Aug. 11, 1953 H. V. HEUSER ET AL 2,648,203

MACHINE FOR PRODUCING ICE CUBES AND CRUSHED ICE

Filed Aug. 3, 1950 3 Sheets-Sheet 1

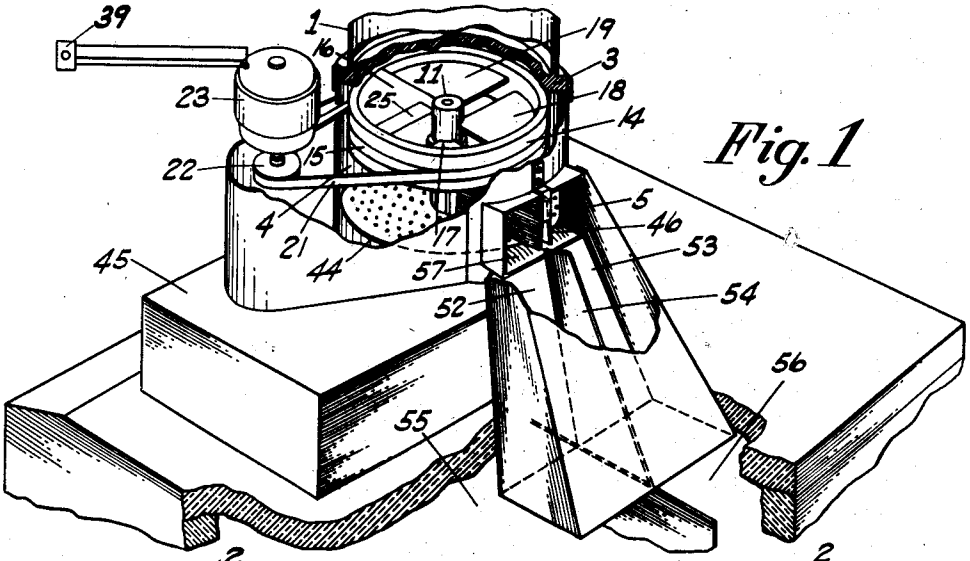


Fig. 1

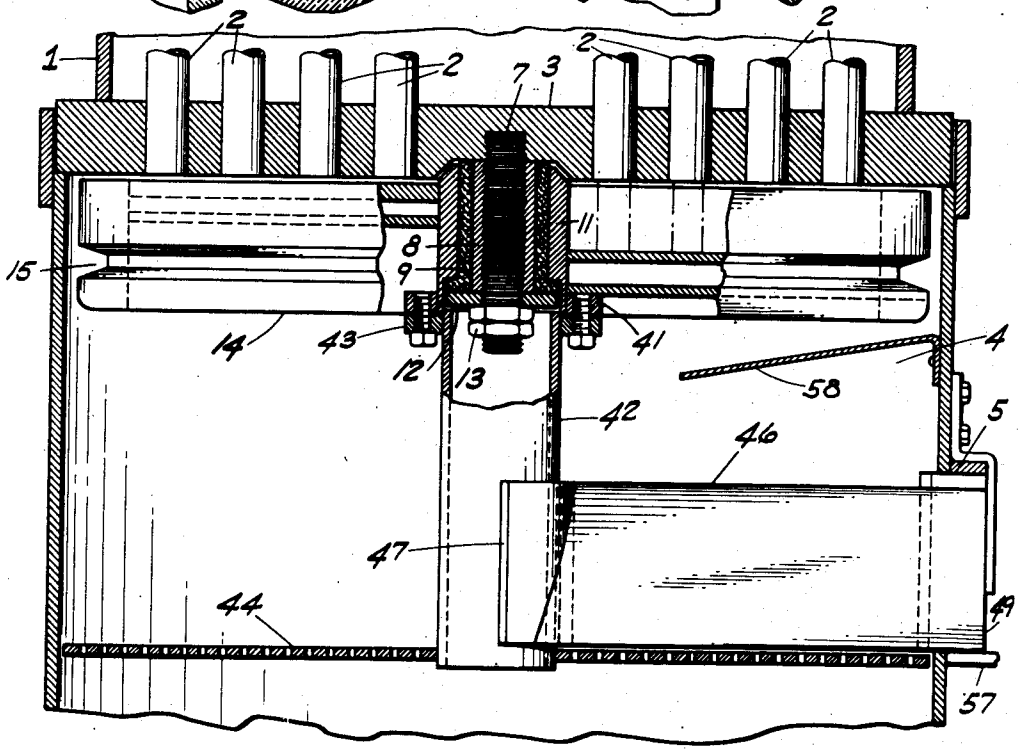


Fig. 2

Inventors
HENRY V. HEUSER & WILLIAM H. FITZNER
By Arthur H. Robert
Attorney

Aug. 11, 1953 H. V. HEUSER ET AL 2,648,203

MACHINE FOR PRODUCING ICE CUBES AND CRUSHED ICE

Filed Aug. 3, 1950 3 Sheets-Sheet 2

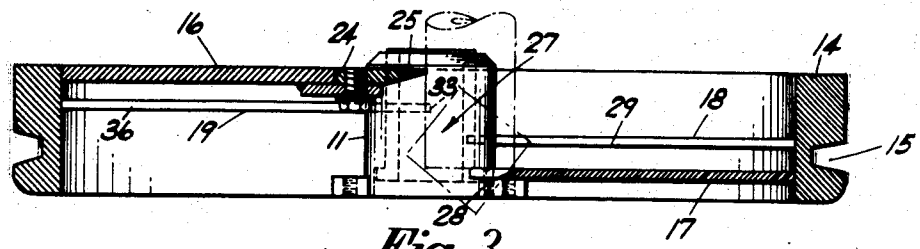


Fig. 3

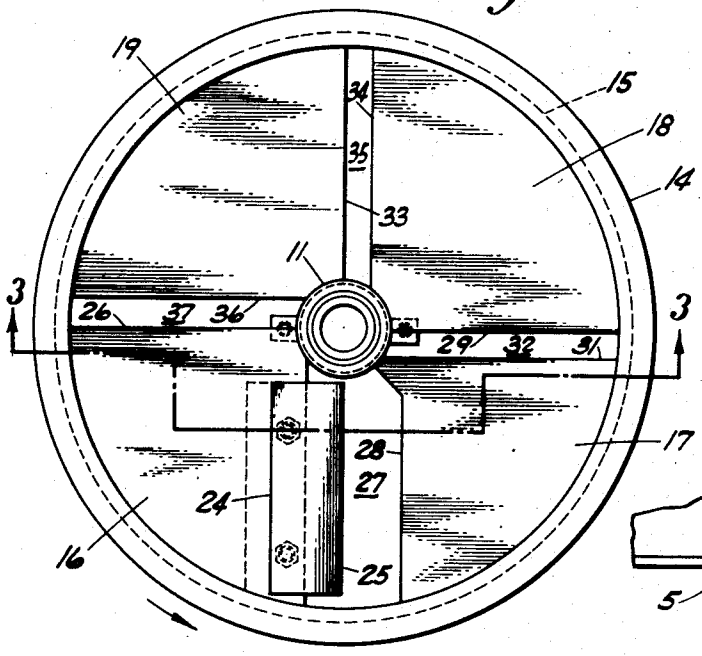


Fig. 4

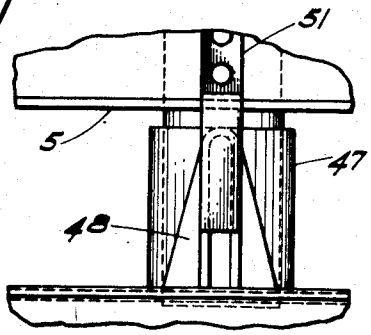


Fig. 5

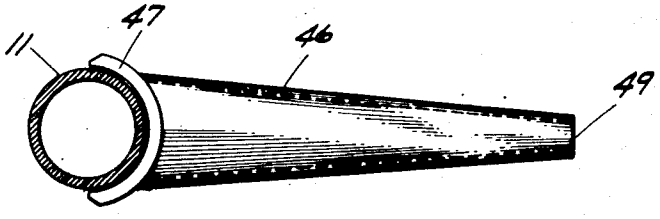


Fig. 6

Inventors

HENRY V. HEUSER & WILLIAM H. FITZNER

By Arthur R Robert

Attorney

Aug. 11, 1953 H. V. HEUSER ET AL 2,648,203

MACHINE FOR PRODUCING ICE CUBES AND CRUSHED ICE

Filed Aug. 3, 1950 3 Sheets-Sheet 3

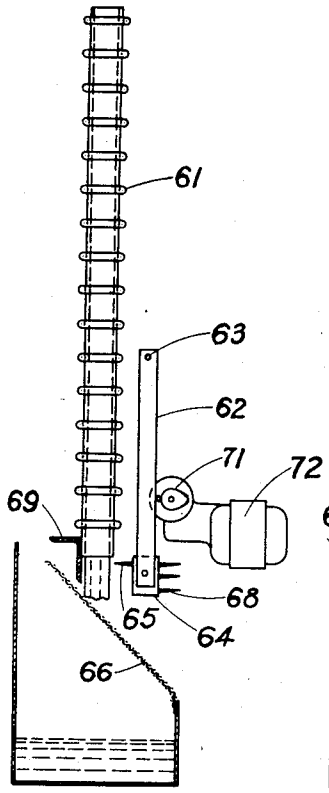


Fig. 7

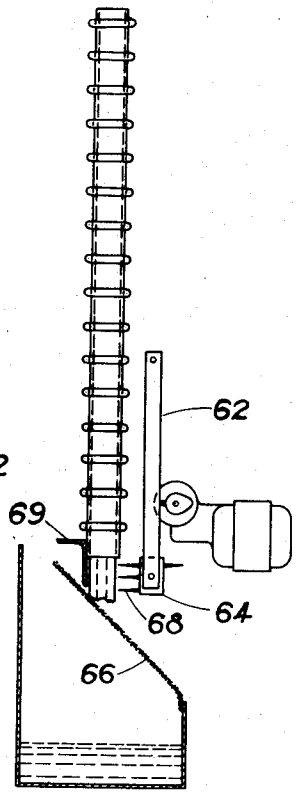


Fig. 8

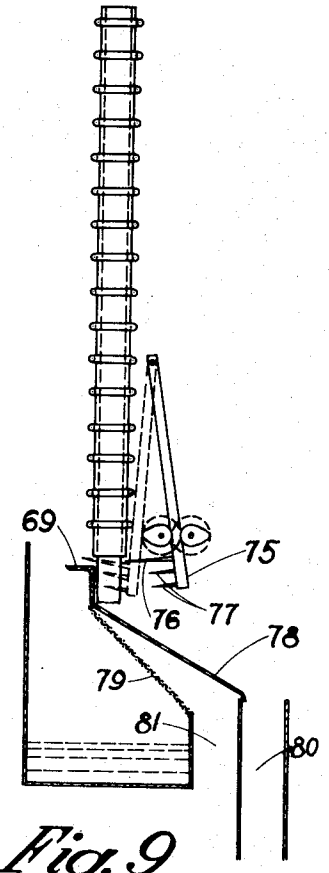


Fig. 9

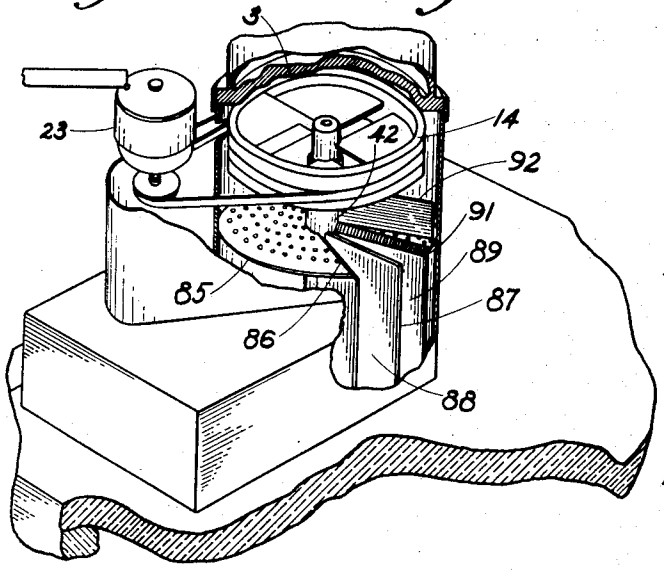


Fig. 10

INVENTORS
HENRY V. HEUSER &
WILLIAM H. FITZNER
BY Arthur J. Robert
ATTORNEY

Patented Aug. 11, 1953

2,648,203

UNITED STATES PATENT OFFICE

2,648,203

MACHINE FOR PRODUCING ICE CUBES AND CRUSHED ICE

Henry V. Heuser and William H. Fitzner, Louisville, Ky., assignors to Henry Vogt Machine Company, Louisville, Ky., a corporation of Kentucky

Application August 3, 1950, Serial No. 177,388

17 Claims. (Cl. 62—106)

1

