June 28, 1960 J. K. NELSON 2,942,435

ICE MAKER

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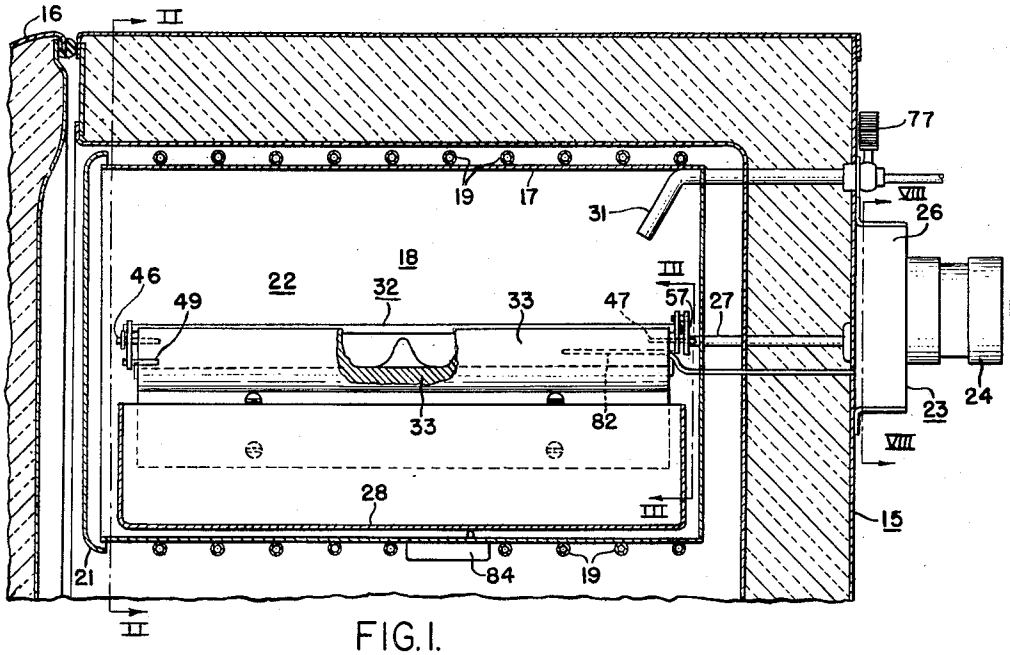

FIG. 1.

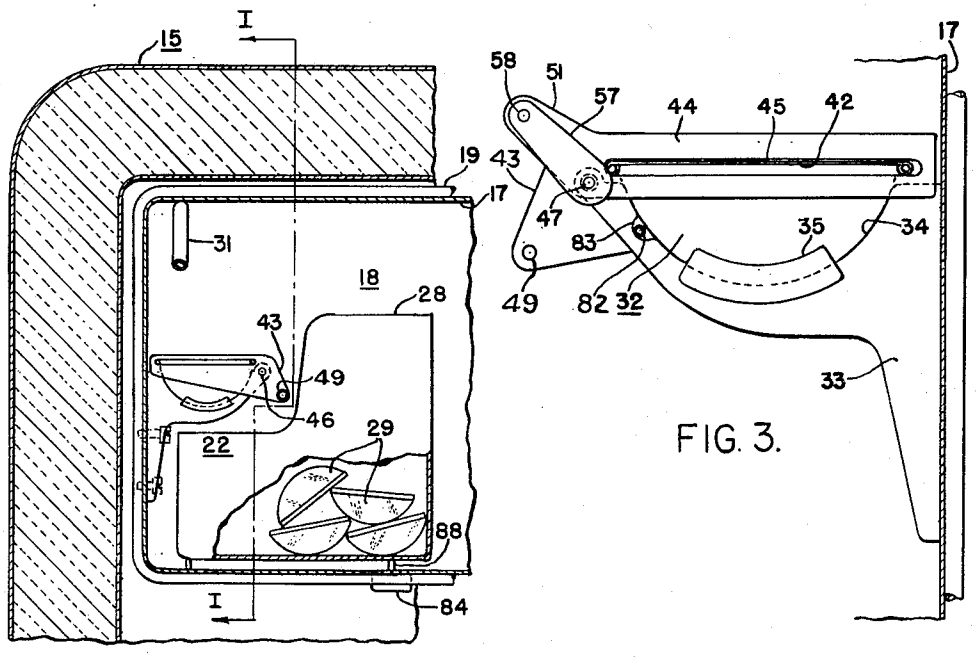

FIG. 2.

FIG. 3.

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FIG. 4.

