice storage chamber, means for supplying water to the inside of said freezing column, means for cooling the wall of said freez-

ing column to freeze ice on the inside surface thereof, a spiral shaft rotatably mounted within said freezing column to elevate and expel the ice formed within said freezing column, an ice chipping member supported at the upper end of said freezing column to disintegrate the ice fed from said freezing column before expulsion into said ice storage chamber, said freezing column being confined within said ice storage chamber so that the ice storage chamber encircles and encloses the freezing column whereby ice discharged into said ice storage chamber will be deposited on said partition and pile up and be positioned around said freezing column and to the rear, sides and front walls of said ice storage chamber while in said ice storage chamber and an opening into said ice storage chamber adjacent the lower end of said ice storage chamber to permit the ice adjacent the bottom of said ice storage chamber to be first removed without stooping.

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