Ice is used in beverages usually either in the form of crushed ice of irregular size, or in the form of more or less uniform cubes or short cylindrical rods. In one form of ice-making machine commercially available, and in use to a considerable extent by large hotels, restaurants and similar institutions, water is frozen in tubes in the form of long hollow ice rods which may be circular or square in cross-section; and when the rods are thawed loose they drop to a cutting mechanism which severs the projecting rod portions into substantially uniform short lengths. These lengths will be in the form of short cylindrical or square rods, depending on the shape of the tubes, and are commonly called ice cubes, regardless of whether the cross-section is square or circular. These cubes are stored in a bin from which they are withdrawn as needed. If it is desired to produce crushed ice, it is necessary to pass the ice rods or the cubes through a crusher. This requires additional equipment and furthermore involves the problem of storing both crushed and cube ice in such manner that the two sizes or grades are not commingled.

An apparatus is disclosed in the Kubaugh Patent No. 2,453,140, issued November 9, 1948, for selectively producing crushed or cubed ice, in which a dual-edge severing device having a blunt and a sharp edge is manually positioned to produce crushed or cube ice. A disadvantage of this device is that as the severing device is located where it is not easily accessible, it entails some inconvenience and a considerable amount of time to change the severing device from a cutter to a crusher or vice versa. Another disadvantage is that commingling of ice cubes and crushed ice is not positively or automatically prevented. Also in rod ice machines of this type it is desirable to maintain the thawing time as small as possible so as to obtain the maximum ice-making capacity of the machine. Upon thawing, the ice rods are discharged from the freezer tubes only as fast as the ends are severed. A further disadvantage of the type of dual-edge severing device of said Kubaugh patent is that when the machine is changed from producing cube ice to producing crushed ice, the crusher severs a smaller length of ice from the end of the rod on each revolution, so it is necessary to operate the severing device at greater speed when operating as a crusher, in order to complete the discharge of ice from the tubes in the same time allowed for discharge when cube ice is made. While the timing of the machine can be changed to provide a longer thawing period, this would reduce the

2

capacity of the machine in two ways: by shortening the total daily freezing time of the machine, and by producing excessive melting of the ice. The operation of the severing device at a greater speed when acting as a crusher requires a complicated drive which is difficult to install in the small space available, is expensive to manufacture, complicates the control apparatus, and requires manual attendance.

It is an object of the present invention to provide an ice-making machine requiring no manual mechanical adjustment, in which the ice can be delivered in the form of cubes or crushed ice as desired.

Another object is the provision of a combined cutter and crusher capable of crushing the ice rods in the same time required for cutting the rods, and which operates at the same speed whether operated as a cutter or crusher.

A further object is the provision of a convertible ice-making machine having a severing device arranged for reversible operation, which selectively severs the ends of the ice rods to produce cubes or crushed ice, depending on the direction of rotation of the severing device.

Another object is the provision of a convertible ice-making machine which selectively produces ice cubes or fragmented ice and grades and separately stores these two forms of ice for use as required.

A further object is the provision of an ice-making machine having in combination a reversible combined crusher and cutter with an automatic grader so that operation in one direction produces cubes which are directed to an ice cube storage bin, and reverse operation produces crushed ice which is automatically directed to a separate crushed ice storage bin.

A further object is to provide an ice-making machine with an ice discharge mechanism requiring less head space than those heretofore employed.

In accordance with one feature of the present invention, an ice rod-making machine incorporates a severing device which provides a relatively sharp or cutting edge and also a plurality of fragmentizing members at different levels, which selectively act on the protruding rod ends to produce ice cubes or crushed ice as desired. Upon engagement of the fragmentizing members with the protruding ends of the ice rods a length of ice is removed in fragments equal to the length removed by the cutting operation, so that the crushing can be accomplished in the same time as the cutting operation.

A number of arrangements may be provided, depending on the structure of the ice-making machine, for mounting the cutting or fragmentizing members for selective operation. Where the tubes are arranged in a row or rows, a reciprocating or oscillating severing device is preferred. The severing head provided in such device may be reversible, with one face or end carrying a sharp-edge blade, prong, or tooth, and the opposite face carrying fragmentizing members, in the form of teeth or blades, at different levels. The reversing of the head may be accomplished by shifting the oscillation of the device to the opposite side of the neutral axis, or by reversing the head on its mounting, thereby bringing into operation, as desired, the cutting edge or the fragmentizing members. Or the head may carry a protruding tooth or blade and fragmentizing members in the form of a plurality of relatively retracted teeth or blades at a lower level, so that by adjusting the length of stroke of the device the protruding tooth, or all the teeth, will engage the ice rod to produce cube ice or crushed ice, as desired. In such arrangement any suitable common gauge may be provided to limit the protrusion of the ice rods from the tubes, and thus determine the length to be cut off.

Where the tubes are arranged in a circular pattern preferably a rotary severing device is employed with a cutting edge, and on which device the fragmentizing members may be in the form of plates arranged in stepped relation at different levels and in opposed direction to the cutting edge. An edge of the lowermost plate lies adjacent and below the cutting edge so that when the severing device is rotated in one direction with the cutter as the advance edge, this plate acts as a gauge for the cutter to hold the ice rods protruding from the freezer until the ends are severed, and the severed short lengths or cubes fall through the space between the plate edge and cutter. When operated in the other direction to engage the leading edges of the stepped plates against the protruding ends of the ice rods as the rods drop from the freezer, the ends are reduced to irregular fragments or crushed ice, and the fragments fall through the spaces between the plates. Thus the feed of the ice rods is automatically gauged in either direction of rotation by the plates, and the crushing operation can be performed in the same time required for the cubing operation, because the fragmentizing members operate at each revolution on the same protruding length of rod as the cutter. Or, a helical plate may be provided having a cutter at its upper edge with fragmentizing edges struck up from the helical surface and directed in opposition to the cutter, the lower edge of the helical plate terminating adjacent the cutting edge to act as a gauge. In this modification when operating as a cutter, because the fragmentizing edges are disposed opposite to the cutter they slide under the ice rods without breaking the rods. Upon rotation in the opposite direction the fragmentizing edges crush the rod ends which fall through the spaces under the struck-up fragmentizing edges. The change in operation from cutting to crushing, or vice versa, can be accomplished merely by changing the direction of rotation of the severing device, by means of a reversible motor and reversing switch, a reversible gearing, or the like.

The invention will be explained in greater detail in the following description taken in connection with the accompanying drawing showing

preferred embodiments of the invention by way of example, and wherein:

Figure 1 is a perspective view, partly in section, of a portion of an ice-making machine incorporating the invention;

Figure 2 is a vertical diametrical sectional view of part of Figure 1 with parts in elevation;

Figure 3 is a section taken on line 3—3 of Figure 4;

Figure 4 is a plan view of Figure 3;

Figure 5 is an end view of Figure 2 as seen from the right;

Figure 6 is a plan view of the deflector;

Figures 7 and 8 show modifications of the invention applied to an oscillating cutter;

Figure 9 shows a further modification applied to an oscillating cutter; and

Figure 10 is a view similar to Figure 1 showing a modified grader.

Referring to the drawing, Figures 1 and 2, the outer jacket 1 of a freezer or evaporator has tubes 2 extending through a bottom plate or tube head 3. The upper end of the freezer may be similarly constructed, and as the freezer and water supply are of conventional construction they are not further illustrated. In the freezing phase of operation a liquid refrigerant is supplied to the jacket surrounding tubes 2 and water flows down the inside walls of tubes 2 and freezes thereon, excess water being discharged at the bottoms of the tubes. In the thawing phase of operation, the refrigerant surrounding tubes 2 may be displaced or heated to thaw loose the ice rods in the tubes, and allows them to drop to a severing mechanism, which severs the ends of the rods as they project from the tubes. The severing mechanism is enclosed in a chamber 4 below the ends of the tubes and this chamber has a side opening 5 adjacent the bottom for discharge of ice therefrom.

Referring to Figure 2, the bottom plate or tube head 3 of the freezer or evaporator is centrally bored and threaded to receive a threaded stud 7 upon which is located a bearing sleeve 8. Surrounding this sleeve is a flanged bushing 9 of anti-friction material, of somewhat shorter length than the sleeve, pressed into the hub 11; and the sleeve 8 is clamped against the bottom plate of the freezer by a washer 12 and locking nuts 13. The washer 12 thus retains the bushing 9 and hub 11 against removal and allows the bushing and hub to rotate freely on the sleeve. An annular rim 14 having a V-groove 15 in its periphery is secured to the central hub 11 by a plurality of plates indicated by the numerals 16, 17, 18, and 19 which may be welded to the hub and rim, or are secured in place in any other desired manner. If desired, these plates may be perforate to allow water to pass therethrough. The rim, plates and hub thus are suspended from above and are rotated by a V-belt 21 passing around the rim in the groove and around a V-groove pulley 22 driven by the reversible motor 23. This simplifies the mounting and drive of the severing device. Suitable reduction gearing may be provided between the motor and the pulley 22 in order to obtain the desired angular speed of the rim 14. As shown digrammatically in Figure 1, the motor 23 may be operated in the desired direction by means of a reversing switch 39, which may be of the double pole double throw type.

The uppermost plate 16 may be substantially flush with upper edge of the rim 14, and its forward or leading edge (when rotating in the direction of the arrow in Figure 4) is recessed at 24 to receive a relatively sharp-edge blade 25,

and its rear or opposite edge 26 is relatively blunt. The lowermost plate 17 has its rear edge 28 sufficiently close to blade 25 in vertical projection so that the plate acts as a gauge to support the ice rod while it is severed by the blade 25, as shown in dot-and-dash lines in Figure 3, and the severed length then can fall obliquely through this space between blade 25 and edge 28. Plate 18 lies in a plane above plate 17 and below plate 16, with its rear edge 29 horizontally spaced from forward edge 31 of plate 17 to provide a space 32. Similarly, plate 19 lies in a plane above plate 18 and below plate 16 with its rear edge 33 horizontally spaced from forward edge 34 of plate 18 to provide a space 35, and the front edge 36 is horizontally spaced from the rear edge 26 of plate 16 to provide a space 37. The stepped plates allow the ice rods to be lowered in steps when the severing device rotates in forward or cutting direction, till they reach the plate 17, where they are severed by blade 25.

When operated to produce crushed or fragmented ice the direction of rotation of the severing device is reversed. It is to be understood that when fragmented ice is desired, the freezer may be operated on a shorter freezing cycle so as to produce thinner-walled hollow ice rods which are more easily fragmented or broken. Plate 19 acts as a gauge for edge 26; plate 18 acts as a gauge for edge 33; and plate 17 acts as a gauge for edge 29. Edge 28 is inoperative in this direction of rotation because the ice rods cannot fall into its path of movement. The spaces between pairs of plates 16, 19; 19, 18; and 18, 17 are such that only small fragments of ice can fall through, so that the larger fragments remain on the respective plates and are impacted against the projecting ends of the ice rods extending from the tubes, and the resulting grinding action reduces the size of the fragments so they can fall through the spaces 37, 35 and 32 to produce crushed or fragmented ice of the desired maximum size. The provision of the plural crushing edges 29, 33 and 26 in the space between gauge plate 17 and blade 25 insures that at each revolution of the severing device the same length of ice rod is fragmented as is cut off by the blade 25 when the severing device is rotated in the opposite direction. For this reason the crusher will allow the rods to be discharged from the freezer in the same length of time required in the cubing operation.

The hub 11 of the cutter (Figure 2) has a flange 41 welded thereto, and a tubular extension 42 having an upper flange 43 is secured thereto. The extension carries a retaining plate 44 at its lower end, which may be perforate to allow water to pass therethrough back to the water supply tank 45. A deflector member, indicated generally by the numeral 46, comprises a semi-circular bearing portion 47 secured to a blade 48. The preferred form of blade illustrated is made of sheet metal and tapers from its maximum width adjacent the bearing to its minimum width at its end 49 adjacent the discharge opening 5, and also tapers from its minimum width at the top to its greatest width at the bottom. However, a flat blade may be employed, if desired. This deflector is arranged adjacent the middle of the discharge opening 5 in the housing and may be secured to the housing at its outer end by a strap 51 welded thereto; and is suitably relieved at the bottom so that a space is provided between its bottom and the plate 44 to eliminate wear and noise. The discharge opening 5 connects with chutes 52, 53 which are divided by a suitable partition 54, and the chutes lead to separate insulated bins 55, 56 for storage of ice. Bin 55 may hold cube ice, while bin 56 holds crushed ice. A grille 57 may be interposed adjacent the discharge opening 5 to allow water and undersized particles to pass therethrough into the water tank 45. If desired, a deflector plate 58 may be provided between the opening 5 and the severing device. This deflector directs water and ice away from the opening to prevent entrance of water into the storage bin.

The operation of the apparatus now will be described. At the end of the freezing cycle the freezer tubes are heated in known manner and release the ice rods, which fall through the lower ends of the tubes and rest upon the plates 16, 17, 18 and 19. Assuming rotation in the direction of the arrow shown in Figure 4, those ice rods which rest upon plate 17, which acts as a gauge, will be engaged by the cutter blade 25 and will be severed by cutting, shearing or breaking action. At the severing member rotates, the rods resting upon plate 18 will drop down onto plate 17, and will be cut or broken off by the cutter blade 25 as it is brought against them. As the cutter rotates the blade successively engages the rod ends which successively rest upon the plate 17 so that the action of the cutter is to form short lengths or cubes of ice rod, the lengths being predetermined by the distance of the plate 17 from the blade 25. The ice sections which are broken off drop obliquely through the opening 27 between the blade 25 and the rear edge 28 of plate 17 onto retaining plate 44. As plate 44 rotates with the cutter the cubes are carried around with the plate against deflector member 46 and are pushed laterally thereby out of the lateral opening 5 into the chute 52 and thence into storage bin 55. Grille 57 allows undersize ice fragments to drop through into water tank 45 and also allows excess water to drain off of the ice into the tank.

When it is desired to employ the refrigerating machine for making crushed or broken ice, the freezing time is reduced so that the walls of the ice rods are thinner, and thus break more easily. Switch 39 is operated to rotate the severing member in the opposite direction, that is, clockwise as viewed in Figure 4, for producing crushed ice. During the thawing cycle, the ice rods will drop onto plates 19, 18, 17 and 16. For example, the rods resting on plate 19 will be engaged by the blunt edge 26 of plate 16 and will be shattered so that the pieces fall onto plate 19, and the smaller-size pieces drop through opening 37. Meantime the ice rods resting on plate 18 will be shattered by the rear edge 33 of plate 19, and the ice rods resting on plate 17 will be shattered by the rear edge 29 of plate 18, and smaller particles will drop through openings 35 and 32. Any large ice pieces remaining on plates 19, 18 and 17 will be pushed by the rear edges 26, 33 and 29 of plates 16, 19 and 18 respectively against the ends of the ice rods protruding from tubes 2 and will be crushed. The protruding ends of the ice rods also will be crushed. The crushed pieces of ice fall through the openings 37, 35 or 32 between the various plates, onto the retaining plate 44, and are carried against the side of the deflector member 46 which pushes the ice pieces laterally into the crushed ice chute 53 by which they are directed to the crushed ice storage compartment 56.

By providing a combined reversible cutter and

crusher that severs the same length of ice per unit movement whether used as a cutter or crusher, the machine may be used for making crushed ice or ice rods as desired, merely by reversing the direction of the motor which operates the cutter. The reversal of the motor is conveniently accomplished by a reversing switch. The rotation of the cutter in cutting direction automaticaly produces ice lengths of the desired size and the distributor directs them into the ice cube bin. When the cutter is reversed and becomes a crusher, the distributor automatically serves to direct the crushed ice into the crushed ice bin without requiring any manual adjustment. This makes it virtually impossible for crushed ice and ice cubes to become commingled in the respective bins.

The distributor may be employed with a severing device arranged to produce only ice cubes, or only crushed ice, in which case a single chute may be provided to receive the ice from the side opening **5**. The type of distributor illustrated results in a considerable reduction in height or headroom of the apparatus because it becomes unnecessary to provide the space needed to locate an inclined chute below the cutter. The plate **44** preferably is located no further from the cutter than required to allow for accumulation of ice cubes. This allows for a lesser height of chamber **4** as compared with the inclined chute construction of the prior art, and results in a corresponding saving of overall height in the apparatus. Because in many installations the overall height of the apparatus is greater than the ceiling height, a reduction in height which makes it unnecessary to cut through the ceiling or floor of a room to install the apparatus is a considerable benefit.