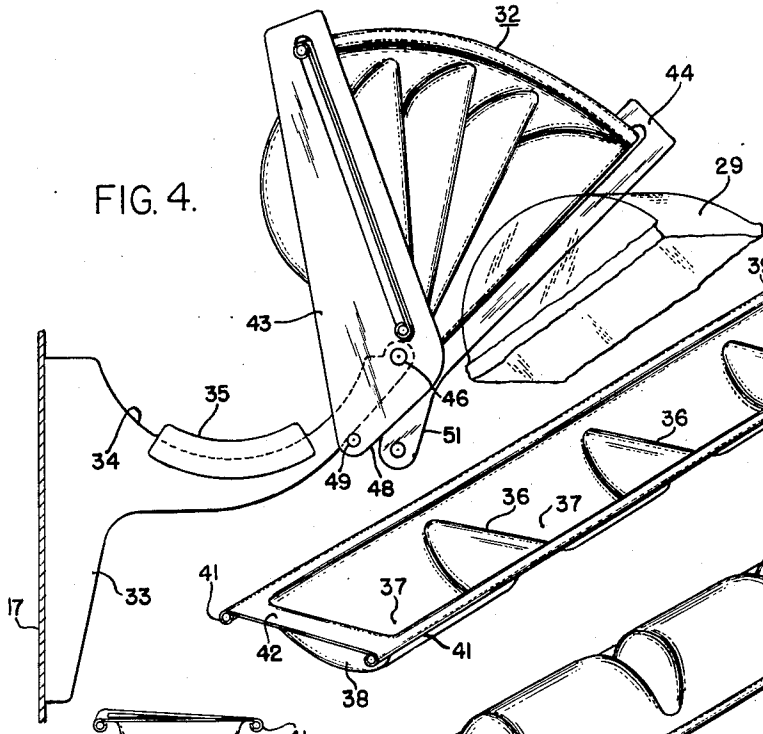

FIG. 5.

FIG. 6.

FIG. 7.

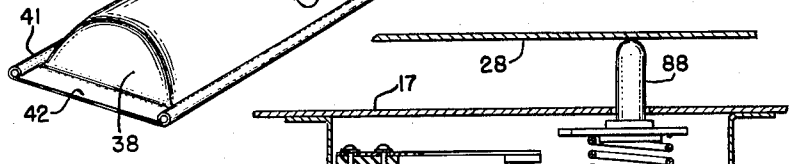

FIG. 13.

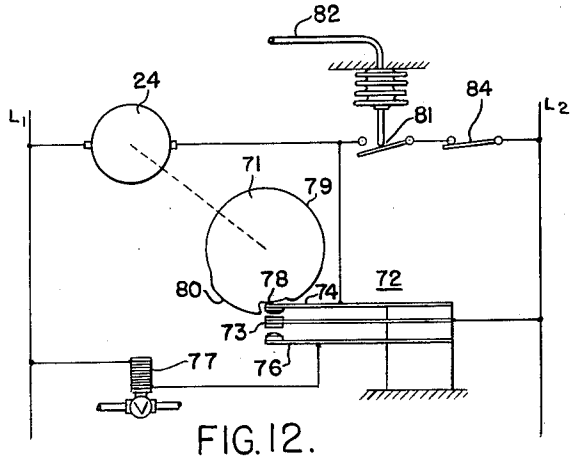

FIG. 12.

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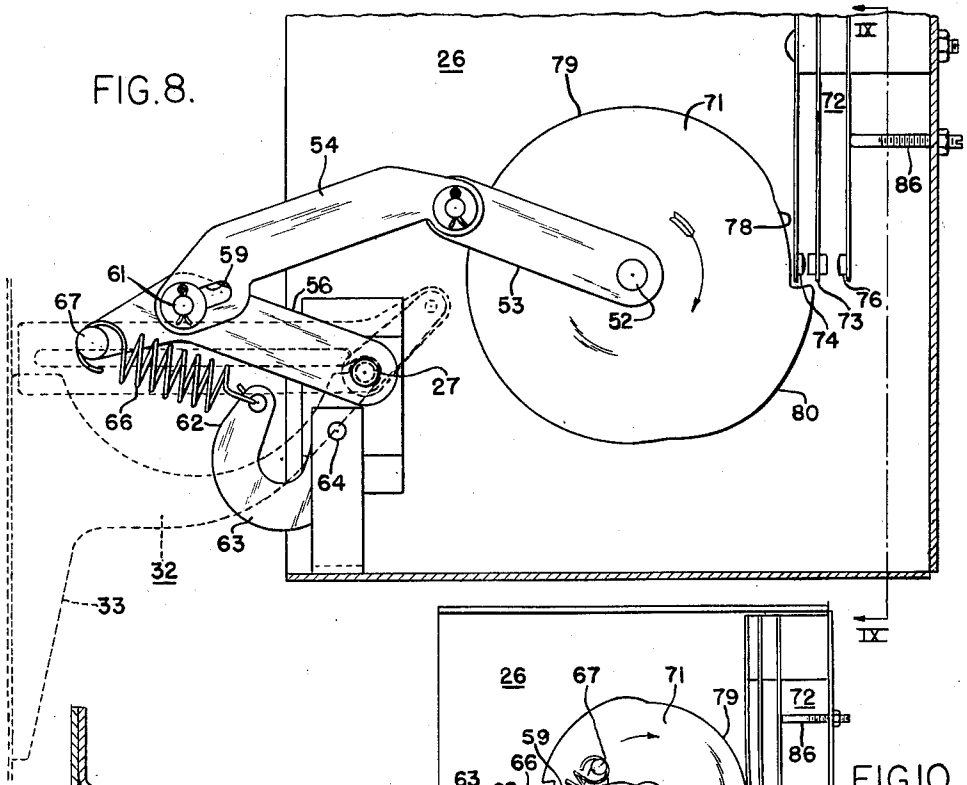
FIG. 8.



