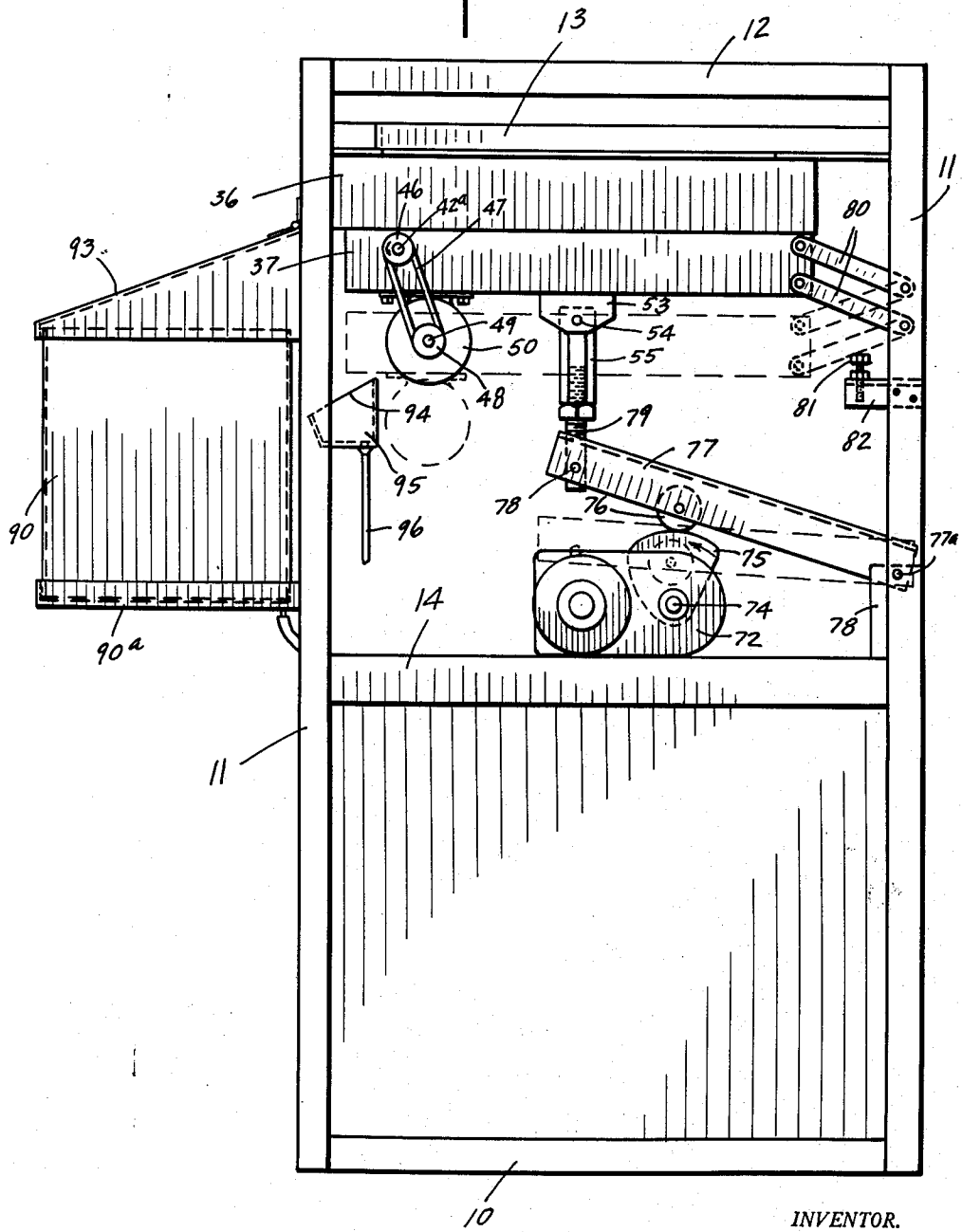
Feb. 9, 1954 D. B. McSHAN 2,668,422

ICE-MAKING MACHINE

Filed Aug. 29, 1951 3 Sheets-Sheet 1

FIG. 1



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