In Figure 7 there is shown a modification of the invention applied to a different type of ice machine. In this modification the water tubes **2** are arranged in a row and are embraced by an evaporator in the form of a long tube **61** coiled about the ice tubes, and adapted to contain the refrigerant during the freezing cycle. During the thawing cycle hot gaseous refrigerant is passed through tube **61** to thaw loose the ice rods, which drop down to the severing mechanism.

As illustrated, the severing mechanism comprises an arm **62** pivotally mounted at **63** adjacent its upper end for oscillatory movement, and carrying a dual-edge head **64** at its lower end. This head has a single row of prongs or teeth **65** on one face positioned near the lower ends of the freezer tubes. The ice rods drop from the tubes until the lower edges engage the grid **66** on the water supply tank **45** and the ends are severed by the row of prongs **65** to provide ice cubes which slide down the grid into a suitable storage chamber.

The opposite face of head **64** has a plurality of rows of teeth **68** at different elevations, and the head is rotatably mounted upon the lower end of arm **62**. In order to secure a crusher action it is necessary only to turn the head through 180° to position the teeth **68** adjacent the ice rods as shown in Figure 8, and upon oscillation of the arm the teeth serve to disintegrate the projecting end of the ice rod against a backing plate **69** to produce ice fragments or crushed ice, the grid acting as a gauge. The ice fragments slide down the grid into a suitable storage bin. The severing arm may be oscillated by any suitable mechanism, and for purposes of illustration the drawing shows the bar oscillated by a cam **71** driven from a motor **72** having a built-in gear reduction. By arranging the fragmentizing points **68** at different elevations covering the same "bite" as taken by the cutter **65**, the crushing operation is carried out in the same time required to produce ice cubes.

In the modification shown in Figure 9, the head **75** has a row of long teeth **76** and a plurality of rows of shorter or retracted teeth **77** at different elevations. The motor and cam drive are adjustable to vary the neutral axis of the stroke of the cutter arm. Shifting the neutral axis of movement of the arm to the right causes only the teeth **76** to penetrate the ice rods to sever ice cubes. These fall onto the grid **78** and are directed to an ice cube storage bin **80**. For producing crushed ice, the neutral axis of the arm is adjusted to the left to cause the teeth **77** to engage the ice rod to produce ice fragments, a space being provided above backing plate **69** to accommodate the row of long teeth **76**. These fragments fall through the grid **78** onto grid **79** which has smaller openings, and are deflected thereby to the crushed ice storage bin **81**. The water and undersized ice particles pass through both grids into the water storage tank **45**. In this modification also the crushing operation can be performed in the same time required for the cubing operation. A similar sizing arrangement can be employed in the modification illustrated in Figures 7 and 8.

In the modification illustrated in Figure 10, the retaining table member **85** is relatively fixed on the housing, and has a generally radial opening **86**. Below the opening is a middle partition **87** separating the chutes **88** and **89** for crushed and cube ice. The edges of the opening **86** may have sloping grilles **91** for directing the ice into the proper bin and separating out undersize fragments. The baffle or shield **58** (Figure 2) overlies this opening to deflect water and falling ice away from the opening. The arm **92** secured to shaft or sleeve **42** sweeps the severed ice into the opening **86**. When this arm rotates in one direction the ice falls off the edge of the table into chute **88**, and when it rotates in the other direction it sweeps the ice off into chute **89** These chutes lead to suitable ice storage bins. Thus it will be seen that when the severing device turns in one direction to produce ice cubes, the arm **92** turning therewith sweeps the cubes into chute **88**, while upon turning in the opposite direction to produce crushed ice, the ice is swept into chute **89**.

We claim as our invention:

1. In a machine for producing congealed liquid selectively in the form of cubes or fragments comprising at least one tube alternately subject to a low temperature to congeal liquid therein in the form of a rod, and to thawing temperature to release the rod formed in the tube: a severing device below said tube carrying a cutting member and a plurality of fragmentizing members at different levels; gauge means for retaining the rod with the end protruding from the tube to be acted on by the severing member; and means for selectively bringing the cutter member and fragmentizing members into engagement with the exposed end of the rod to sever the gauged length.

2. In a machine for producing congealed liquid selectively in the form of cubes or fragments comprising at least one tube alternately subject to a low temperature to congeal liquid therein in the form of a rod, and to thawing temperature for a

predetermined period to release the rod formed in the tube: a severing device below said tube carrying a cutting member and a plurality of fragmentizing members at different levels; gauge means for retaining the rod with the end protruding from the tube; means for repeatedly moving said severing means into contact with the protrduing end of the rod; and means for selectively positioning said cutter member and fragmentizing members to engage the exposed end of the rod to selectively sever equal lengths of said rod per unit movement of the severing means.

3. In a machine for producing congealed liquid selectively in the form of cubes or fragments comprising at least one tube alternately subject to a low temperature to congeal liquid therein in the form of a rod, and to thawing temperature to release the rod formed in the tube: a severing device below said tube carrying a cutting member and a plurality of fragmentizing members at different levels; gauge means for retaining the ice rod with the end protruding from the tube; means for rotating said severing means in one direction to bring the cutting member repeatedly into contact with the protruding end of the ice rods; and means for reversing the rotation of the severing means to bring the fragmentizing members into repeated contact with the protruding end of the rod to sever an equal length of rod in fragments per revolution.

4. In a machine for congealing liquid to selectively produce ice cubes or fragments comprising at least one tube for carrying liquid to be congealed, and subject alternately to a low temperature to congeal the liquid therein to rod, and to thawing temperature to release the rod formed in the tube; a severing device located below said tube having a cutting edge and a plurality of stepped plates providing fragmentizing edges in opposed relation to said cutting edge; means for rotating said severing device in one direction for severing the protruding rod end to produce ice cubes; and means for reversing the direction of movement of said severing device to fragment the protruding rod end to produce crushed ice.

5. In a machine for congealing liquid selectively to produce ice cubes or fragments comprising at least one tube for carrying the liquid to be congealed, and subject alternately to a low temperature to congeal the liquid therein to rod, and to thawing temperature to release the rod formed in the tube; a severing device located below said tube having a cutting edge, a gauge edge, and a plurality of fragmentizing edges, between the cutting edge and gauge edge and in opposed stepped relation to said cutting edge; means for rotating said severing device in one direction for severing the protruding rod end to produce ice cubes; and means for reversing the direction of movement of said severing device to fragment the protruding rod end to produce crushed ice.

6. An apparatus as specified in claim 1 having means to selectively separate cubed sections of rod from fragmentized sections.

7. An apparatus as specified in claim 3 having a receiving plate below the severing device and a deflector across the plate, the receiving plate and deflector being relatively rotatable to direct cubed sections of rod to one side and fragmentized sections to the other side.

8. An apparatus as specified in claim 7 wherein the receiving plate rotates and the deflector is fixed.

9. In a refrigeration machine for freezing liquid in the form of ice cubes or fragments comprising at least one tube alternately subject to a low temperature to freeze liquid therein in the form of ice rod, and to thawing temperature to release the rod formed in the tube; a severing device below said tube arranged for alternative operation on the prtruding end of the ice rod for producing crushed ice and ice cubes; a pair of chutes for receiving severed ice; and means cooperating with the severing device to direct crushed ice into one chute and cube ice into the other chute.

10. A rotary severing device comprising: a hub adapted to be mounted for rotation upon the bottom plate of a freezer; a rim; a plate connecting said hub and rim and having a cutting edge and an opposite crushing edge; a gauge plate connecting the hub and rim; and auxiliary plates between the hub and rim in vertically stepped relation between the first plate and gauge plate.

11. A machine as specified in claim 10 wherein said rim receives an endless band for rotating the severing device.

12. In a machine for making ice comprising at least one tube in which water is alternately frozen to ice rod and the ice rod is thawed loose: means for severing the protruding end of the rod; a plate member for receiving the severed ends; and a deflector member arranged above said plate, one of said members being rotatable relative to the other for discharging ice from said plate.

13. In a machine for making ice in the form of rods or cylinders comprising at least one tube for carrying the liquid to be frozen, and subject alternately to freeing temperature to freeze the liquid therein to rod, and to thawing temperature to release the rod formed in the tube; a severing device below said tube arranged for alternative operation in either direction on the protruding end of the rod; a divided passage for receiving severed ice; a plate member below the severing device; a deflector member extending across the plate, said members being rotatable relative to each other; and means to rotate one of said members with said severing device.

14. An apparatus as specified in claim 13 wherein said deflector is rotatable and the plate member has an opening therein connecting with a pair of chutes.

15. An apparatus as specified in claim 14 wherein grilles are provided at the edges of the plate adjacent the opening for separating undersized particles of ice.

16. In a machine for producing congealed liquid selectively in the form of cubes or fragments comprising at least one tube alternately subject to a low temperature to congeal liquid therein in the form of a rod, and to thawing temperature to release the rod formed in the tube: a severing device below said tube having a head carrying a cutting member and a plurality of fragmentizing members at different levels; means for vibrating said severing device; and means for reversing the head on the severing device to bring the fragmentizing members into engagement with the exposed rod.

17. In a machine for producing congealed liquid selectively in the form of cubes or fragments comprising at least one tube alternately subject to a low temperature to congeal liquid therein in the form of a rod, and to thawing temperature to release the rod formed in the tube: a severing device below said tube carrying a cutting member and a plurality of retracted fragmentizing members at different levels; means for vibrating

said severing device to bring the cutting member into engagement with the exposed rod; and means for shifting the zero axis of vibration of the severing device to bring the cutting member and fragmentizing members into engagement with the exposed rod.

HENRY V. HEUSER.
WILLIAM H. FITZNER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
913,187	Arnstein	Feb. 23, 1909
1,964,290	Krause	June 26, 1934
2,191,756	Gray	Feb. 27, 1940
2,239,234	Kubaugh	Apr. 22, 1941
2,453,140	Kubaugh	Nov. 9, 1948
2,549,747	Leeson	Apr. 17, 1951
2,593,874	Leeson	Apr. 22, 1952