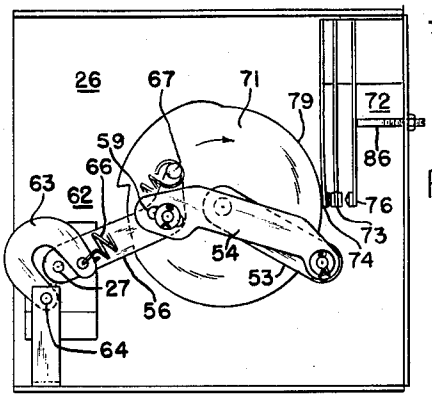


FIG. 10.

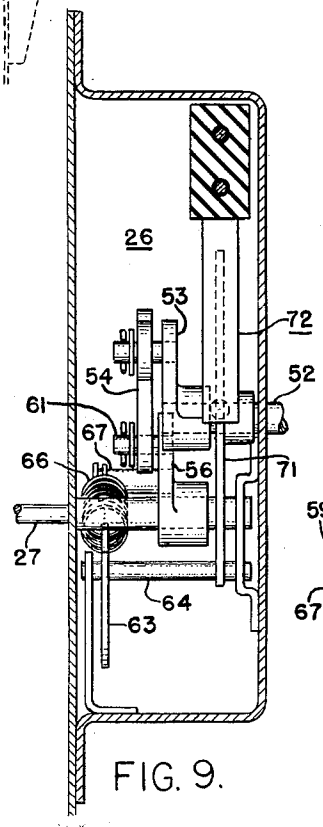


FIG. 9.

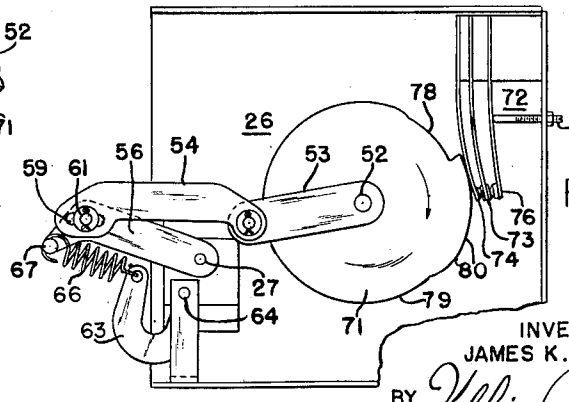


FIG. 11.

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United States Patent Office 2,942,435 Patented June 28, 1960

2,942,435

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Filed Feb. 20, 1956, Ser. No. 566,582

8 Claims. (Cl. 62—233)

This invention relates to refrigeration apparatus and more particularly to an automatic ice making machine of the type usable in domestic refrigerators.

This invention provides an improved mechanism for automatically freezing small blocks or pieces of ice of the size normally used to cool beverages and the like; for removing the ice from the mold in which it is formed; for storing the ice in a dry conveniently usable condition; and for replenishing the supply of ice in the storage receptacle when the supply is depleted through usage. The mechanism of the automatic ice maker of this invention includes means for admitting a controlled quantity of water to the freezing mold each time a new batch of ice is to be frozen.

In performing these functions, this improved ice maker employs a mold which is twisted to break the bond between the mold and the ice frozen therein. This feature of the invention enables ice to be ejected or removed from the mold without the necessity for applying heat to the mold to loosen the ice. The mechanism which applies twisting forces to the mold also lifts the mold from the refrigerated surface on which it rests during the period that ice is being frozen, and bodily tilts the mold in such a manner that the pieces of ice therein fall out of the tray by gravity when loosened therefrom. This feature of this improved ice maker eliminates the necessity for employing powered fingers or levers for pushing the pieces of ice out of the mold pockets, as has been found necessary in some prior ice makers.

The invention has as an object thereof the provision of an improved mechanism for effecting removal of ice from an ice mold in an automatic ice maker.

It is a further object of this invention to provide an improved method and mechanism for controlling the admission of water to the freezing mold of an automatic ice maker.

These and other objects are effected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a vertical section through a domestic refrigerator, showing the freezing compartment thereof as seen from one side and illustrating the ice maker of this invention positioned in the refrigerator;

Fig. 2 is a vertical section through the refrigerator of Fig. 1, taken along the line II—II of Fig. 1, and showing a front view of the automatic ice maker of this invention;

Fig. 3 is an enlarged rear view of the ice mold and associated structure of the ice maker of this invention. This view is taken as indicated by line III—III of Fig. 1;

Fig. 4 is an enlarged front view of the ice mold and associated structure illustrating the position of the ice mold as ice is ejected therefrom;

Fig. 5 is a perspective view from above, showing the ice mold of this invention;

Fig. 6 is a perspective view showing the underside of the ice mold;

Fig. 7 is a front end view of the ice mold;

Fig. 8 is an enlarged view of a portion of the power mechanism of the ice maker showing the position of certain elements of the power train when ice is being formed in the ice mold; the ice mold and its associated elements being shown in phantom;

Fig. 9 is a vertical sectional view of the power mechanism shown in Fig. 8, and is taken as indicated by the line IX—IX of Fig. 8;

Fig. 10 is another view of the power mechanism on a somewhat reduced scale and illustrating the position of the elements of the power train when the ice mold is moved to the position shown in Fig. 4 to eject ice therefrom;

Fig. 11 is a vertical view similar to Fig. 10 and showing the elements of the power train in a further position through which they pass during the period water is being admitted to the ice mold;

Fig. 12 is a wiring diagram for the ice maker showing some of the elements of the electrical circuit diagrammatically; and

Fig. 13 is a sectional view of the shut-off switch employed to deenergize the ice maker when the ice storage container is filled with ice.