ICE-MAKING MACHINE

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FIG. 2

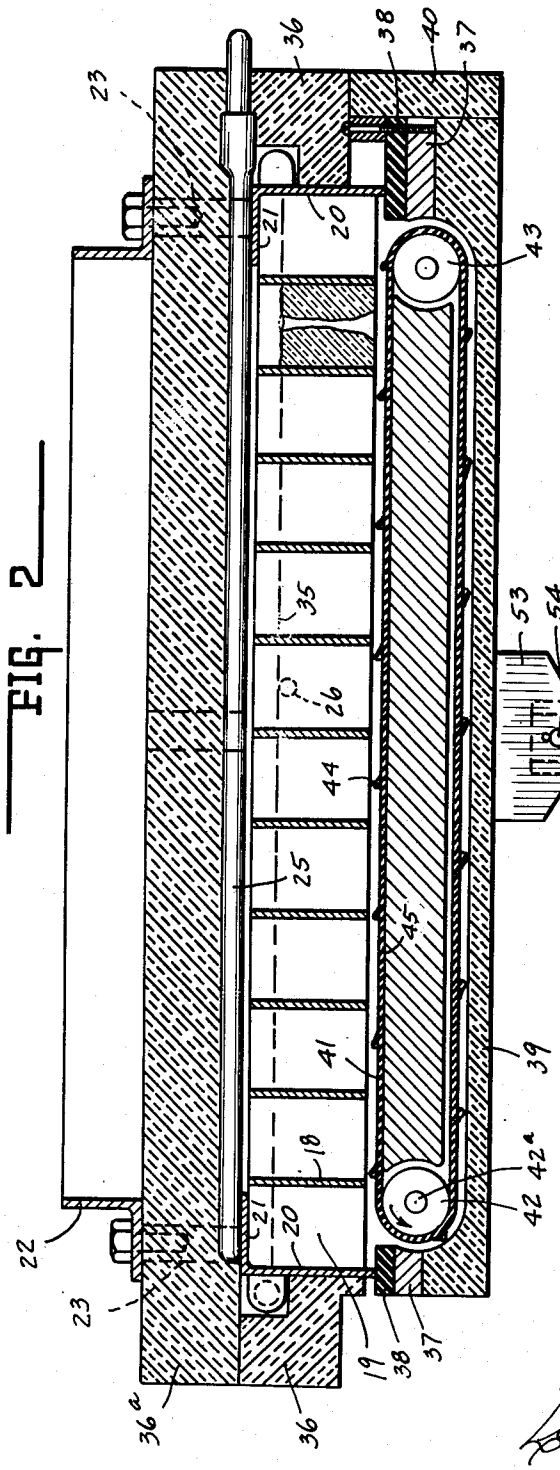
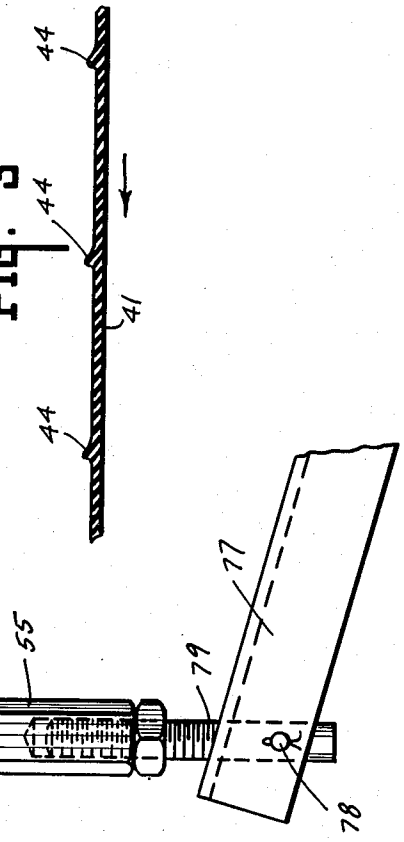


