April 27, 1965 E. H. FROHBIETER 3,180,103

ICE BODY MAKER

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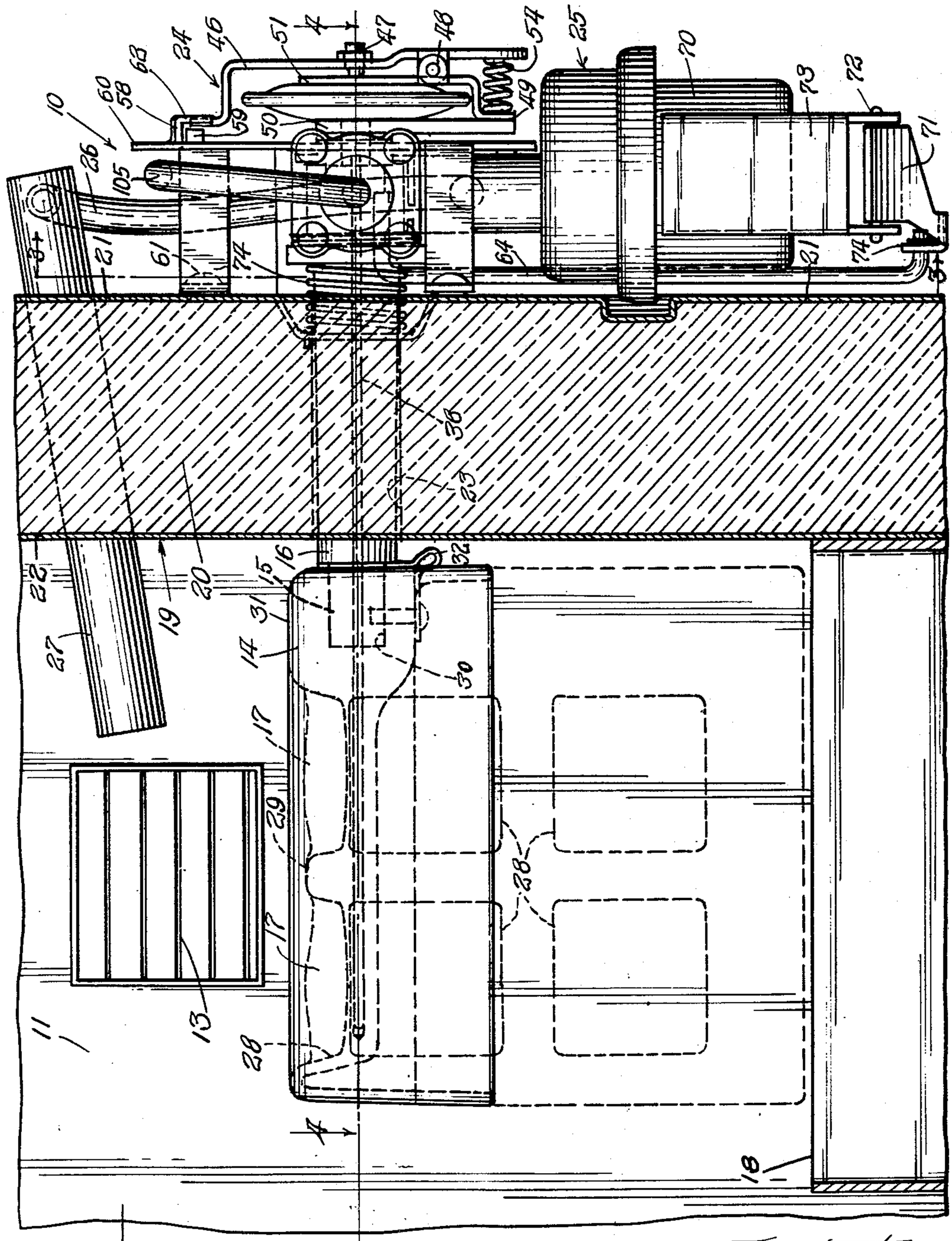

Fig. 1.

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Allen & Stellman, Attys.

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Fig. 3.