General arrangement

The general arrangement of the ice maker of this invention is shown in Figs. 1 and 2 in which the numeral **15** indicates generally an insulated refrigerator cabinet having a door **16** closing the front thereof. Only the upper portion of the cabinet **15** is shown and, as in many conventional domestic refrigerators, this upper portion of the cabinet contains a cooling unit **17** defining a freezer chamber **18**. The cooling unit **17** is provided with conduits **19** through which refrigerant is circulated to maintain the temperature of the cooling unit **17** and the freezer space **18** therein at a temperature below the freezing point of water, and generally at about 0° F. This cooling unit **17** is open at its front side to permit access to the freezing compartment **18**, and a door **21** is provided for closing this access opening. Although not illustrated, the door **21** is mounted by means of suitable hinges which permit it to be swung aside for access to compartment **18**.

The automatic ice maker of this invention may be considered as having several major components. One component, the ice freezing and ejecting mechanism, is designated by the numeral **22** and, as shown in Figs. 1 and 2, is disposed directly within freezing compartment **18** and preferably attached directly to a refrigerated portion of the cooling unit **17**. The ice freezing and ejecting mechanism **22** is actuated by a power component **23** preferably mounted on the back wall of the refrigerator cabinet **15** outside the refrigerated space. This power component includes an electric motor **24** and a power train mechanism **26** for converting the rotary motion of the motor **24** to usable motions which are transmitted to the ice making and ejecting mechanism **22** by a shaft **27** passing through the rear wall of the cabinet **15** and the rear wall of the cooling unit **17**. Ice ejected from the mechanism **22** falls into an open top storage container **28** positioned beneath the mechanism **22** and supported on the bottom wall of the cooling unit **17**. This storage container **28** is readily movable to permit access to the ice pieces **29** stored therein.

The ice maker also includes a system for supplying water to the ice making mechanism **22**. A portion of this component is illustrated in Figs. 1 and 2 by the water filling tube **31** extending through the refrigerator cabinet wall to a region above the ice freezing mechanism **22**.

Ice freezing mechanism

Again referring to Figs. 1 and 2 and also Fig. 3, ice is formed by the ice freezing mechanism in a trough-like mold **32** supported by a bracket **33** mounted on a side wall of the cooling unit **17**. The supporting bracket **33** is constructed of a good heat conducting material, such as aluminum, and has generous wall thickness to provide a low resistance heat path between the mold **32** and the cooling unit **17**. The upper surface of the support bracket **33** has a semi-circular trough **34** formed therein which closely conforms to the convex, under surface of the mold **32** to insure a large area of contact and good heat transfer between the mold **32** and the bracket **33**.

The mold support **33** is maintained at a temperature below the freezing point of water by virtue of its being attached to the cooling unit **17** and, consequently, frost will form on the surfaces of the support **33** including its trough-like upper surface **34**. The frost on this surface **34** will be melted each time a fresh supply of water is added to the ice mold **32**, as the heat from this water warms the mold and portions of the support **33** in contact with the mold. It is desirable to retain at least some of the water formed from the melting of this frost on the support surface **34** in order that this water may refreeze and form a bond between the mold **32** and the support **33**. The presence of ice in this area improves the heat flow path between the mold and its support **33** which might otherwise be impaired by irregularities in the under surface of the mold **32** which prevent uniform contact between the bottom of the mold and its support. To insure that some water will always be retained on support **33**, the front and rear ends of the support are equipped with dam plates **35** which hold some water in the bottom of the support trough **34**.

The configuration of the mold **32** is best shown in Figs. 5, 6 and 7. This mold is preferably formed from a single thin sheet of highly resilient material such as beryllium copper. The mold **32** is dished into a trough-like shape of semi-circular cross section, and wedge-shaped partitions **36** are formed at intervals therein throughout its length to divide the mold into a series of ice pockets **37**. The side walls of the partitions **36** are joined at their upper edges by a smoothly curved junction spaced slightly below the peripheral edges of the mold. It is thus possible for water to flow from one pocket **37** to another without overflowing the mold. The end walls **38** of the mold **32** slope upwardly and outwardly toward the ends of the mold and together with the sloping walls of the wedge-shaped partitions **36** give the pockets **37** considerable taper or draft to enable the ice to be removed from the pockets **37** more easily. The mold is provided with a planar peripheral edge **39** and the metal sheet of the mold is rolled under along the sides of the mold, as at **41**, to stiffen the mold longitudinally. End extensions **42** of the mold sheet provide a convenient means for mounting and supporting the mold.