FIG. 3



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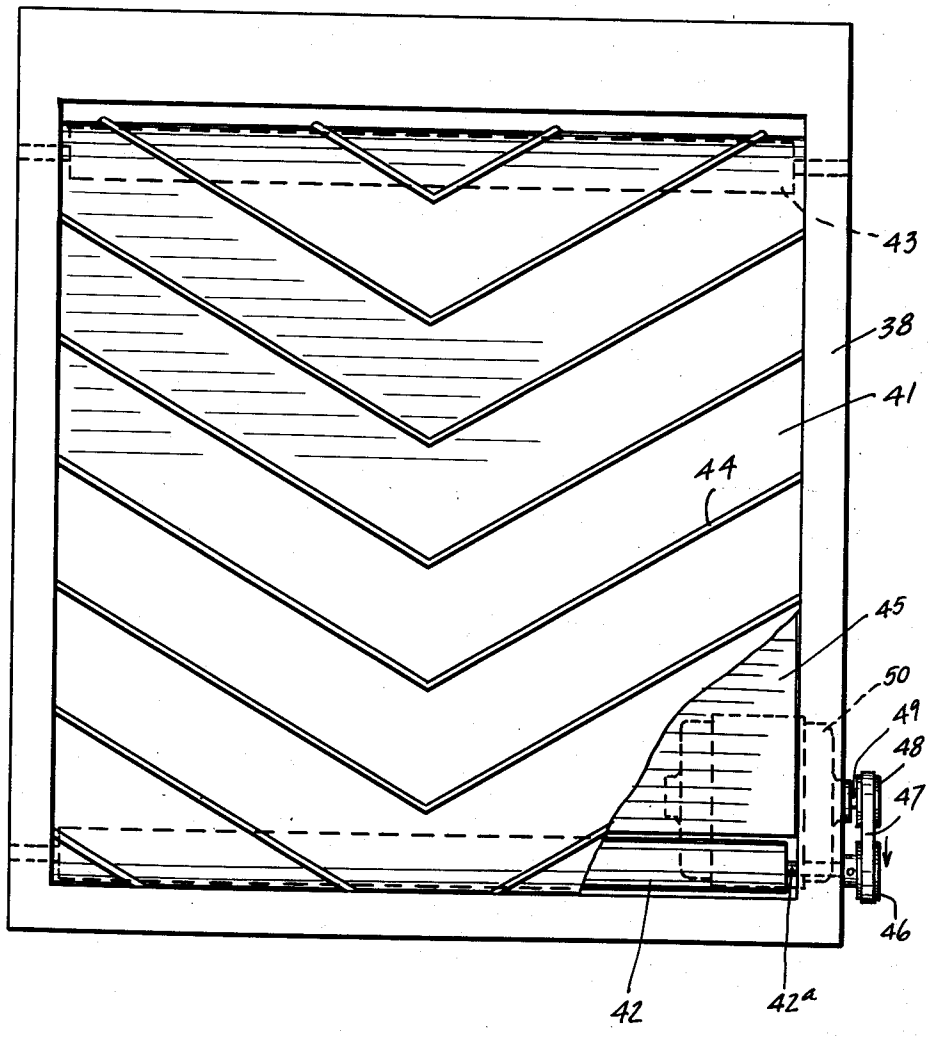
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ICE-MAKING MACHINE

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3 Sheets-Sheet 3

FIG. 4



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UNITED STATES PATENT OFFICE

2,668,422

ICE-MAKING MACHINE

Dormon B. McShan, Indianapolis, Ind., assignor to John R. Bayston, as trustee, Icecrafter (Liquidating) Trust, Van Nuys, Calif.

Application August 29, 1951, Serial No. 244,152

8 Claims. (Cl. 62—106)

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This invention relates to a machine for manufacturing and delivering ice cubes automatically wherein a number of individual ice cubes are simultaneously frozen and thereupon automatically defrosted and released from their freezing cells for discharge to a delivery chute, as generally disclosed in Letters Patent granted August 7, 1951, to John R. Bayston, No. 2,563,093, for Ice Making Machine.

The object of the invention is to provide mechanism applicable to a machine of this general type for subjecting the liquid during the freezing cycle to just sufficient agitation and washing action as to prevent incorporation of impurities in the ice being formed, to thereby produce substantially clear ice cubes as distinguished from cubes generally referred to as cloudy.

The agitation and washing action above referred to is accomplished, according to this invention, by submerging a continuously moving belt in the liquid and directly beneath the group of cells within the freezing unit adapted to be driven in a direction transversely of the cells and closely adjacent their partitions for creating a turbulence and washing action of the under surface of the water contained in the cells, which turbulence and washing action are transmitted upwardly in each cell to wash the impurities from the water as it is being frozen within the walls thereof.

A further feature of the invention resides in the provision of generally V-shaped ribs formed on the effective surface of the belt which enhances the agitating action of the water.