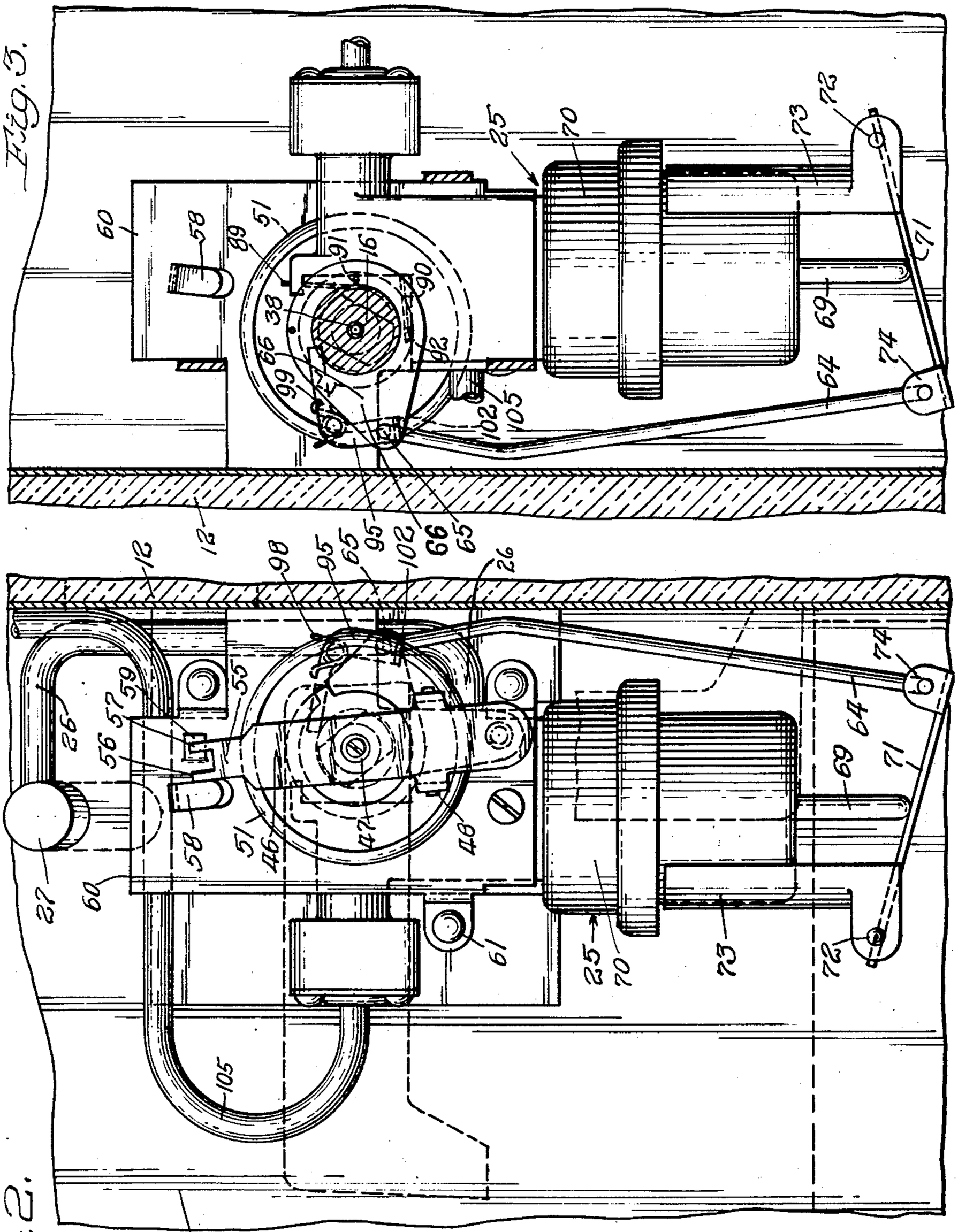

Fig. 2.

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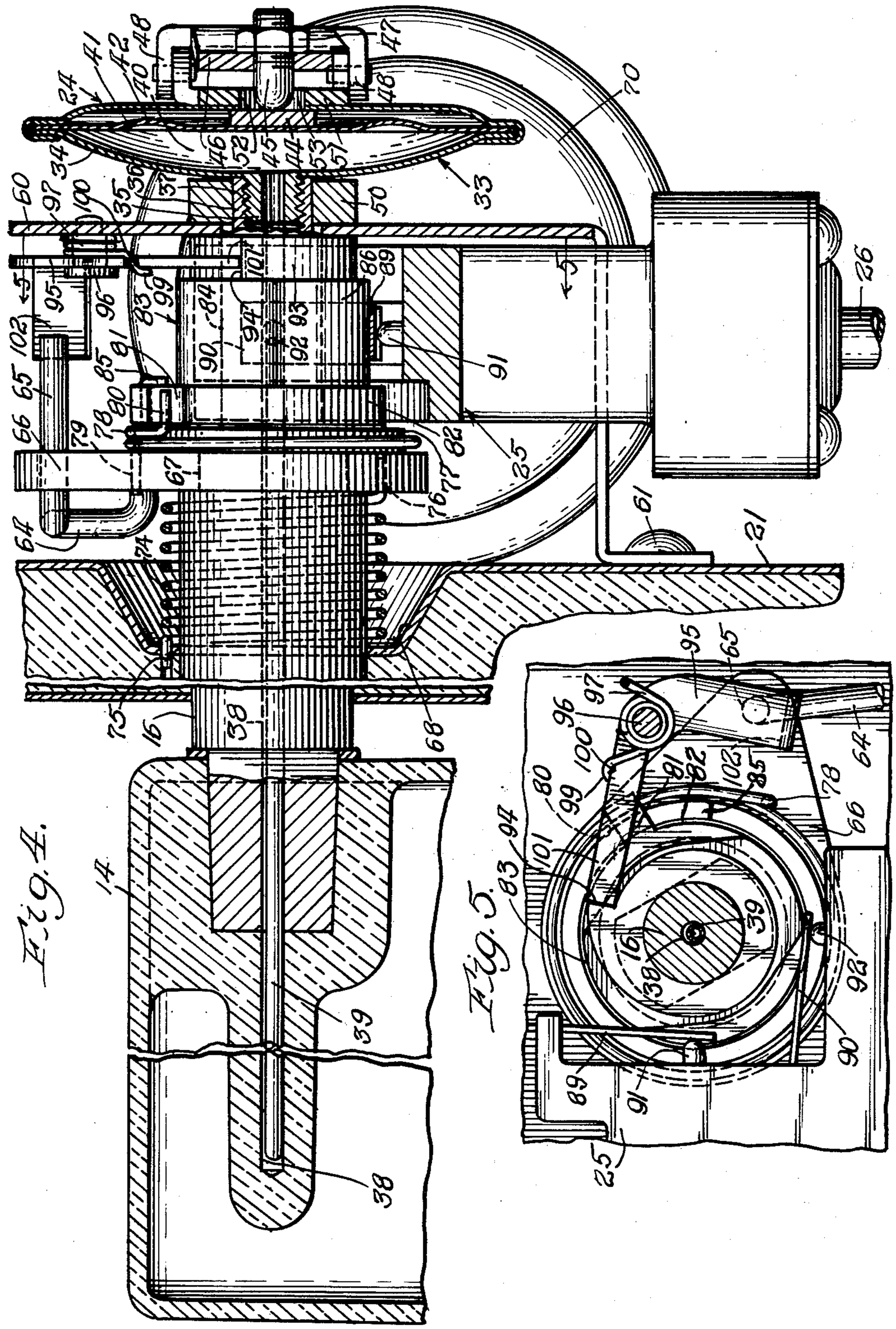

Fig. 4.

Fig. 5.

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Fig. 8.