It will be noted from the illustrations of the ice mold **32** in Figs. 5, 6 and 7 that the mold is constructed with a permanent twist about its longitudinal axis. In other words, as viewed in Fig. 5, the left-hand rear corner of the mold **32** is displaced upwardly, angularly displacing the rear mold extension **42** with respect to the front mold extension **42**. Because the mold **32** is forced in contact with the support **33**, by forces applied to its rear extension **42** only, there would normally be little, if any, forces tending to hold the front end of the mold **32** in contact with the support **33**. To freeze water quickly in the mold **32**, it is essential that good contact be maintained between the mold **32** and the support **33** throughout the extent of the mold **32**. The permanent twist in mold **32**, in effect, causes the front end of the mold to engage the support **33** before the rear end of the mold comes in contact with the support. When the rear of the mold **32** is forced down against the support **33**, in a manner which will hereinafter be described, the mold will be stressed throughout its length, and the front end thereof will be forced into good thermal contact with the support **33**.

The mold **32** is carried by front and rear pivot plates designated, respectively **43** and **44**. The end extensions **42** of the mold **32** extend into slots **45** provided therefor in the plates **43** and **44**. These plates **43** and **44** support the mold **32** for swinging movement on the support bracket **33** about an axis parallel to and closely adjacent one longitudinal edge of the mold **32**. The pivot points for this swinging motion comprise pins **46** and **47** mounted in and extending from the ends of the support bracket **33**. The plates **43** and **44** are journalled, respectively, on pins **46** and **47** in a manner to permit the mold **32** to be moved up and away from the recessed upper surface **34** of the support bracket **33** as shown in Fig. 4. The front pivot plate **43** is provided with an extension **48** which carries a pin **49** disposed to engage a portion of the support bracket **33** when the mold **32** is moved up and away from the support bracket **33**. This pin **49** acts as a stop to limit rotational movement of the front end of mold **32** about pin **46**. No such stop is provided for the rear end of the mold **32**, and the rear end of the mold may, therefore, be rotated on its pivot pin **47** through a larger arc than the front end of the mold to twist the mold as illustrated in Fig. 4.

The rear pivot plate **44** is provided with a crank arm extension **51** through which power is transmitted to the plate **44** from the power mechanism **23** to move the mold **32**.

Power mechanism

As mentioned previously, the power mechanism consists, generally, of an electric motor **24** which is preferably equipped with suitable speed reduction gearing, and a power train **26** for converting the rotary motion of the motor **24** to the action required to move the ice mold **32** to eject ice therefrom. The power train **26** is shown most clearly in Figs. 8 and 9 in which the numeral **52** indicates the shaft extending from the speed reduction gearing of the motor **24**. Speed reduction gears suitable for this application are well known in the art and no detailed description thereof is deemed necessary here, the only requirement for this application being that the motor and speed reducer combination turn the shaft **52** slowly, say at one r.p.m., and with sufficient power to drive the ice mold **32** through its ice ejecting action as will hereinafter be explained. The shaft **52** has secured thereto a crank arm which, through a connecting link **54**, drives another crank arm **56** which moves with a reciprocating motion about the axis of the power transmitting shaft **27** to which it is attached. It can readily be seen that rotation of crank arm **53** through a full revolution will cause crank arm **56** to swing first to the right, as viewed in Fig. 8, then back to the position shown, with an arc of approximately 130°. This reciprocating movement of crank arm **56** is transmitted through shaft **27** to the ice mold **32**. Shaft **27** is equipped at its end with another smaller crank arm **57** which drives the crank extension **51** of the mold rear support plate **44** through a connecting pin **58**.

Shaft **27** is preferably made of a spring-like material and is of comparatively small diameter to permit the shaft to twist when a load is applied thereto. This stressing of the shaft **27** by twisting stores energy in the shaft which is released as the ice is broken loose from the mold **32**. The mold **32** offers considerable resistance against being twisted when ice is frozen solidly therein. Thus, when movement of the front end of the mold **32** is stopped by pin **49** engaging support **33**, movement of the rear end of the mold **32** tends to be arrested and shaft **27** is stressed and twisted. Continued operation of the power mechanism eventually builds by sufficient stress in shaft **27**

to overcome the resistance to twisting offered by the mold 32 and its frozen contents. As mold 32 is twisted and the ice therein is loosened, the mold becomes more flexible, i.e., more easily twisted, and the twisted shaft 27 unwinds rapidly.

The pivotal connection between link 54 and crank 56 of the power mechanism is so constructed as to permit movement of the link 54 under a set of conditions in which crank 56 must remain stationary. This connection, which is, in effect, a lost-motion connection, comprises an elongated slot 59 in the end of link 54 through which passes a pivot pin 61 which is attached to crank 56. In Fig. 8, the power train is shown in the position which the arms assume when the mold is at rest in its supporting bracket 33 and ice is being formed therein. When the motor 24 is energized, crank 53 is rotated in a clockwise direction, pulling link 54 until pin 61 reaches the left end of slot 59, at which point crank 56 is pulled to the right and is rotated in a clockwise direction. After the ice releasing operation and when the ice mold 32 has been returned to its position in contact with its support 33, the elements of the power train are in the position shown in Fig. 11 in which the crank 53 continues to rotate in a counterclockwise direction, carrying with it link 54. No motion is imparted to crank arm 56 nor to mold 32 because pin 61 slides loosely in slot 59 of crank 54. This lost motion between the shaft 52 carrying crank 53 and the ice mold 32 enables the drive motor 24 to rotate shaft 52 for a short period while the mold 32 remains at rest in an upright position on its supporting bracket 33. This timed rotative movement of shaft 52 is utilized in controlling the admission of water to the mold 32 in a manner as will hereinafter be described.