The invention as herein described is applied to the ice making machine particularly shown and described in detail in Letters Patent granted January 22, 1952, to Gustav F. Erickson and Dormon B. McShan, No. 2,583,294, entitled Ice Making Machine, reference being had thereto in respect to the automatic controls, refrigeration and defrosting, and particularly the lowering of the platen from its cell closing and sealing position to its ice discharging position, the structure of said application being made a part hereof with the modification pertaining to the belt agitator of this invention as distinguished from the reciprocating or vibrating agitating plate shown and described therein.

A further advantage of this invention over and above the agitating medium of the above-mentioned Erickson and McShan application resides in the fact that whereas in the former, the platen carrying the agitating plate must be dropped to a decided angle in its lowered position sufficiently to permit the ice cubes when released from the cells to slide therefrom into the ice receptacle. By means of this invention involving the moving belt, and particularly wherein it is provided with transverse V-shaped ribs, it is unnecessary to lower the platen at such angle as to discharge the ice by gravity. On the other hand, the platen need be dropped down and maintained in parallel relation with the cells at only sufficient distance therefrom to provide overhead for the released ice cubes. The moving belt then acts to carry the released cubes to the discharge end of the platen where they are fed from the platen to the ice receptacle.

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The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a side elevation with parts removed and broken away, of the upper portion of the ice making machine showing the platen in closed ice forming position in full lines and dropped down to ice discharging position in dotted lines.

Fig. 2 is an enlarged vertical section through the evaporator including the ice cells and the agitating belt.

Fig. 3 is a further enlargement of a section of the belt illustrative of the rib formation thereof.

Fig. 4 is a plan view of the belt carrying platen with a portion of the belt broken away.

In the drawings there is shown that portion of the ice making machine pertaining to the evaporator, platen and the mechanism for lowering the platen as embodied in the upper portion of the frame structure of the machine. The mechanisms for automatically controlling the alternate freezing and defrosting action, and the lowering of the platen and freeing the frozen cubes is shown and described in the above-mentioned Erickson and McShan Letters Patent No. 2,583,294, which mechanisms are referred to and made a part hereof.

In the drawings there is shown the upper part of the supporting frame structure of the machine including a bottom frame member 10, the uprights 11, top frame member 12, and cross frame members 13 and 14. In the lower compartment of the frame structure and below the frame member 14 there is mounted suitable refrigerating apparatus of any well known make, not shown herein but reference being had to the above-mentioned application.

In the upper section of the frame structure there is provided a freezing unit including a plurality of individual cube forming cells open at their top and bottom as shown in Fig. 2; said

cells are in the form of square sleeves defined by partition walls 18 crossed by transversely extending partition walls 19, all of which are surrounded by the outer walls 20 of greater depth. The outer walls 20 are formed with inwardly extending top flanges 21 upon which the supporting frame 22 is bolted and spaced by the spacing sleeves 23.

Extending transversely over the partition walls 19 there are provided sinuous refrigerating and defrosting coils 25. Said coils provide the passageway through which the refrigerant is caused to flow and are preferably in intimate contact and substantially coextensive with the cell walls 19 to provide a sufficient heat exchange therebetween. The liquid such as water to be frozen is discharged into the freezing unit through the tube 26 below, but adjacent the desired liquid level indicated at 35. Said tube 26 is connected with a suitable source of supply automatically controlled as shown and described in said above-mentioned application. The liquid introduced through the tube 26 is distributed to each of the cells within the outer walls 20 to flow below the cell partitions 18 and 19.

Surrounding the freezing unit there is a wall of insulating material 36 covered by a top layer of insulating material 36a. For closing and sealing the unit from the bottom there is provided a platen 37 having a rubber sealing gasket 38 adjacent its edges adapted to engage and seal with the outer walls 20. Said platen 37 carries over its lower surface a layer of insulating material 39, and about its sides and rear edges outer insulating strips 40 which are adapted to engage the walls 36 to provide an insulated closure for the freezing unit and platen when the latter is in its sealing and closing position as shown in Fig. 2.

Said platen carries within the sealing gasket 38 a continuously moving endless agitating belt 41, which is substantially coextensive with the cells of the unit. Said belt is mounted upon the rollers 42, 43 at each end thereof, said rollers being rotatably supported within the platen 37, the roller 42 being positioned at the forward discharge end of the platen and the roller 43 at the opposite end thereof and arranged relative to the cells so that the upper lap of the belt is caused to move in a plane closely spaced thereto with only enough clearance to permit passage of the ribs 44. The platen is recessed to receive the rollers and the return lap of the belt, the upper face of said platen indicated at 45 providing a supporting surface for maintaining the upper lap of the belt closely adjacent said cells.

The belt is driven preferably through the front roller 42 which is provided with a shaft 42a. Said shaft carries an exposed pulley 46 driven by a V belts 47 from the pulley 48. The pulley 48 is mounted on the drive shaft 49 of an electric motor 50 secured to the underside of the platen 37 adjacent the forward side edge thereof.

Depending from the platen there is a bracket 53 to which is pivotally mounted at 54 an adjustable coupling 55 extending downwardly from said platen. For moving the platen between the cell closing and freezing position and its lowered discharge position there is provided a cam motor 72 controlled by a suitable temperature controller as described in said above-mentioned application, having a gear train driving connection with the cam shaft 74 which drives the cam 75, said cam engages a cam follower 76 carried by a platen raising and lowering lever 77. Said lever is pivotally mounted at 77a upon the bracket 78 which is carried on the upright frame member 11. The free end of the lever 77 is pivotally connected at 78 to a shank 79 connected through the coupling 55 with said platen.

Upon the cam motor 72 being energized, the shaft 74 rotates the cam in the direction of the arrow to release the platen from sealing engagement with the evaporator cells (full lines) and permit it to be dropped down or be lowered to the position shown in dotted lines. In this latter position the platen will be spaced downwardly from the evaporator sufficiently to permit ice cubes to drop and be freed therefrom, whereupon the constantly driven agitator belt 41 with its ribs 44 will carry the freed ice cubes forwardly to discharge them from the forward end of the platen.

For this purpose the rear or back end of the platen is connected by parallel pairs of hinge straps 80 to the uprights 11, which straps are restricted in their downward drop by the adjustable stop screws 81 respectively, each of which is carried by a bracket 82. At the forward or discharge end of the platen and immediately below its lowermost position there is mounted on the forward uprights 11 an ice receptacle 90 seated in a fixed supporting tray 90a for receiving charges of ice cubes delivered by the belt from the platen. Said receptacle is closed by cover-lid 93 adjacent the discharge end of the platen. Immediately below said discharge end there is a sloping perforated drain chute 94 which may be in the form of a screen over which the ice cubes slide, but which permits the free and unfrozen liquid to pass therethrough into a drain receptacle 95 from which the liquid passes through the discharge pipe 96 to any suitable disposal.

The belt and pulley drive between the motor 50 and the belt driving roller 42 is geared down to preferably drive the belt with a relative slow movement or approximately a rate of one revolution per second in the direction of the arrows of Figs. 2, 3 and 4. The ribs 44 extend approximately $\frac{1}{16}$ of an inch above the belt and at oppositely directed 30° angles in parallel spaced relation with each other. They are spaced from each other slightly greater than the width of an ice cube to be received therebetween when the cubes are discharged from the cells.

The moving belt agitates the under surface water in the respective cells creating a turbulence therein which induces the film of water as it is being frozen within the cell to let go and cause a deposit of the impurities through the washing action resulting from the turbulence therein. Such impurities are carried away from direct association with the cells to the lower part of the platen and eventually discharged into the drain 94 through the continuing movement of the belt. Furthermore, the movement of the belt prevents freezing thereon of the water in the cells in a manner to prevent ice formation on the belt or platen such as to resist its movement to lowered position and free discharge of the ice cubes.

The invention claimed is:

1. In an ice cube making machine, the combination of a freezing unit comprising a plurality of cells normally open at the bottom, a closure plate for said unit movable to close and seal said unit during a freezing cycle, means for introducing into said cells a liquid to be frozen into ice cubes, means for refrigerating said unit

to freeze the liquid therein, an endless belt mounted in said closure plate extending transversely of and closely adjacent the open bottom of the several cells in said unit, and means carried by said plate operably connected with said belt for imparting continuous movement thereof in one direction to effect an agitation of the liquid during the freezing cycle.

2. In an ice cube making machine, the combination of a freezing unit comprising a plurality of cells normally open at the bottom, a closure plate for said unit movable to close and seal said unit during a freezing cycle, means for introducing into said cells a liquid to be frozen into ice cubes, means to alternately effect freezing and defrosting cycles to freeze the liquid in said unit and free the frozen liquid therefrom respectively, said closure plate being movable from said unit a greater distance therefrom than the dimensions of said cubes for receiving cubes from said cells during the defrosting cycle, an endless belt carried by said plate having the upper lap thereof extending closely adjacent the open bottom of said cells movable in a plane parallel thereto in a direction to receive and discharge ice cubes received thereon from said cells when in its lowered position, and means operably connected with said belt to impart continuous movement thereof in said discharge direction during both the freezing and defrosting cycles to effect agitation of the liquid in said cells during the freezing cycle and effect discharge of the ice cubes during the defrosting cycle.

3. In an ice cube making machine, the combination of a freezing unit comprising a plurality of cells normally open at the bottom, a closure plate for said unit movable to close and seal said unit during a freezing cycle, means for introducing into said cells a liquid to be frozen into ice cubes, means for refrigerating said unit to freeze the liquid therein and defrosting said unit to free the frozen ice cubes therefrom during a discharge cycle following the freezing cycle, means for lowering said closure plate from its sealing engagement with said unit following a freezing cycle, a continuously moving member carried by said closure plate having a liquid agitating surface lying closely adjacent the open bottom of said cells and in parallel relation thereto, and means mounted on said plate operably connected with said member for continuously driving it transversely of said cells in a direction to effect an agitation of the liquid therein during the freezing cycle.

4. In an ice cube making machine, the combination of a freezing unit comprising a plurality of cells normally open at the bottom, a closure plate for said unit movable to close and seal said unit during a freezing cycle, means for introducing into said cells a liquid to be frozen into ice cubes, means for refrigerating said unit to freeze the liquid therein and defrosting said unit to free the frozen ice cubes therefrom during a discharge cycle following the freezing cycle, means for lowering said closure plate from its sealing engagement with said unit following a freezing cycle during the defrosting cycle, an endless belt carried by said closure plate having its upper lap lying closely adjacent the open bottom of said cells and in parallel relation thereto, means mounted on said plate operably connected with said belt for continuously driving it transversely of said cells in a direction to effect an agitation of the liquid therein during the freezing cycle and discharge ice cubes therefrom during the defrosting cycle, and a series of transverse ribs protruding upwardly from the exposed surface of said belt arranged in spaced relation for increasing the agitating turbulence of the liquid and facilitating the discharge of ice cubes respectively.

5. In an ice making machine, the combination of a freezing unit having a plurality of open bottom cells for receiving the liquid to be frozen and a removable closure therefor, of a continuously moving member having a liquid agitating surface mounted between said closure and the bottom of said cells, and means connected with said member for imparting movement thereto in a single direction through a plane parallel with the bottom of said cells and in close proximity thereto for effecting agitation of the liquid during the freezing cycle.

6. In an ice making machine, the combination of a freezing unit having a plurality of open bottom cells for receiving liquid to be frozen and a removable closure therefor, of an agitating member movable between said closure and the bottom of said cells in a single direction parallel to the plane of said closure and transversely of said cells, and means connected with said member for imparting said transverse movement in said plane closely adjacent the bottom of said cells for agitating liquid therein during the freezing cycle.

7. In an ice making machine, the combination of a freezing unit having a plurality of open bottom cells for receiving the liquid to be frozen and a removable closure therefor, of an endless belt carried by said closure with an agitating surface movable transversely of said cells in a single direction and in close proximity thereto, and means connected with said belt for imparting continuous movement thereto in one direction for agitating the liquid in said cells during the freezing cycle.

8. In an ice making machine, the combination of a freezing unit having a pluality of open bottom cells for receiving the liquid to be frozen and a removable closure therefor, of an endless belt carried by said closure with an agitating surface movable transversely of said cells in a single direction and in close proximity thereto, a series of upstanding spaced ribs carried by said belt, said ribs extending substantially transversely thereof, and means connected with said belt for imparting continuous movement thereto in one direction for agitating the liquid in said cells during the freezing cycle.

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Number	Name	Date
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