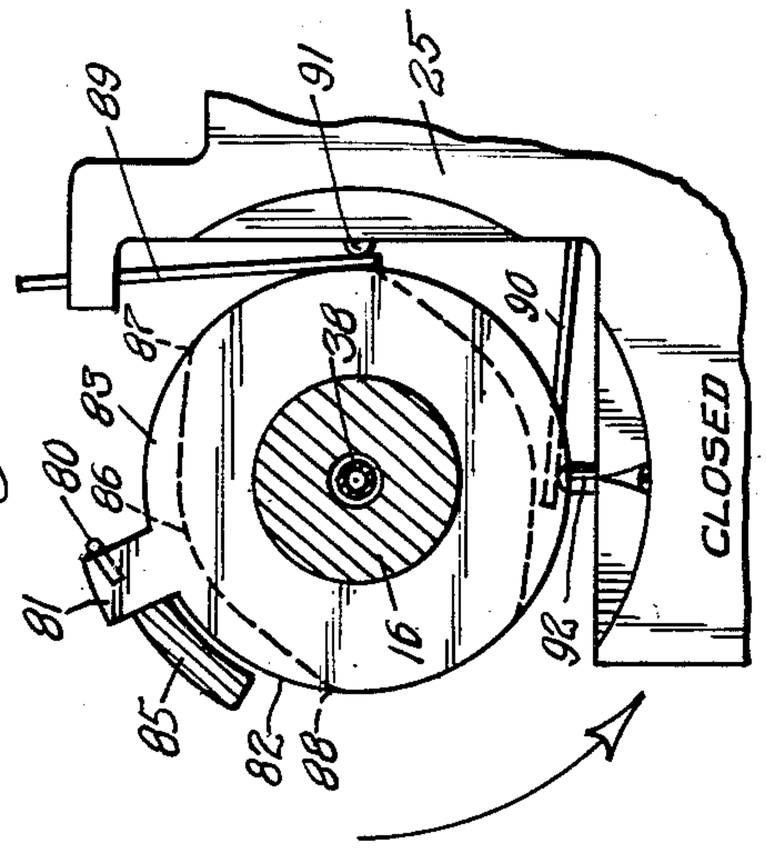


Fig. 9.

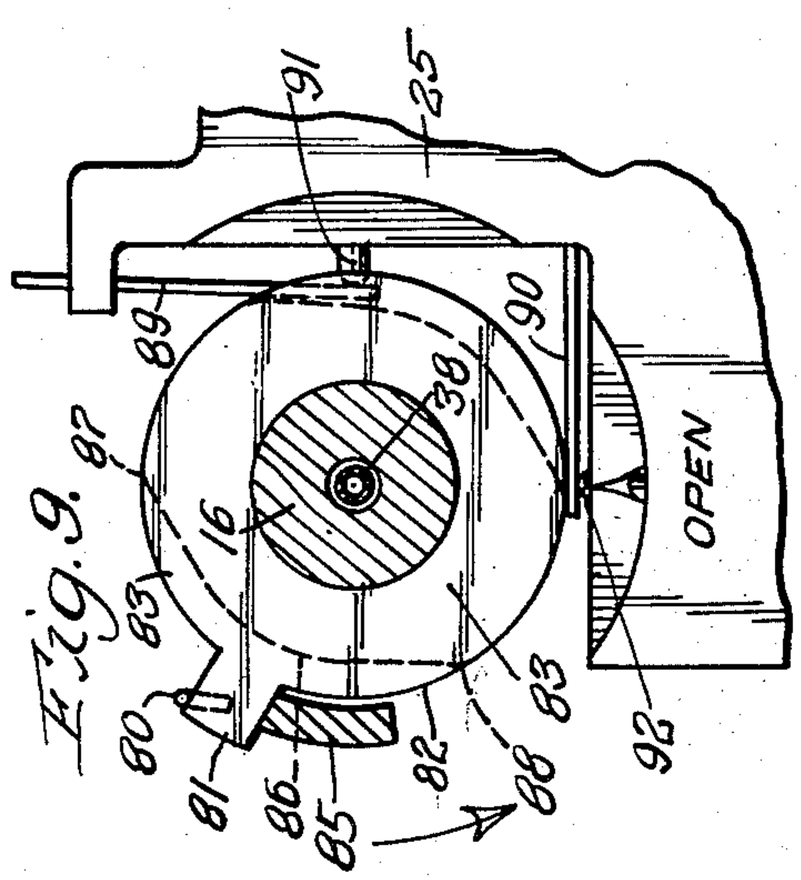


Fig. 6.

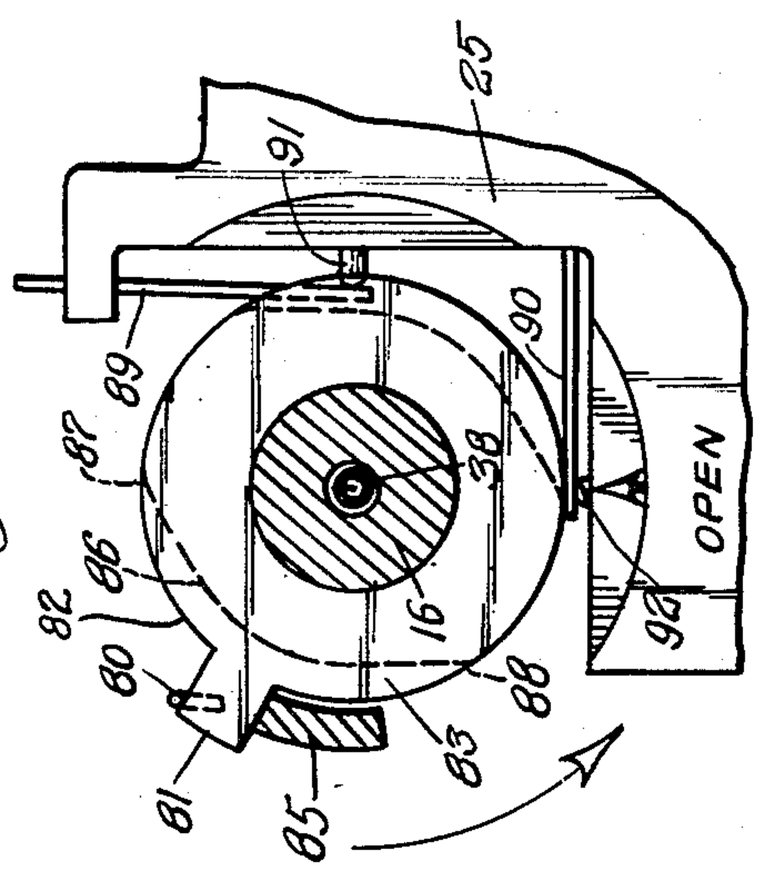
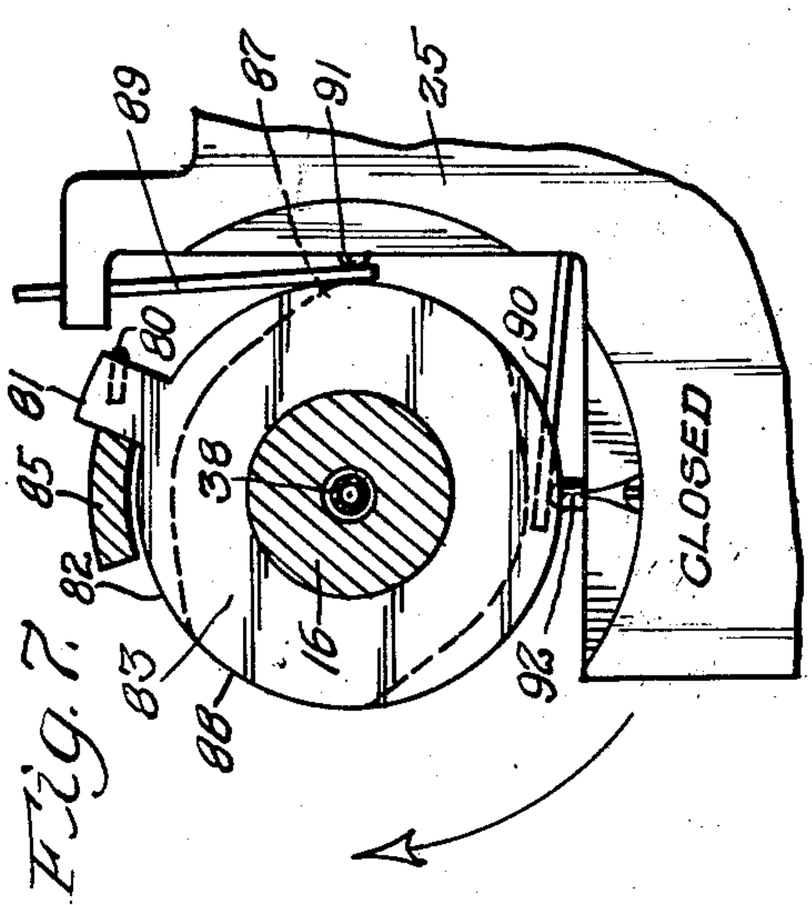


Fig. 7.



United States Patent Office

3,180,103

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3,180,103
ICE BODY MAKER

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Filed July 27, 1960, Ser. No. 45,750
20 Claims. (Cl. 62—135)

This invention relates to ice makers and in particular to ice makers for use in refrigerators.

One method of producing ice bodies, such as ice cubes, in a conventional refrigerator has been to provide a separate compartment maintained at a subfreezing temperature by associating an evaporator element in heat transfer contact with the walls of the compartment. In more recent refrigerators provided with a freezer section, the ice body makers have been placed in the freezer section. However, in order to provide the relatively high freezing rate required, particularly where the ice body maker is adapted to produce a small number of ice bodies during each freezing cycle, it has been necessary to continue to provide an evaporator tube means in direct contact with the freezing mold. The requirement of the provision of such additional evaporator tube means raises the cost of the apparatus substantially.

Another problem encountered in the known ice body makers is the relatively complex and costly means provided therein for ejecting the ice bodies from the mold. Such ejecting means conventionally include either relatively costly motors which must be large enough to provide the relatively substantial forces necessary to break the ice bodies free from the mold walls or large, relatively expensive heaters which inherently cause meltage of the ice bodies and an increased freezing time.

The present invention comprehends a new and improved ice body maker effectively eliminating each of the above discussed problems. The principal feature of the present invention is, therefore, the provision of a new and improved ice body maker.

A further feature of the invention is the provision of such an ice body maker having improved simplified construction permitting the installation of the mold portion thereof in a freezer section of a refrigerator for forming ice bodies automatically without requiring auxiliary evaporator means in conductive association with the mold.

Another feature of the invention is the provision of such an ice body maker having new and improved ejecting means including means utilizing the forces of expansion of the ice body itself to free the ice body from the mold walls and means removing the freed ice body from the mold utilizing effectively minimized forces.

A further feature of the invention is the provision of such an ice body maker utilizing pressure forces of the water provided for forming the ice bodies therein to operate the ice body maker.

Still another feature of the invention is the provision of such an ice body maker having means thermally responsive to the freezing of the ice bodies in the mold to control the operation of the ice body maker by the water pressure forces.

Yet another feature of the invention is the provision of such an ice body maker having improved, simplified and economical construction obviating the need for relatively expensive and bulky power supply devices such as timer motors as provided in conventional ice body makers.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevation of an ice body maker embodying the invention, mounted in a portion of a refrigeration apparatus;

FIG. 2 is a rear elevation thereof;

FIG. 3 is a vertical section taken substantially along the line 3—3 of FIG. 1;

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FIG. 4 is an enlarged, broken horizontal section taken substantially along the line 4—4 of FIG. 1;

FIG. 5 is an enlarged vertical section taken substantially along the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary elevation illustrating the position of the control cam during the portion of the cycle of operation of the ice body maker in which the ice bodies are being frozen in the mold;

FIG. 7 is a view similar to that of FIG. 6 but with the cam rotated approximately 90°, illustrating its position at the time the mold is in a vertical, ice body releasing position;

FIG. 8 is a view generally similar to that of FIG. 6 but with the cam returned 45° from the position of FIG. 7, illustrating the position thereof at an intermediate point in the operation of the ice body maker; and

FIG. 9 is a view generally similar to that of FIG. 6 illustrating the position of the cam when the mold is returned to the horizontal position.

As best seen in FIG. 1 of the drawing, the ice body maker, generally designated 10, of the present invention comprises a unitary assembly adapted to be mounted in a refrigerator having a freezing section chamber 11 defined in part by a wall 12 having a louvered opening 13 through which freezing temperature air is delivered to chamber 11. The ice body maker assembly includes a mold 14 carried on the inner end 15 of a shaft 16 to be arranged in chamber 11 selectively in a horizontal disposition adjacent opening 13 wherein freezing temperature air delivered downwardly into chamber 11 from louvered opening 13 impinges directly on the top of the mold (as shown in full lines in FIG. 1), and in a vertical disposition (as shown in dotted lines in FIG. 1) wherein the ice body 17 may fall from the mold for collection in a suitable subjacent bin 18.

Ice body maker 10 is carried on the rear wall 19 of the refrigerator defined by a block 20 of foam insulation, a back mounting plate 21, and a front panel 22 confronting chamber 11. From mold 14, shaft 16 extends rearwardly through a bore 23 in wall 19 to terminate rearwardly of back mounting plate 21 in association with a control mechanism generally designated 24 carried on back mounting plate 21. Also secured to mounting plate 21 is a water valve assembly 25 for delivering water through a fill tube 26 and a dispenser tube 27 to mold 14.

More specifically, mold 14 is preferably formed of a thermal-insulating material, such as a molded plastic. The mold is preferably substantially square and is provided with four upwardly opening cavities 28 spaced apart by a relatively low dividing wall 29 whereby water delivered to the mold from dispenser tube 27 may spill between the four cavities to fill each to the same depth. Shaft end 15 is connected to the mold in a socket 30 provided in a solid mid-portion 31 thereof, the mold being secured to the shaft end by means of a spring retainer 32 for rotation with the shaft 16 about its longitudinal axis.

Referring now more specifically to FIG. 4, control mechanism 24 includes a bellows 33 having a housing 34 provided with a forward exteriorly threaded boss 35 secured to the rear end 36 of the shaft 16 in a complementary threaded recess 37 thereof. A capillary tube 38 extends from housing 34 axially through shaft 16 to terminate at its forward end 39 within mold 14 closely adjacent the recesses 28. The interior of the bellows housing 34 is divided into a forward chamber 40 and a rear chamber 41 by a diaphragm 42 extending thereacross. The pressure in chamber 40 varies with the temperature sensed by the capillary tube 39 to vary the force with which the diaphragm 42 is urged rearwardly (to the right as seen in FIG. 4).

Pressing against the rear face of diaphragm **42** is a button **44** carried on a round point Allen screw **45** threaded through a timer arm **46** and locked in place by a jam nut **47**. Timer arm **46** is pivotally mounted on a pair of ears **48** carried by a support **49** having a forward portion **50** and a rear portion **51**. Rear shaft end **36** passes through and is keyed to the upper end of forward support portion **50** to carry the bellows **33** and timer arm **46** rotatively therewith. Rear support portion **51** is provided with a hole **52** slidably receiving the rearward portion **53** of the button **44**. As shown in FIG. 1, the timer arm **46** is pivoted in a counterclockwise direction by a coil spring **54** extending between the timer arm and the rear support portion **51** below ears **48**. Thus, the button **44** is urged by spring **54** against diaphragm **42** to follow the diaphragm at all times.

Referring now to FIG. 2, the upper end **55** of the timer arm **46** defines a pair of vertically projecting fingers **56** and **57**. These fingers cooperate with a pair of lugs **58** and **59** respectively extending rearwardly from a valve mounting plate **60** secured to back mounting plate **21** by suitable means such as screws **61**. As shown in FIG. 1, lug **58** comprises an L-shaped member having its vertical leg **62** spaced substantially rearwardly of the valve mounting bracket. Depending on the position of the diaphragm **42**, the finger **56** is aligned with the lug portion **62** or disposed forwardly thereof selectively precluding and permitting rotation of the shaft **16**, as will be brought out more fully hereinafter.

The rotation of shaft **16** is effected by means of a long rod **64** pivotally connected at its upper end **65** to an arm **66** keyed to a mid-portion **67** of shaft **16** rearwardly of a dished portion **68** of back mounting plate **21**. The rod **64** is reciprocated longitudinally by a plunger **69** which is urged downwardly by water pressure within housing **70** of valve **25**. A lever **71** is pivotally connected at one end **72** to a bracket **73** carried by the valve housing and at the other end **74** to the lower end of rod **64**, plunger **69** urging arm **66** in a counterclockwise direction, as shown in FIG. 3. As arm **66** is keyed to shaft **16**, the shaft **16** is correspondingly rotated against the biasing action of a coil spring **74** having one end **75** fixed to back mounting plate **21** in dished portion **68**, and its opposite end **76** fixed to the arm **66**.

Arm **66** further includes an annular rearward projection **77** carrying a second coil spring **78** having one end **79** fixed to the arm **66** and an opposite end **80** bearing against a lug **81** on a cylindrical forward portion **82** of a cam generally designated **83** rotatably mounted coaxially on a cylindrical portion **84** of shaft **16** extending between portions **67** and **36** thereof. Projecting rearwardly from annular portion **77** of arm **66** is a lug **85** against which lug **81** is urged by the spring **78**.

Rearwardly of portion **82**, cam **83** is provided with a valve actuating portion **86** having diametrically opposed lobes **87** and **88** cooperating with a pair of levers **89** and **90** for actuating valve pins **91** and **92** respectively (FIGS. 6–9). The rear portion **93** of cam **83** is generally cylindrical except for a radial shoulder **94** in one portion of the periphery thereof.

Referring now to FIG. 4, a quick change lever **95** is pivotally mounted on a shoulder screw **96** secured to valve mounting bracket **60**. A coil spring **97** is mounted on the screw **96** between quick change lever **95** and bracket **60**, having one end **98** thereof fixed to the bracket **60** and the other end **99** thereof bearing against the quick change lever in a groove **100** in the top edge thereof. Thus, spring **97** biases the quick change lever end portion **101** against the cam portion **93**. The quick change lever **95** further includes a forwardly projecting flange **102** terminating adjacent the rear end of the long rod end portion **65** so that when the rod **64** is in its extreme downward position, end portion **65** strikes the flange **102** to rotate the quick change lever in a clockwise direction as seen in FIG. 2 about the screw **96** against the action of the spring **97**.

The operation of ice body maker **10** is as follows. Freezing temperature air is delivered from opening **13** to chamber **11** to impinge on the upper surface of the mold **14** and the water therein to cause the water to freeze downwardly from the top. As the mold **14** is formed of a material having low thermal conductivity, effectively uniform inward, herein downward, progressive freezing occurs. As the lowermost portion of the water in the mold cavities freezes, the expansion of this portion of the water causes the ice bodies **17** to move upwardly away from the walls of the mold and thereby automatically frees the ice bodies for subsequent removal from the mold. As the last portion of the water freezes, the temperature sensed by the capillary tube **38** decreases to the point where the reduced pressure within chamber portion **40** permits the spring **54** to pivot the lever arm **46** sufficiently in a counterclockwise direction as shown in FIG. 1 to dispose finger **56** forwardly of lug portion **62**, permitting spring **74** to rotate shaft **16** in a counterclockwise direction as seen in FIG. 2 thereby turning the mold from the horizontal position of FIG. 1 to the vertical position to drop the ice bodies **17** into the collecting bin **18**.

During this 90° rotation of the shaft **16**, the arm **66** is correspondingly rotated. This rotation is in turn imparted to cam **83** by the engagement of lug **85** of arm **66** with lug **81** of cam portion **82**. Thus, cam **86** is rotated from the position of FIG. 6 to the position of FIG. 7. As lobe **88** of the cam **86** moves away from lever **90** pin **92** is released to close the outlet to fill tube **26**. Slightly thereafter, the lobe **87** urges pin **91** inwardly to open the inlet of valve **25** connected to a suitable source of water under pressure (not shown) through an inlet line **105** thereby permitting delivery of water to the valve.

As the housing **70** of the valve fills with water, the rod **64** is urged downwardly by the plunger **69**, thereby reversely rotating the shaft **16** to redispose the mold **14** in the horizontal position of FIG. 1. Spring **78** maintains the cam lug **81** in engagement with the arm lug **85** during the initial portion of this reverse rotation. However, when the cam has been reversely rotated approximately 45° to the position of FIG. 8, portion **101** of the quick change lever engages shoulder **94** of the cam to preclude further reverse rotation thereof at this time. As the valve housing **70** continues to fill with water, the rod **64** continues to move downwardly and the arm **66** and shaft **16** continue to rotate back to the position of FIG. 1 thereby rewinding the spring **74** and thereby potentiating ice body maker **10** for subsequent operation. As the cam **83** is retained in the position of FIG. 8 at this time, the pin **91** is maintained depressed and the valve inlet is maintained open.

At the time that mold **14** reaches the horizontal position, finger **57** of timer arm **46** slides against and past the lug **59** to catch therebehind. Immediately subsequent to this operation, the end portion **65** of rod **64** engages the flange **102** of quick change lever **95** and pivots the quick change lever in a clockwise direction as seen in FIG. 2 to disengage the end **101** thereof from the cam shoulder **94**. As the cam is now released for rotation on shaft **16**, spring **78** quickly rotates the cam to re-engage lug **81** thereof with lug **85** of the arm **66** Thus, cam **83** is brought to the position of FIG. 9 wherein lobe **87** of the cam releases pin **91** to close the valve inlet and immediately thereafter lobe **88** of the cam depresses pin **92** to open the valve outlet to dispense the measured quantity of water in housing **70** through tubes **26** and **27** to mold **14** and initiate a subsequent freezing cycle.

As the water delivered to the mold is relatively warm, the diaphragm **42** is urged rearwardly, thereby pivoting timer arm **46** in a clockwise direction as seen in FIG. 1. This releases the finger **57** from engagement with lug **59** permitting the rewound spring **74** to cause a small amount

of movement of the shaft 16 in a counterclockwise direction as seen in FIG. 2. However, after only a few degrees of such rotation, finger 56 engages end portion 62 of lug 58 precluding further rotation of the shaft at this time.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An ice body maker comprising: a mold having an open portion; means for delivering a preselected volume of water to the mold; means for freezing the water in the mold progressively inwardly from said open portion whereby the expansion of the ice resulting from the freezing of the innermost portion of the water therein forces the resultant ice body loose in the mold; means for removing the loose ice body from the mold; means operated by pressure of the water to be delivered to the mold to store energy and thereby potentiate the removing means; and means operated by the freezing of the ice body in the mold to release the potentiated removing means and utilize the stored energy to eject the ice body from the mold, said last named means being arranged to release the removing means quickly thereby to impart a dislodging force to the ice body.

2. An ice body maker comprising: a mold formed of a thermal insulating material; means for delivering a preselected volume of water to the mold; means for freezing the water in the mold progressively inwardly whereby the expansion of the ice resulting from the freezing of the innermost portion of the water therein forces the resultant ice body loose in the mold; means for removing the loose ice body from the mold; means storing energy for potentiating the removing means; and means operated by the freezing of the ice body in the mold to release the potentiated removing means and utilize the stored energy to eject the ice body from the mold, said last named means being arranged to release the removing means quickly thereby to impart a dislodging force to the ice body.

3. An ice body maker comprising: a mold; means for delivering a preselected volume of water to the mold; means for directing a flow of freezing air against the upper surface of the water in the mold whereby the expansion of the ice resulting from the freezing of the lowermost portion of the water therein forces the resultant ice body loose in the mold; means for removing the loose ice body from the mold; means operated by pressure of the water to be delivered to the mold to store energy and thereby potentiate the removing means; and thermoresponsive means releasing the potentiated removing means and utilizing the stored energy to eject the ice body from the mold upon completion of the freezing of the ice body in the mold.

4. An ice body maker comprising: a mold; means for delivering a preselected volume of water to the mold; means for freezing the water in the mold progressively inwardly whereby the expansion of the ice resulting from the freezing of the innermost portion of the water therein forces the resultant ice body loose in the mold; means for quickly turning the mold to remove the loose ice body therefrom; means storing energy for potentiating the mold turning means; and thermoresponsive means releasing the potentiated mold-turning means and utilizing the stored energy to eject the ice body from the mold upon completion of the freezing of the ice body in the mold.

5. An ice body maker comprising: a mold; means for delivering a preselected volume of water to the mold; means for freezing the water in the mold progressively inwardly whereby the expansion of the ice resulting from the freezing of the innermost portion of the water therein forces the resultant ice body loose in the mold; ejecting means biased to eject the loose ice body from the mold; potentiating means operated by pressure of the water to be delivered to the mold to store biasing energy in said ejecting means; latch means retaining the potentiating means in the energy-storing condition; and thermoresponsive means releasing the latch means and thereby releasing the ejecting means to quickly eject the ice body from the mold upon completion of the freezing of the ice body in the mold.

6. An ice body maker comprising: means defining a chamber; a mold in said chamber; means moving a stream of freezing temperature air through said chamber substantially directly impinging on the top of the mold, said mold being formed of an insulating material and having an outwardly widening, outwardly opening cavity; and means selectively positioning the mold about a fixed axis to dispose said cavity opening to open upwardly to receive a body of water and for said impingement of the freezing temperature air against the top of the water to freeze the body of water in the mold progressively downwardly from the top whereby the freezing of the last portion of the water at the bottom of the mold causes an expansion of that portion breaking the entire resultant ice body free of the mold cavity wall, and to dispose the mold with the cavity opening downwardly to permit the freed ice body to fall from the mold for collection.

7. An ice body maker comprising: means defining a chamber; means moving a stream of freezing temperature air through said chamber; a mold formed of an insulating material and having a plurality of outwardly widening outwardly opening cavities; and control means including a horizontal shaft connected to said mold and rotatable about the longitudinal axis thereof for selectively positioning the mold with said cavities opening upwardly to receive water therein and for impingement of the freezing temperature air against the water in the center to freeze the bodies of water in the mold progressively downwardly from the top whereby the freezing of the last portion of the water at the bottom of each cavity causes an expansion of that portion breaking the entire resultant ice body free of the mold cavity wall, and inverting the mold with the cavities simultaneously opening at a substantial angle away from the upwardly opening position to permit the freed ice bodies to fall from the mold for collection.

8. An ice body maker comprising: a mold; means for delivering a preselected volume of water to the mold; means for freezing the water in the mold progressively downwardly whereby the expansion of the water resulting from the freezing of the lowermost portion of the water therein forces the resultant ice body loose in the mold; means for removing the loose ice body from the mold; means potentiating the removing means; and means utilizing heat energy of the water delivered to the mold for latching the potentiated removing means to preclude operation thereof until completion of the freezing of the ice body in the mold and quickly release the removing means upon said completion of the freezing of the ice body.

9. An ice body maker comprising: a mold; means adapted to be connected to a source of water under pressure for delivering a preselected volume of water to the mold; means for freezing the water in the mold; means for removing the ice body from the mold; means operated by the pressure of the water potentiating the removing means; and means utilizing heat energy of the water delivered to the mold for latching the potentiated removing means to preclude operation thereof until completion of the freezing of the ice body in the mold.

10. An ice body maker comprising: a mold formed of an insulating material and having a plurality of outwardly widening, normally upwardly opening cavities; means

for delivering a preselected volume of water to the mold cavities; means for directing a flow of freezing air substantially directly against the upper surface of the water in the mold cavities whereby the expansion of the ice resulting from the freezing of the lower-most portion of the water therein forces the resultant ice body loose in the mold; means for applying a force to the mold preselected to remove the loose ice body from the mold; means operated by pressure of the water to be delivered to the mold to store energy for turning the mold; and thermoresponsive means responsive to the completion of the freezing of the ice bodies in the mold to cause said force applying means to eject said ice body and to cause said water pressure means to store energy for subsequent turning of the mold.

11. An ice body maker comprising: a mold having a plurality of outwardly widening cavities normally disposed in a first upwardly opening position; means adapted to be connected to a source of water under pressure for delivering a preselected volume of water to the mold cavities; means for freezing the water in the mold cavities to form ice bodies therein; means for freeing the ice bodies from the mold cavities; and rotation means for rotating said mold from said first upwardly opening position to a second ice body dumping position and subsequently back to said first position, said rotation means including first potentiated means for rotating the mold to one of said first and second positions, second means for rotating the mold to the other of said first and second positions, said second means being operated by the pressure of the water to be delivered to the mold cavities, and said first means being potentiated by the rotation of the mold to said other of said first and second positions.

12. The ice body maker apparatus of claim 11 wherein said rotation means includes unlatching means for releasing said potentiated rotating means.

13. An ice body maker comprising: a mold having a plurality of outwardly widening cavities normally disposed in a first upwardly opening position; means adapted to be connected to a source of water under pressure for delivering a preselected volume of water to the mold cavities; means for freezing the water in the mold cavities to form ice bodies therein; means for freeing the ice bodies from the mold; rotation means for rotating said mold from said first upwardly opening position to a second ice body dumping position and subsequently back to said first position, said rotation means including first potentiated means for rotating the mold to one of said first and second positions, second means for rotating the mold to the other of said first and second positions, said second means being operated by the pressure of the water to be delivered to the mold cavities, and said first means being potentiated by the rotation of the mold to said other of said first and second positions; and thermo-responsive means responsive to the completion of the freezing of the ice bodies in the mold cavities to initiate operation of said rotation means for rotating said mold from said first position to said second position.

14. An ice body maker comprising; a mold having a plurality of outwardly widening cavities normally disposed in a first upward opening position; means adapted to be connected to a source of water under pressure for delivering a preselected volume of water to the mold cavities; means for freezing the water in the mold cavities to form ice bodies therein; means for freeing the ice bodies from the mold; means for rotating said mold from said first upwardly opening position to a second ice body dumping position and subsequently back to said first position, said rotation means including first potentiated means for rotating the mold to one of said first and second positions, second means for rotating the mold to the other of said first and second positions, said second means being operated by the pressure of the water to be delivered to the mold cavities, and said first means being potentiated by the rotation of the mold to the other of said first and

second positions; thermoresponsive means responsive to the completion of the freezing of the ice bodies in the mold cavities to initiate operation of one of said first and second means to rotate said mold from said first position to said second ice body dumping position; and means energized by the rotation of said mold to said second position to initiate operation of the other of said first and second means to rotate said mold back to said first position

15. An ice making apparatus comprising in combination, a chamber, a refrigerating system including means out of thermal conductive association with said chamber and discharging air chilled to a sub-water freezing temperature in a concentrated stream thereof into said chamber, a mold having an open top and walls forming sides and a rigid bottom of a compartment therein adapted to receive water to be frozen, means for supporting said mold in an upright position in the chamber out of thermal conductive contact with said system in the path of flow of said concentrated chilled air stream discharged into said chamber, the chilled air entering said chamber being directed over said mold into engagement with the surface of water in the open top compartment, said mold shielding and secluding walls of said compartment from said chilled air stream in a temperature environment within said chamber above the temperature of said discharged air whereby water in that part of the compartment bounded by said shielded secluded walls freezes from the top downwardly therein into an ice block, the final freezing of water in said compartment causing same to expand and react against the rigid bottom thereof for self-loosening the ice block therefrom and for substantially simultaneously therewith bodily shifting the block upwardly with respect thereto, said mold together with the loosened block of ice therein being movable into a position for ejecting said ice block from said compartment, and walls of the compartment of said mold being immovable relative to one another during freezing, loosening, shifting and ejection of said ice block.

16. An ice making apparatus comprising in combination, a chamber, a refrigerating system including means out of thermal conductive association with said chamber and discharging air chilled to a sub-water freezing temperature in a concentrated stream thereof into said chamber, a pan-like freezing device having a flat top wall and depressions therein forming side walls and a rigid bottom wall of compartments adapted to receive water to be frozen, means for supporting said device in an upright position in the chamber out of thermal conductive contact with said system in the path of flow of said concentrated chilled air stream discharged into said chamber, the chilled air entering said chamber being directed over said device into engagement with the surface of water in said compartments, said flat top wall of the pan-like freezing device shielding and secluding walls of said compartments therebelow from said chilled air stream in a temperature environment within said chamber above the temperature of said discharged air whereby water in that part of each compartment bounded by said shielded secluded walls freezes from the top downwardly therein into ice blocks, the final freezing of water in said compartments causing same to expand and react against the rigid bottom wall thereof for self-loosening each ice block therefrom and for substantially simultaneously therewith bodily shifting them upwardly with respect thereto, said freezing device together with the loosened blocks of ice therein being movable from said supporting means into a position for emptying all of the ice blocks out of said compartments, and the walls of said compartments of said device being immovable relative to one another during freezing, loosening, shifting and emptying of said ice blocks.

17. In the art of making and harvesting ice from a mold having an open top and walls providing a rigid bottom and sides of a compartment containing water dis-

posed within a chamber out of thermal conductive relationship with a refrigerating system associated with said chamber and out of thermal conductive contact therewith which comprises; supporting said mold in an upright position in said chamber, discharging air cooled to a sub-water freezing temperature in a concentrated chilled stream thereof into said chamber over said mold into engagement with the surface of water in said compartment, utilizing the mold to shield and seclude walls of said compartment therein from the concentrated chilled air stream in a temperature environment within said chamber above the temperature of air discharged over said mold for freezing the water progressively from top downwardly in the compartment into an ice block, employing final freezing of the water for causing its expansion and reaction against said rigid bottom of the compartment to self-loosen the ice block therefrom and to substantially simultaneously therewith bodily shift the block of ice upwardly with respect thereto, moving said mold together with the loosened ice block therein as a unit into a position for ejecting said ice block therefrom, and preventing relative movement of walls of the compartment of said device during freezing, loosening, shifting and ejection of said ice block.

18. In the art of making and harvesting ice from a pan-like freezing device having a flat top and depressions therein providing a rigid bottom and side walls of compartments containing water disposed within a chamber out of thermal conductive relationship with a refrigerating system associated with said chamber and out of thermal conductive contact therewith which comprises; supporting said device in the chamber with its flat top positioned above walls of said compartments, discharging air cooled to a sub-water freezing temperature in a concentrated chilled stream thereof into said chamber over said freezing device into engagement with the surface of water in said compartments, utilizing said flat top of the pan-like device to shield and seclude walls of said compartments therebelow from the concentrated chilled air stream in a temperature environment within said chamber above the temperature of air discharged over said device for freezing the water progressively from top downwardly in the compartments into ice blocks, employing final freezing of the water for causing its expansion and reaction against said rigid bottom of the compartments to self-loosen the ice blocks therefrom and to substantially simultaneously therewith bodily shift them upwardly with respect thereto, moving said freezing device together with the loosened blocks of ice therein as a unit into a position for ejecting said ice blocks therefrom, and preventing relative movement of walls of compartments of said device during freezing, loosening shifting and ejection of said ice blocks.

19. In combination, a refrigerator having a chamber therein, a refrigerating system including means out of thermal conductive association with said chamber and discharging air chilled to a sub-water freezing temperature in a concentrated stream thereof into said chamber, a unitary pan-like freezing device having a top wall and depressions therein forming side walls and a rigid bottom wall of a plurality of compartments adapted to receive water to be frozen, said pan-like freezing device being, after filling said compartments thereof with water, placeable in a stationary upright supported position within said chamber out of thermal conductive contact with said system in the path of flow of said concentrated air stream discharged into the chamber, the chilled air entering said chamber being directed over the top of said device into engagement with the surface of water in said compartments, said top wall of the pan-like freezing device shielding and secluding walls of said compartments therebelow from said chilled air stream in a temperature environment within said chamber above the temperature of said discharged air whereby water in that part of each compartment bounded by said shielded secluded walls freezes from top downwardly therein into ice blocks, the final freezing of water in said compartments causing same to expand and react against the rigid bottom wall thereof for self-loosening ice blocks therefrom and for substantially simultaneously therewith bodily shifting them upwardly with respect thereto while the freezing device is stationarily supported within said chamber, said freezing device together with the loosened blocks of ice therein being rotatable into an inverted position for emptying the ice blocks from said compartments, and the walls of said compartments of said device being immovable relative to one another during freezing, loosening, shifting and emptying of said ice blocks.

20. In combination, a refrigerator having a chamber therein, a refrigerating system including means out of thermal conductive association with said chamber and discharging air chilled to a sub-water freezing temperature in a concentrated stream thereof into said chamber to cool the main body portion thereof to a temperature below 32° F., a unitary pan-like freezing device having a top wall and depressions therein forming side walls and a rigid bottom wall of a plurality of compartments adapted to receive water to be frozen, said pan-like freezing device being, after filling said compartments thereof with water, placeable in a stationary upright supported position within said chamber out of thermal conductive contact with said system in the path of flow of said concentrated chilled air stream discharged into the chamber, the chilled air discharged into said chamber being directed over the top of said device into engagement with the surface of water in said compartments before entering said main body portion of the chamber, said top wall of the pan-like freezing device shielding and secluding walls of said compartments therebelow from said chilled air stream whereby water in that part of each compartment bounded by said shielded secluded walls freezes from top downwardly therein into ice blocks, the final freezing of water in said compartments causing same to expand and react against the rigid bottom wall thereof for self-loosening ice blocks therefrom and for substantially simultaneously therewith bodily shifting them upwardly with respect thereto while the freezing device is stationarily supported within said chamber, said freezing device together with the loosened blocks of ice therein being rotatable into an inverted position for emptying the ice blocks from said compartments, and the walls of said compartments of said device being immovable relative to one another during freezing, loosening, shifting and emptying of said ice blocks.

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