The power mechanism also includes a device for imparting a short jarring force to the ice mold 32 near the end of its twisting sequence to assist in ejecting the loosened ice from the mold 32. This device is shown in Figs. 8 through 11 and consists of an over-center mechanism 62 associated with crank arm 56. The over-center mechanism 62 includes a C-shaped link 63 pivotally mounted on a shaft 64 suitably carried in the power mechanism housing. The free end of link 63 is attached to a spring 66 which, in turn, is looped over a pin 67 projecting from the end of crank arm 56. The pivotal shaft 64 for link 63 is positioned within the power mechanism housing closely adjacent the shaft 27 which drives the ice mold 32, and in such a position that an imaginary line drawn between the center of shaft 64 and the center of pin 67 will swing across the axis of shaft 27 as crank arm 56 moves from the position shown in Fig. 8 to a position at the end of its range of movement, as illustrated in Fig. 10. This arrangement provides an over-center biasing action for the crank arm 56, whereby the spring 66 tends to move the arm 56 to the left or counterclockwise, as viewed in Fig. 8, when the pin 67 at one end of the spring 66 is to the left of the line drawn through the axes of shafts 64 and 27; and biases the crank 56 to the right or clockwise when the crank 56 has carried this pin 67 to the right of the line through shafts 64 and 27. In passing through the center position of this linkage, that is, when pin 67, shaft 27, and shaft 64 are in a straight line, a snapping motion is imparted to the crank arm 56 by virtue of the reversal of direction of the biasing force applied thereto by spring 66. As is best shown in Fig. 10, the elements of this over-center mechanism 62 are so arranged that this snapping motion occurs near the end of the movement of crank arm 56 which imparts the twisting motion to mold 32. The mold 32 is thereby jarred to assist in dislodging the ice pieces from the mold. This action is assisted by the lost motion connection 59—61 between the link 54 and crank arm 56, which permits a short, abrupt movement of crank arm 56 independent of the other elements of the power train.

It will also be noted that when the mold 32 is resting on its support bracket 33, that is, when elements of the power train mechanism 26 are in positions such as those shown in Figs. 8 and 11, the over-center mechanism 62 biases the mold 32 downwardly into close contact with the surface 34 of the mold support bracket 33, ensuring good heat conduction between the mold and its support.

Control

The electrical control circuit for the ice maker is shown in Fig. 12. In this circuit the ice maker drive motor is indicated by the numeral 24 and, as shown, is supplied with electrical power from two supply lines identified as L_1 and L_2. The motor 24, in addition to driving the ice making and ejecting mechanism described previously, also drives a switch actuating cam 71 shown mechanically connected to the motor 24 by a dotted line. This cam 71 is also shown in Figs. 8 through 11 illustrating the power train mechanism, which appear on Sheet 3 of the drawings. This cam 71 is carried by and rotates with the shaft 52 extending from the reduction gearing for motor 24 and is positioned to actuate a triple leaf control switch 72 also positioned within the power train housing. Referring again to Fig. 12, it will be noted that the switch 72 has its central electrical contact arm 73 electrically connected to supply line L_2. One outside contact arm 74 is insulated from arm 73 and is electrically connected to one side of drive motor 24; the other side of motor 24 being directly connected to supply line L_1. Another outside contact arm 76 of the switch 72 is also insulated from contact arm 73 but electrically connected to one side of the power windings for a solenoid operated valve 77. The other side of valve 77 is connected to supply line L_1.

The cam 71 is provided with three distinct peripheral sections arranged at different distances from its center. The numeral 78 designates the lowest peripheral section, that is, the section having the smallest radius. The numeral 79 designates the intermediate section, and the numeral 80 designates the highest section of the cam. The cam 71 is arranged with respect to the switch 72 in such a manner that with the lowest section 78 adjacent the ends of switch arms 73, 74 and 76, these arms are out of contact with one another and the electrical circuits through the switch 72 are interrupted. This is the position which the cam 71 assumes when the power train mechanism 26 and the ice mold 32 are in the position shown in Fig. 8, which occurs when the mold 32 is full of water and ice is being formed therein. During this phase of operation of the ice maker, drive motor 24 and solenoid valve 77 are deenergized.

The motor 24 is energized to cause the ice to be ejected from the mold 32 in response to freezing of the water in the mold 32, as sensed by a thermostatic control switch 81 having a temperature-sensitive bulb 82 disposed adjacent the ice mold 32. Fig. 3 of the drawings illustrate one such location for the temperature-sensitive bulb 82 in which the bulb rests in a recess 83 in the upper curved surface 34 of the mold supporting bracket 33. In this location the control bulb 82 senses the temperature of the mold 32 and is adapted to cause the switch 81 to close when the temperature of the mold 32 has been reduced to a point at which all of the water in the mold is frozen. For example, the thermostatic switch 81 may be set to close when the temperature of bulb 82 reaches 25° F. With the closing of switch 81, a circuit is established from supply line L_1, through a normally closed switch 84 the purpose of which will hereinafter be disclosed, switch 81, through motor 24 and then to line L_1. As the motor 24 rotates, it drives cam 71 in a clockwise direction, bringing its intermediate section 79 into contact with switch arm 74, moving this arm into contact with switch arm 73. This establishes a holding circuit for the drive motor 24 through switch arms 74 and 73 and shunts out thermostatic switch 81 and switch 84, rendering them ineffective to control further operation of the motor 24.

After ice has been ejected from the mold 32 and the mold has returned to its rest position on its support

bracket 33, the high section 80 of cam 71 is brought into contact with switch arm 74, moving arm 74 and arm 73 over until arm 73 contacts arm 76. This position of the switch elements is illustrated in Fig. 11, and, as can be seen from the control circuit shown in Fig. 12, the contacting of switch arms 73 and 76 establishes a circuit through the solenoid valve 77, opening the valve 77 to admit water through the supply pipe 31 into the ice mold 32. The solenoid valve 77 is so constructed as to permit a constant rate of flow therethrough. Thus, the quantity of water admitted to the mold 32 is governed by the length of time that solenoid valve 77 remains energized. A screw 86 is provided for varying the position of switch arm 72 to adjust the point at which solenoid valve 77 is energized and hence to change the period of energization of the valve. At the end of this predetermined period of energization of solenoid 77, the low section 78 of cam 71 moves next to the ends of switch arms 73, 74 and 76 which, owing to their own resiliency, spring back to the deenergized position shown in Figs. 8 and 12, terminating the ice ejecting and mold refilling operations.

Switch 84 in the electrical circuit for motor 24 is employed to terminate operation of the ice maker when the storage container 28 becomes filled with ice. The construction of switch 84 is illustrated in Fig. 13 and, as shown in Figs. 1 and 2, is adapted to be mounted on the cooling unit 17 in such a manner that an actuating plunger 88 thereof engages the bottom wall of the container 28 and partially supports the container. When storage container 28 is full of ice the combined weight of the container and the ice depresses plunger 88, opening switch 84 and breaking the circuit to the motor 24. As ice is taken from the storage container 28 and the weight of the container is reduced, switch 84 moves to its closed position to condition the motor circuit for energization.

Operation

Assume the ice mold 32 is filled with ice and the temperature of the mold has been reduced to a point at which the thermostatic switch 81 energizes the drive motor 24. Motor 24, acting through power train mechanism 26 and shaft 27, lifts mold 32 from its supporting bracket 33 and begins to tilt mold 32 about the pivot pins 46 and 47. During the initial stage of operation of motor 24, cam 71 actuates switch 72 to establish a holding circuit through the motor 24 to insure that the motor 24 will drive the ice maker through a complete ejecting and filling operation.

Motion of the forward end of mold 32 is stopped as the mold approaches a vertical position by pin 49 engaging the mold support 33. The rear end of the ice mold continues to move about its pivot pin 46, twisting the mold as shown in Fig. 4 to loosen and permit the ice to fall therefrom by gravity into the storage container 28. At this point, the power train mechanism 26 has assumed the positions shown in Fig. 10 and the over-center mechanism 62 has applied a jarring motion to the ice mold 32 to assist in the ejection of ice therefrom.

Mold 32 is thereafter returned to a seated position against its support bracket 33 as cam 71 actuates switch 72 to energize solenoid valve 77 to admit water to the mold 32 through the supply pipe 31. The admission of relatively warm water to the mold 32 raises the temperature of the mold and adjacent portions of its support 33 sufficiently to warm bulb 82 and cause thermostatic switch 81 to open prior to the time that switch 72 is opened. Continued operation of the motor 24 and rotation of the cam 71 eventually cause switch 72 to open, deenergizing all circuits in the ice maker.

The elements of the ice maker remain inactive as ice is formed in the mold 32 by virtue of its proximity to the freezing surface of cooling unit 17. Unless switch 84 has been opened by virtue of storage container 28 becoming full of ice, the next ice ejecting cycle will be commenced by the thermostatic switch 81 and the cycle repeated.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

1. In an ice maker, a refrigerated surface, a mold adapted to contain water to be frozen when said mold is in contact with said surface, means supporting said mold for movement toward and away from said surface, a motor rotatable in but one direction, means connecting said motor to said mold and for transmitting movement of said motor to said mold for causing said mold to move away from said surface, to discharge the frozen contents thereof, and to return to said surface, said connecting means including a lost-motion element permitting said motor to rotate in said one direction for a predetermined period without moving said mold when said mold is in contact with said refrigerated surface, means for admitting water at a constant rate to said mold, and means actuated by said motor when said mold is in contact with said refrigerated surface for first, energizing said water admitting means, and for thereafter deenergizing said water admitting means, whereby the period of energization of said water admitting means is determined by said motor.

2. In an ice maker, a refrigerated mold adapted to contain water to be frozen therein when said mold is in an upright position, power means for at least partially inverting said mold and for loosening the ice pieces formed therein, motion transmitting means connecting said power means to said mold, said motion transmitting means permitting limited independent movement of the mold with respect to the power means, a spring member, and an over-center connection between said spring member and said mold enabling said spring member to bias said mold to its upright position when the mold is near its upright position and toward an inverted position when the mold is near its partially inverted position, the construction and arrangement being such that said motion transmitting means permits said mold to undergo a rapid jarring movement as the mold is moved through the center position of said over-center connection.

3. In an ice maker, a flexible mold adapted to receive water to be frozen therein when said mold is in an upright position, means for refrigerating said mold, means pivotally and independently supporting opposite ends of said mold, power means adapted to rotate one end of said mold about is pivotal connection through an angle greater than 90° to partially invert said mold, stop means positioned in the path of movement of the other end of said mold to prevent said other end from rotating on its pivotal connection through an angle as great as that through which the said one end is rotated, whereby said mold is twisted throughout its length during the latter portion of the range of movement of said one end to break the bond between the ice and said mold, and a resilient power transmitting member connecting said power means to said one end of the mold, the construction and arrangement of said resilient member being such that the member yields within its elastic limit under the forces imposed thereon and required to twist said mold with ice frozen therein, whereby energy stored in said member during the initial twisting of said mold is released as the bond between the ice and said mold is broken.

4. In an ice maker, a refrigerated surface, mold means adapted to form a plurality of connected ice pieces, a power mechanism movable between first and second positions, and a resilient member connecting said power mechanism and said mold means, said power mechanism in its first position maintaining said mold means in a position in which the mold means is in heat exchange relation with said refrigerated surface, said power mech-

anism being adapted upon moving to its second position to move said mold means away from said refrigerated surface and to separate and release said ice pieces from said mold means, the construction and arrangement of said resilient member being such that the member yields within its elastic limit under forces imposed thereon by said power mechanism in moving from its first to its second position to separate said ice pieces from said mold means.

5. In an ice maker, a refrigerated surface, a flexible mold adapted to contain water to be frozen by the cooling effect of said refrigerated surface, means pivotally and independently supporting opposite ends of said mold and providing for movement of said mold about a horizontal axis from an upright position in which said mold is in contact with said refrigerated surface to a second position spaced from said refrigerated surface in which said mold is at least partially inverted, power means connected to one end of said mold and adapted to rotate said one end about its pivotal connection through an angle greater than 90°, and means for limiting movement of the other end of said mold, whereby a twist is imparted to said mold to loosen the ice therein when the mold is moved to its said second position, said mold when relaxed having a longitudinal twist therein for causing the said other end of the mold to be in intimate contact with said surface when the powered end thereof rests on said surface.

6. In an ice maker a refrigerated surface, a flexible mold adapted to contain water to be frozen therein when said mold is in contact with said surface, power means connected to but one end of said mold for moving said mold away from said surface, for loosening and discharging the frozen contents of the mold, and for returning the mold to said surface, means for limiting movement of the other end of said mold, whereby a twist is imparted to said mold to loosen the ice therein when said mold is moved away from said surface, spring means, and an over-center connection between said one end of the mold and said spring means for enabling the spring means to bias said mold toward said surface when said mold is near said surface and to bias said one end of the mold away from the surface when the contents thereof are being discharged, whereby said spring means assists said power means in twisting said mold.

7. In an ice maker, a refrigerated surface, mold means adapted to form a plurality of connected ice pieces, a powered mechanism connected to said mold means and movable between first and second positions, said powered mechanism in its first position maintaining said mold means in a position in which the mold means is in heat exchange relation with said refrigerated surface, said powered mechanism being adapted upon moving to its second position to move said mold means away from said refrigerated surface and to separate and release said ice pieces from said mold means, spring means and an over-center connection between said spring means and said powered mechanism enabling said spring means to bias said powered mechanism in one direction when said mechanism is in its first position, whereby said mold means is biased toward said refrigerated surface to insure good thermal exchange therebetween, and to bias said powered mechanism in the opposite direction when said powered mechanism is in its second position, whereby said spring means assists said powered mechanism in separating and releasing said ice pieces.

8. In an ice maker, a refrigerated surface, mold means adapted to form a plurality of connected ice pieces, said mold means being movable toward and away from said refrigerated surface, power means for moving said mold means away from said refrigerated surface and for separating and releasing said ice pieces from said mold means, motion transmitting means connecting said power means to said mold means, said motion transmitting means permitting limited independent movement of the mold means with respect to the power means, a spring member, and an over-center connection between said spring member and said mold means enabling said spring member to bias said mold means toward said refrigerated surface when said mold means is near said surface, and to bias said mold means in the opposite direction when the mold means is moved away from said surface, the construction and arrangement being such that said motion transmitting means permits said mold means to undergo a rapid jarring movement as the mold is moved through the center position of said over-center connection.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,942,435

June 28, 1960

James K. Nelson

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 75, for "builds by" read -- builds up --; column 8, line 51, for "about is" read -- about its --.

Signed and sealed this 31st day of January 1961.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents