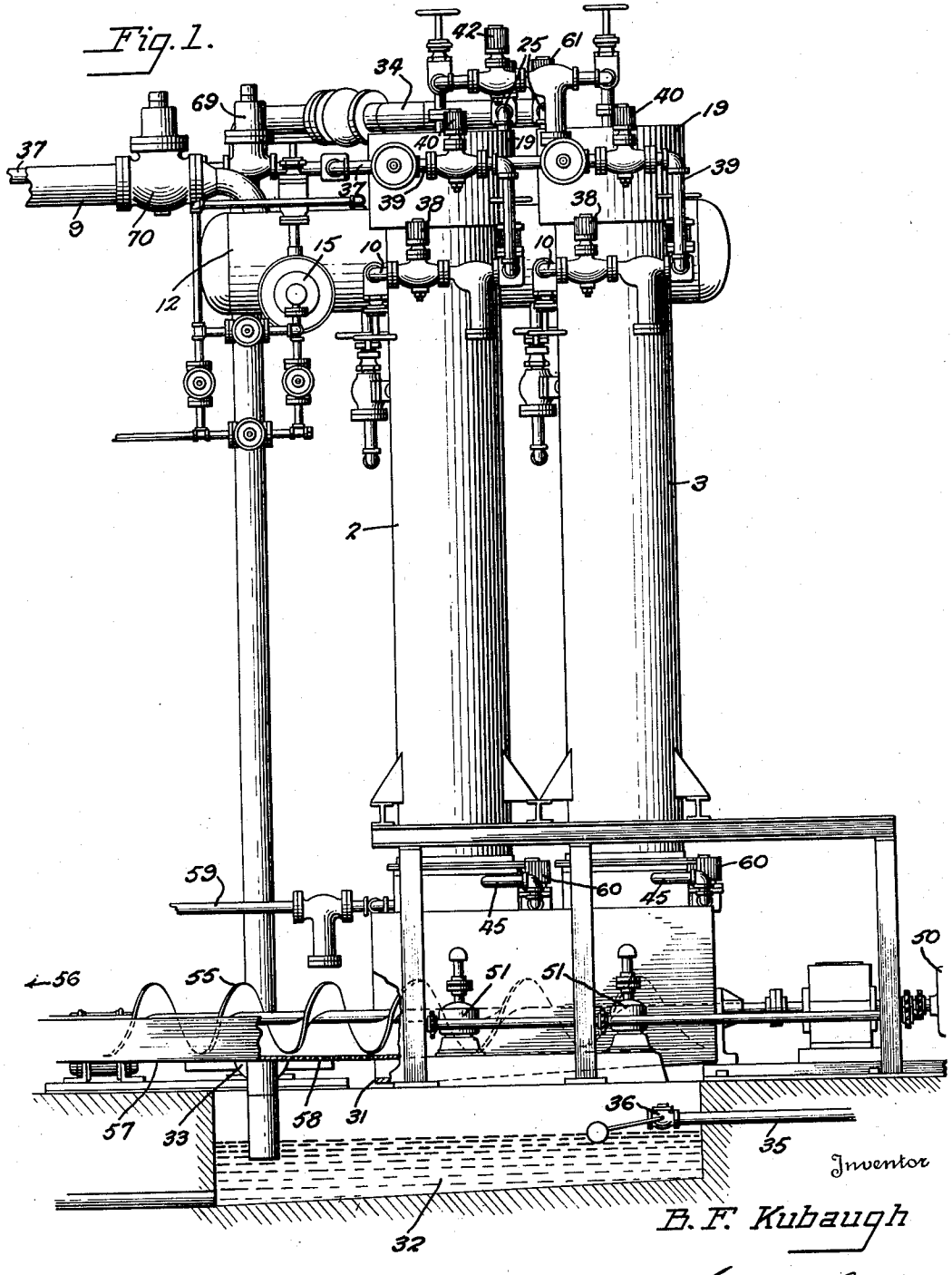
April 22, 1941. B. F. KUBAUGH 2,239,234

ICE FREEZING APPARATUS

Filed April 12, 1939 5 Sheets-Sheet 1

Fig. 1.



Inventor

B. F. Kubaugh

By Mason, Fenwick & Lawrence

Attorneys

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ICE FREEZING APPARATUS

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Fig. 2.

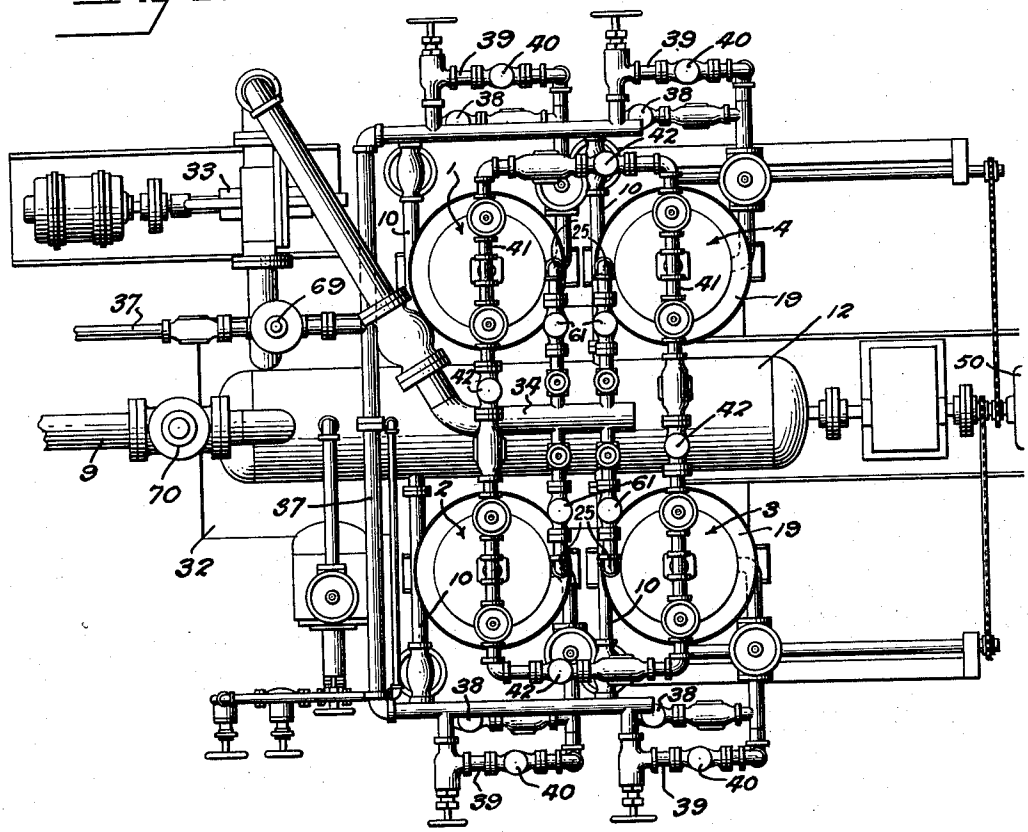
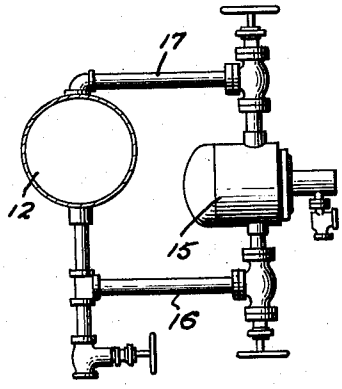


Fig. 4.



Inventor

B. F. Kubaugh

By Mason Fennick & Lawrence

Attorneys

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ICE FREEZING APPARATUS

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Fig. 3.

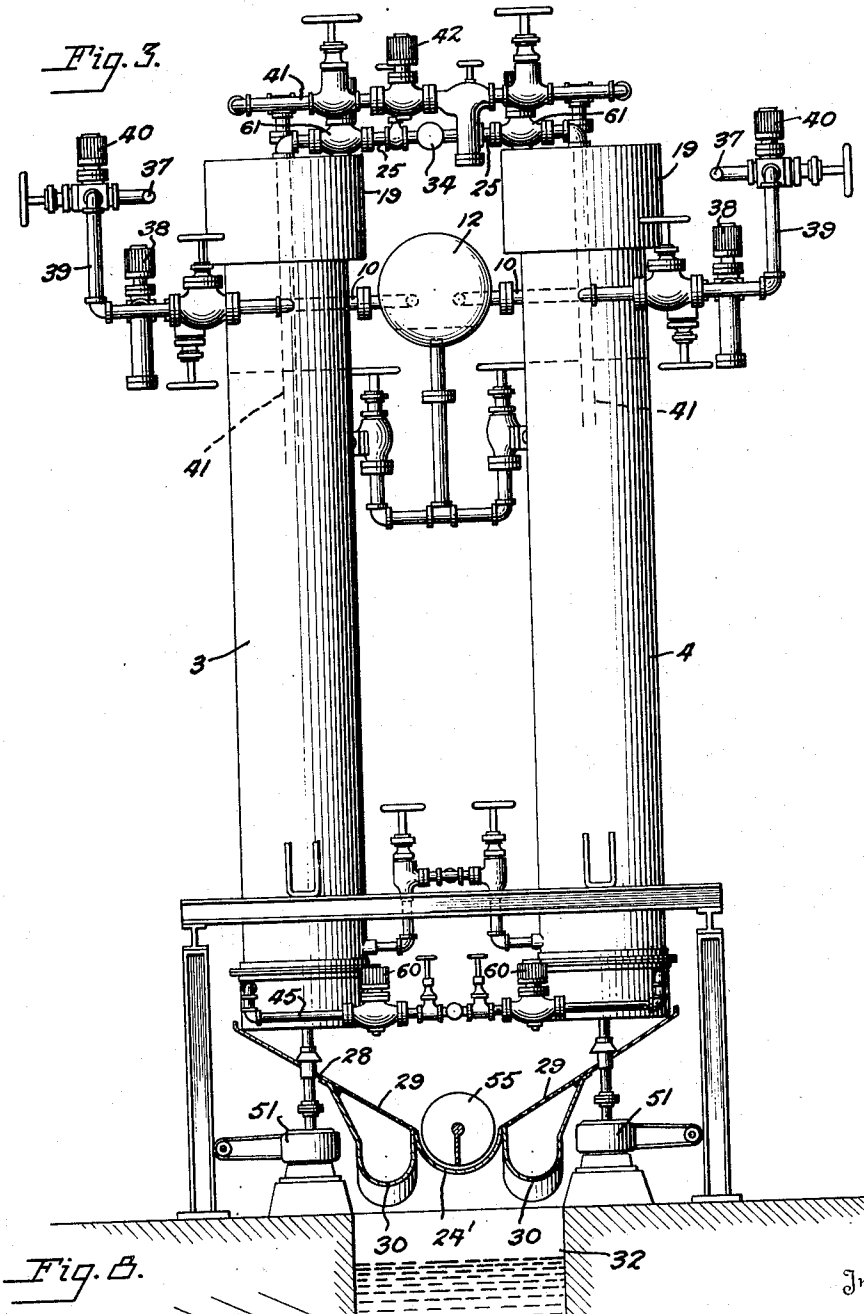
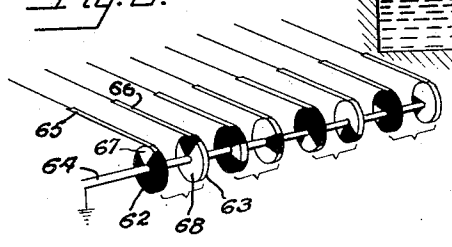


Fig. 8.



Inventor

B. F. Kubaugh

By Mason Fenwick & Lawrence

Attorneys

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ICE FREEZING APPARATUS

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Fig. 5.

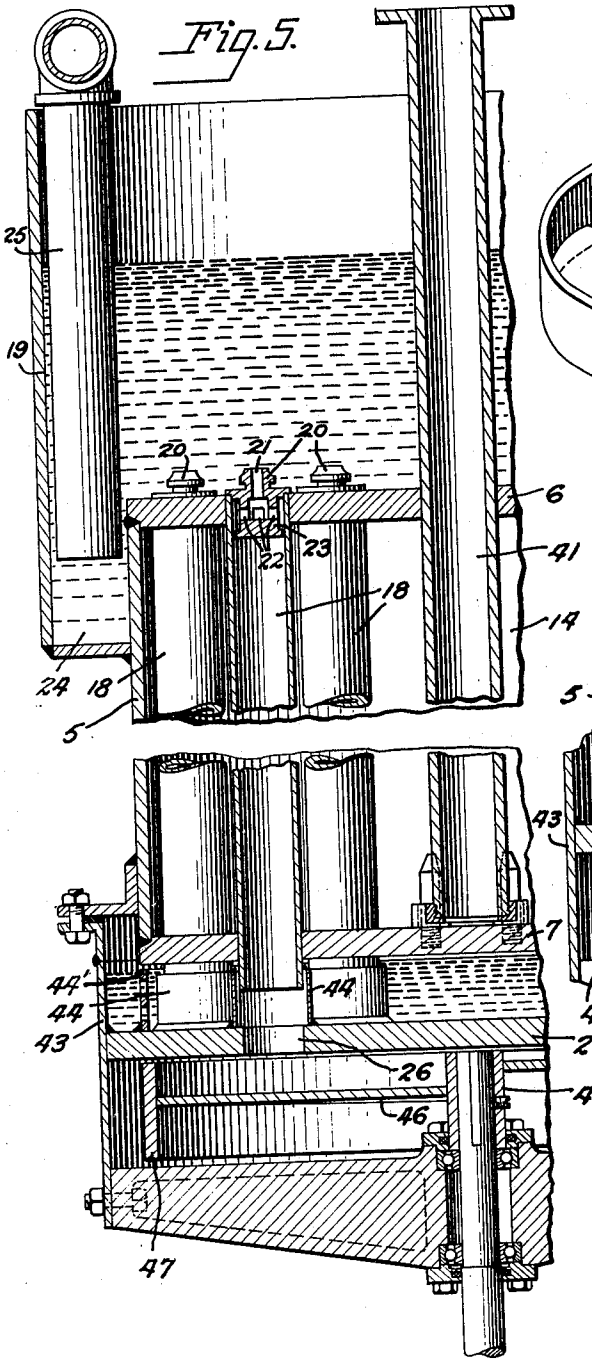


Fig. 6.

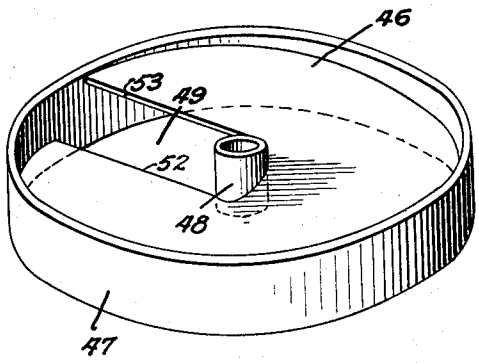
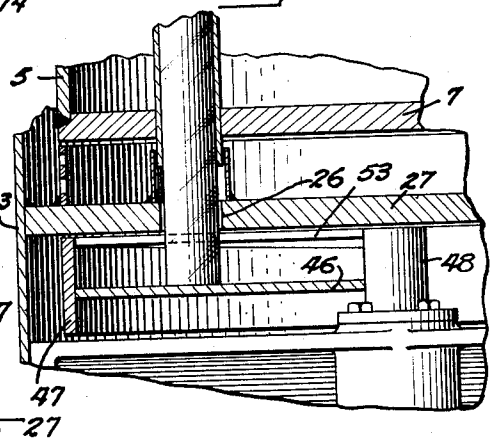


Fig. 7.



Inventor

B. F. Kubaugh

By Mason Fenwick & Lawrence

Attorneys

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ICE FREEZING APPARATUS

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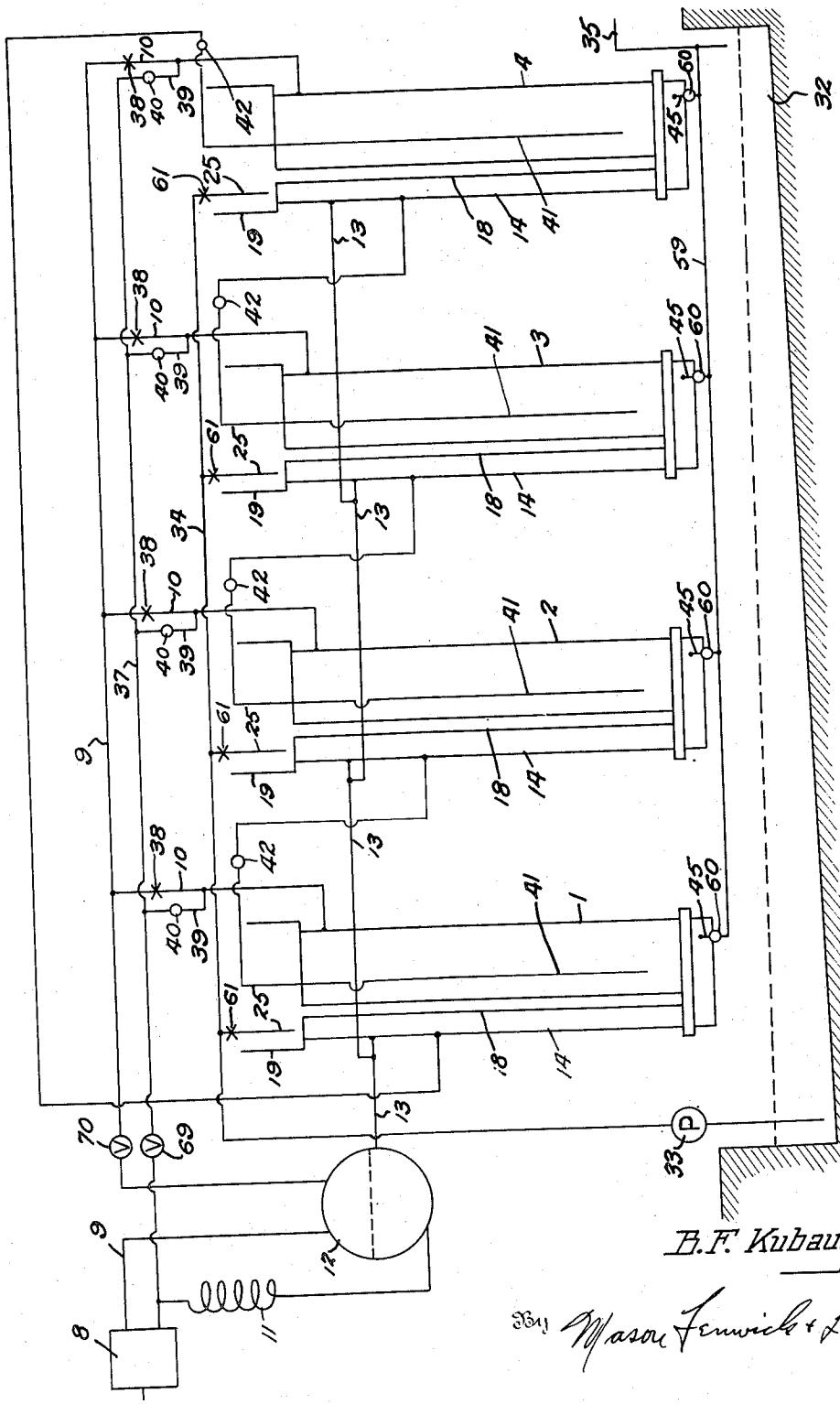


Fig. 9.

Inventor

B. F. Kubaugh

By Mason Fenwick & Lawrence

Attorneys

Patented Apr. 22, 1941

2,239,234

UNITED STATES PATENT OFFICE

2,239,234

ICE FREEZING APPARATUS

Benjamin F. Kubaugh, Louisville, Ky., assignor to Henry Vogt Machine Co. Inc., Louisville, Ky., a corporation of Kentucky

Application April 12, 1939, Serial No. 267,499

13 Claims. (Cl. 62—164)

This invention relates to ice making apparatus of the general type disclosed in my copending application Ser. No. 207,128, filed May 10, 1938, and which comprises a battery of freezers, each consisting of an upright bundle of spaced tubes within an evaporator tank, the evaporating tanks forming an element of a refrigeration system, within which tubes rods of ice are frozen, and from which they are discharged by gravity following a thawing operation, the freezers operating in a determined order of rotation whereby one discharges while the others are freezing, it being within the concept of the invention to have the number of freezers in the battery so numerous that the time interval between the successive discharge periods is so small that the delivery of ice may be described as practically continuous.

The invention described and claimed in said co-pending application is characterized by the introduction of refrigerant under pressure in the hot gaseous stage at the termination of the freezing period in each evaporator, for displacing the liquid refrigerant from one evaporator to another, and for thawing the ice rods from the interior surfaces of the tubes in which they are formed.

The present invention has for its specific objects, the provision in refrigerating apparatus of the type described of automatic control of the several operations involved in the freezing, thawing and discharging of the units of ice.

Another object of the invention is the provision of means for controlling the pressure of the hot gaseous refrigerant which evacuates the refrigerant from the evaporator, thereby controlling the thawing temperature in each of the units.

Another object of the invention is to provide on the main suction line for all of the units, a back pressure valve which serves the purpose of maintaining a uniform and predetermined pressure, and therefore controls the freezing temperature of the units.

Still another object of the invention relates to the provision of a cutter for severing the ice rods as they emerge from the units, sizing them to a predetermined length.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings which accompany and form a part of the following specification, and throughout the several figures of which the same characters of reference have been employed to designate identical parts:

Figure 1 is a side elevation, partly in section, of a battery of freezing units incorporating the features of the invention;

Figure 2 is a plan view;

Figure 3 is an elevation taken in a plane perpendicular to that of Figure 1;

Figure 4 is a detail in elevation showing the accumulator, the liquid float control therefor and the liquid and vapor equalizing connections;

Figure 5 is a vertical diametrical section through one of the freezing units, on an enlarged scale, the intermediate portion being broken away;

Figure 6 is a perspective view of the rotary cutter;

Figure 7 is a fragmentary vertical elevation showing the cutter with one of the ice rods in position being cut;

Figure 8 is a perspective view of a rotary switch for controlling the solenoid valves involved in the automatic operation of the system including the valves in the suction line to each evaporator, the ice water supply valves to each unit, the valves controlling the hot gas employed in evacuating the evaporators, the valves controlling the liquid evacuation pipes and the valves controlling the admission of thawing water to each of the units; and

Figure 9 is a general diagrammatic view showing the essentials of the system, and with particular reference to the valves controlled by the rotary switch.

Referring now in detail to the several figures, the reference characters 1, 2, 3 and 4 represent the individual freezing units in a battery of four units. At this point it may be stated that the invention contemplates no specific number of units, but the larger number of units, the more nearly continuous will be the delivery of ice. In general, it may be said that the freezing period for each unit is twenty-seven minutes, while the thawing and discharge of ice from a unit requires a little more or less than a minute. With four units in a battery, as shown, there will be delivery of ice about every seven and a half minutes. With a battery of ten units, there will be an ice delivery every three minutes. The units may be considered identical, one being shown in detail in Figure 5 comprising a shell 5, preferably cylindrical, having upper and lower ends or tube sheets 6 and 7. The shell 5, together with the tube sheets, forms a closed chamber or evaporator 14, all four of which evaporators are connected in multiple into a closed refrigeration

system, which as shown in Figure 9, may include the compressor 8, suction line 9, with branches 10 communicating with the individual evaporators, the condensers 11, the liquid refrigerant accumulator or receiver 12, the latter having branches 13 communicating with the evaporators 14. Level of liquid in the several evaporators and in the accumulator 12 is controlled by liquid level control apparatus of conventional type, shown in Figure 4, designated by the reference character 15, and including the liquid and vapor equalizing pipes 16 and 17, respectively.

A bundle of tubes, each of which is designated by the reference character 18, is positioned in an upright manner within the shell 5, the upper and lower ends of said tubes opening through the respective tube sheets. The upper end of the shell 5 extends into the water box 19. The upper ends of the tubes 5 are provided with metallic or porcelain ferrules 20, which project above the tube sheets 6 and have a central water inlet 21. They are provided within the tubes with radial water outlets 22 which discharge water upon a deflector 23, the periphery of which lies close to the interior wall of the tube 18, so that the water from the outlets 22 is distributed between the deflector 23 and tube in a thin film against the wall of the tube 18. Thus the conditions for quick freezing are met. Care is taken that the disposition of all of the ferrules 20 are in a horizontal plane. The water box 19 is preferably formed with an annular trough 24, into which the ice water supply pipe 25 dips. This causes the ice water to be distributed uniformly all around the water box before inundating the tube sheet 6 and entering the ferrules 20. This ensures uniform freezing in all of the tubes 18. The ice water traverses the length of the tubes 18, flowing through holes 26 in the underlying shear plate 27, and discharging upon the inclined plates 28 shown in Figure 3 which lead down to ice water troughs 30. The central conveyor trough 24' is for ice, as will presently appear. The ice water goes through the screens 29 into the lateral, inclined troughs 30, from which it discharges at the point 31 in Figure 1 into an underlying tank 32. From this tank the ice water is picked up by a pump 33 and carried back to the ice water header 34, from which it again discharges into the water box 19 by way of the pipes 25 in those of the units which are in the freeezing phase of the refrigeration cycle. The ice water distributing pipes are controlled by the preferably solenoid operated valves 61.

It will be understood that the ice water herein referred to is not precooled at the starting of the apparatus, but becomes chilled by successive passages through the tubes 18. That part of the ice water which remains on the surface of the tubes in the freezing of the ice rods is replenished from the water main 35 controlled by the float valve 36 in the tank 32. It is to be understood that the rods will ordinarily not be permitted to freeze solid but will preferably always have a hole extending longitudinally throughout their length, through which the ice water continues to flow up to the time for discharging the ice rods. Since there is no frozen core, this assures that the ice rod shall be transparent throughout, and it also avoids the necessity for any change in the volume of ice water as the freezing proceeds. Only enough water is supplied to the tubes to cause a thin film to traverse the inner surfaces of the tubes during the initial part of the freezing period, and as the ice walls thicken and the hole within the ice rods decreases in diameter, it is still large enough at the end of the freezing period to pass the same volume of water which originally was distributed over the surfaces of the tubes.

In the normal operation of the battery of freezers, all but one will be simultaneously engaged in the freezing cycle, and that one will either be discharging or preparing for the discharge of its supply of ice rods. At the end of the freezing period the liquid refrigerant in that freezer which is about to discharge is displaced therefrom through the pressure of the hot gaseous refrigerant which is introduced into the freezer at a point above the level of the liquid refrigerant. With this end in view, the branch pipes 10 are connected to the high side of the compressor between the compressor and the condenser by a manifold 37 and branches 39. Suitable valves 38 which in the present embodiment of the invention are indicated as being solenoid operated valves, are provided in the branches of the suction line to cut on and off communication with the suction line, respectively, at the beginning and the end of the freezing period. The branch pipes 39 are provided with a valve 40, also shown as being solenoid operated, and whose function it is to open to admit hot compressed gas to the evaporator by way of the branch pipes 10 after the valves 38 have closed. Each of the evaporators is provided with an evacuating pipe 41 extending from a point near the bottom of one evaporator and communicating with the top of another evaporator. Valves 42, preferably solenoid operated, control the evacuating pipes, said valves being open when the hot compressed gas valves 40 are open, and being closed when the suction valves 38 are open.

In operation, when the freezing period in one evaporator terminates, for example the evaporator 1 in Figure 2, the suction valves are automatically closed, then the evacuating valve and the hot gas valve are opened. Hot gas from the high side of the compressor will then enter the evaporator and depress the liquid therein, discharging it through the evacuating pipe 41 into the cylinder which has most recently discharged its ice rods and which is consequently the next cylinder to start the freezing operation. If preferred, each of the evaporators may evacuate its liquid, in turn, into a common receptacle, such for example the accumulator 12, and which liquid is then returned from said accumulator into the said evaporator. It takes about thirty seconds for the hot gas to displace the liquid in the evaporator, at the end of which time the hot gas valve closes. The hot gas warms the tubes 18 and thaws the ice from adherence with the surface of said tubes.

It will be observed in Figure 5 that provision is made for thawing the ice rods at the extreme lower ends of the tubes 18, which ends of said tubes are remote from the direct influence of the heated gaseous refrigerant within the evaporator. The thawing of the lower ends of the tubes is accomplished as follows. Inside the cutter casing 43 is the fixed shear plate 27 welded thereto, and carrying ferrules 44 welded thereto and surrounding the lower extending ends of the tubes 18 with a small clearance space therebetween. An annular partition 44' surrounds all of the ferrules 44, being spaced from the cutter casing to form an annular thawing water distributing chamber. This partition is perforated height-

wise. Thawing water enters by way of branches 45 of a thawing water pipe 59, said branches being controlled by the preferably solenoid operated valves 60. The thawing water fills the chamber between the partition and the cutter casing, flows through the partition simultaneously at all points, and inundates the ferrules 44, finally flowing over the upper edges of said ferrules against the extending ends of the tubes 18 and contacting tube head 7. The thawing water gravitates downwardly, mingling with the ice water in the tank 32.

When the ice rods have been freed from the tubes 18 both by the hot gaseous refrigerant within the evaporator and by the thawing water in the lower extending ends of the tubes, the ice rods drop by gravity upon the helically inclined plate 46 of the cutter. This, as shown in Figure 6, comprises a rotary member having an outer cylindrical peripheral portion 47 and an inner central hub portion 48. The helical plate 46 surrounds the hub 48, dropping from a high to a low level, and leaving a slot 49 between its edges, which slot is wider than the diameter of the ice rod.

All of the ice rods in a freezer will drop practically at one time, because they are simultaneously thawed. They will land upon the underlying helical plate 46, some in a high position near the upper edge of said plate, and some in a low position. The cutter is positively driven by means of the motor 50, shown in Figure 1, and suitable connecting shafting, and is preferably driven at a reduced speed relative to that of the motor, reducing mechanism being shown at 51. As the cutter rotates, the ice rods descend progressively to the lower level of the helical plate 46. When they reach the lower edge 52 of said plate they are about to be cut off or sized. Just as the helical plate 46 is moving from under the ice rods resting adjacent the edge 52, the upper edge 53 of said helical plate jams the ice rods against the edge of the hole 26 in the shear plate, breaking the ice rods off at a definite height equal to the distance between the horizontal planes which embrace the lower and upper edges 52 and 53 of the helical plate 46. Since at the moment of breakage the bottoms of the ice rods are unsupported, being over the slot 49, there is no danger of the sized units of the ice rods clogging or collecting in the cutter, but they must inevitably fall upon the inclined plates 28 and down into the conveyor trough 24'. It will be understood that when the discharge of ice rods takes place, there will probably be some ice water running down through the ice rods or around them, and some thawing water, so that the ice will be in wet condition. As they pass over the screens 29 the accompanying water will be drained from the ice units, the water passing down the inclined troughs 30 and draining into the tank 32 at the point 31 in the manner that has already been described. The ice units in the trough 24 find themselves entrained in the helices of a conveyor 55, by means of which they are propelled toward the storehouse 56. The conveyor 55 extends some distance into the storehouse, so that the ice units will be kept in motion in the conveyor trough while being subjected to the lower temperature within the storehouse, sufficiently to congeal the moisture on the surface of the ice units so that they will not stick together, that is to say, pack, when finally discharging into said storehouse. That portion 57 of the conveyor trough which enters the storehouse inclines downwardly toward the tank 32 so that there will be no risk of water being discharged into the storehouse. Any water traveling back upon this inclined part of the conveyor finds its way through the screen 58 into the tank 32.

The operation of the system is made automatic by the control of the several sets of solenoid operated valves which have been hereinbefore mentioned. For instance, the suction valves 38 and the ice water valves 61 are open during the entire freezing period in all of the evaporators which are simultaneously engaged in freezing, that is, in all but the one evaporator which is discharging its ice contents. The other three sets of solenoid operating valves, namely, the hot compressed gas admitting valves, the liquid refrigerant evacuating valves and the thawing water valves are closed during the entire freezing period, and are opened only during the few seconds which it requires to thaw the ice rods from the tube surfaces, to thaw the lower ends of the tubes which extend beyond the lower tube sheet, and to discharge the refrigerant from the evaporator which is ready to discharge, into an adjoining evaporator. The control of these valves may be accomplished by a rotary switch, such as that shown in Figure 8, in which rotary discs 62 and 63 may have conductive segments grounded to the shaft 64, said discs being wiped by the contacts 65 and 66. There is a pair of discs 62 and 63 and a pair of cooperating contacts for each evaporator. The disc 62 has a small conductive segment 67 adapted to control the simultaneous opening of the hot gas, evacuating and thawing water valves which are open for only a short period. The disc 63 has an extensive conductive segment 68, which controls the suction valves and the ice water distributing valves which are open during the relatively long period of freezing. The small and large conductive segments of the respective discs 62 and 63 are arranged in opposite phase, so that the sets of valves controlled by one will be closed while the sets of valves controlled by the other are open. The pair of switch discs 62 and 63 are so displaced on the shaft that it will be observed that three of them are in different phases of the freezing period simultaneously, while only one is in the discharging phase.

Two of the most important valves of the system are the pressure reducing valves 69 on the hot compressed gas line which serves to control the evacuating pressure and thereby the thawing temperature in each evaporator, also the back pressure valve 70 on the main suction line 9, which serves the purpose of maintaining a uniform and predetermined pressure and therefore, a uniform freezing temperature in the units.

While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it will be understood to those skilled in the art that the details of construction and arrangement of parts as shown and described may be varied to suit the exigencies of use without departing from the spirit or scope of the invention as claimed.

What I claim is:

1. In ice making apparatus, a refrigeration system including an evaporator in the form of a tank having ice freezing tubes passing therethrough in a direction to discharge their contents gravitationally, said evaporator having connections with the liquid and suction limbs of said system, means for circulating through said tubes the water to be frozen into ice columns therein, means for displacing liquid refrigerant from said

evaporator at the end of the freezing period by admitting hot gaseous refrigerant under pressure to said evaporator, the heat of which thaws the ice columns from the walls of said tubes, ice cutting mechanism mounted beneath said tubes, movable transversely thereof into the path of which the ice columns gravitate when detached from said ice tubes, the lower ends of said tubes extending beyond said evaporator in proximity to said cutting mechanism and out of the thawing zone of the hot gaseous refrigerant, means for applying thawing water to said tube ends, valves controlling the suction connection of said evaporator, the supply of water thereto for ice making, the admission of the hot gaseous refrigerant, and the flow of thawing water, and valve operating means for opening both the ice water supply controlling valve and the suction valve and at the same time closing both the hot gaseous refrigerant admitting valve and the thawing water controlling valve or closing both the ice water supply controlling valve and the suction valve and at the same time opening the hot gaseous refrigerant valve and the thawing water controlling valve.

2. In ice making apparatus, a refrigeration system including a battery of evaporators arranged in multiple, each being in the form of a tank having a bundle of ice freezing tubes passing therethrough in a direction to discharge their contents gravitationally, each evaporator having connections with the liquid and suction limbs of said system, means for circulating through said tubes the water to be frozen into ice columns therein, said evaporators working successively in a determined order in which all but one of the evaporators are in the freezing phase while the remaining one is in the thawing and discharging phase, means for displacing liquid refrigerant from one of said evaporators and delivering it to the one which has just completed its discharging phase, by admitting hot gaseous refrigerant under pressure to said one evaporator, the heat of which thaws the ice columns from the walls of the tubes of said one evaporator, ice cutting mechanism mounted beneath each evaporator into the path of which the ice columns gravitate when detached from said ice tubes by thawing, the lower ends of said tubes extending beyond said evaporator in proximity to said cutting mechanism and out of the thawing zone of the hot gaseous refrigerant, means connected to said evaporators for applying thawing water to said tube ends, a set of valves controlling the suction connections of said evaporators, a set of valves controlling the supply of water for ice making thereto, a set of valves controlling the admission of hot gaseous refrigerant to said evaporators, a set of evacuating valves in the liquid refrigerant connections between said evaporators, and a set of valves controlling the supply of thawing water to said evaporators, and valve operating means for simultaneously opening the suction and ice water supplying valves of each evaporator for starting the freezing phase and maintaining them open during the freezing period, and for opening said hot gaseous refrigerant admitting valve, the thawing water valve and the evacuating valve in that evaporator which has completed its freezing period, and maintaining them open for a short thawing period, said means simultaneously closing the valves which are open during the freezing period and opening the valves which are concerned with the thawing phase.

3. An ice making apparatus of the type claimed in claim 2, wherein an accumulator for liquid refrigerant is intercalated in the liquid limb of the refrigerating system and forms a part of the liquid connections between said evaporators, said accumulator being also intercalated in the suction line of the refrigeration system.

4. An ice making apparatus of the type claimed in claim 2, in which the several sets of valves therein mentioned are of the solenoid type and the means for controlling the operation of said valves comprises a rotary switch, the rotor of which includes pairs of conductive elements, one pair for each evaporator and the conductive elements of each pair being in opposite phase relative to the axis of rotation of said rotary element, one element of each pair controlling the sets of valves which are open during the freezing period, the other element of each pair controlling the valves which are open during the thawing period, said pairs of conductive elements being so offset that all but one of said evaporators are at the same time in various phases of freezing while the one remaining evaporator is in its thawing and discharging phase.

5. In ice making apparatus, a refrigeration system including an evaporator in the form of a tank having ice freezing tubes passing therethrough in a direction to discharge their contents gravitationally, said evaporator having connections with the liquid and suction limbs of said system, means for circulating through said tubes the water to be frozen into ice columns therein, said water circulating means comprising a water box on said evaporator into which the upper ends of said tubes open, and a tank below said evaporator into which water is discharged, after having passed through said tubes, a pump for picking up water from said tank and delivering it into said water box, means for displacing liquid refrigerant from said evaporator at the end of a freezing period by admitting hot gaseous refrigerant under pressure to said evaporator, the heat of which thaws the ice columns from the walls of said tubes, said tubes extending through and beyond the bottom of said evaporator and out of the thawing zone of the hot gaseous refrigerant, a shear plate below said evaporator spaced from the bottom thereof and having ice column passages aligned with the ends of said tubes and spaced therefrom, said shear plate and the bottom of said evaporator defining between them a thawing water chamber, means for supplying thawing water to said chamber for thawing the ends of said tubes, rotary ice cutting mechanism mounted below said shear plate and cooperating therewith, into the path of which the ice columns gravitate when detached from said ice tubes and are cut off by the cooperation between said cutting mechanism and the lower edges of the apertures in said shear plate, a valve controlling the suction connection of said evaporator, a valve controlling the flow of ice water to said water box, a valve controlling the admission of hot gaseous refrigerant to said evaporator, a valve controlling the flow of thawing water to said chamber, and valve operating means for simultaneously opening said suction and ice water supplying valves at the beginning of the freezing period and maintaining them open during the freezing period, and for opening said hot gaseous refrigerant admitting valve, and said thawing water valve upon the completion of the freezing period, said means simultaneously closing the valves which are open during the freezing period

and opening the valves directly controlling the thawing functions.

6. An ice making apparatus of the type claimed in claim 5, including ferrules at the upper ends of said tubes within said water box projecting above the bottom of said water box and having their upper ends terminating in a common horizontal plane, said ferrules each having a central intake bore and lateral outlet bores within the tube which it terminates and being formed to distribute a thin film of water against the interior surface of said tube.

7. An ice making apparatus of the type claimed in claim 5, said thawing water chamber being provided with a peripheral annular baffle defining an encompassing distributing channel into which the thawing water is delivered, said shear plate being formed with annular ferrules surrounding the apertures in said shear plate and telescoping over the lower ends of said tubes, with clearance, said ferrules terminating in a common horizontal plane whereby the thawing water simultaneously overflows said ferrules and comes into contact with the ends of said tubes.

8. An ice making apparatus of the type claimed in claim 5, wherein said ice cutting mechanism comprises a driven shaft with a spiral plate disposed thereabout, terminating in substantially parallel vertical planes, spaced apart a distance somewhat wider than the cross-sectional width of an ice column, forming upper and lower edges the difference in level of which edges determines the length of the pieces into which the ice is cut, and upon which plate the ice rods gravitate when discharged from said freezing tubes, and whereby through rotation of said plate they are progressively lowered, the upper edge of said plate cooperating with the lower edges of the passages in said shear plate for effecting the cutting of the ice into sized pieces.

9. In ice making apparatus, a refrigeration system including a battery of evaporators each having the form of a tank having a bundle of ice freezing tubes passing therethrough in a direction to discharge their contents gravitationally, said evaporators being connected with the liquid and suction limbs of said system, means for circulating through said tubes the water to be frozen into ice columns therein, said ice water circulating means comprising a water box on each of said evaporators into the bottom of which the upper ends of said tubes open, a tank beneath said battery of evaporators into which the ice water discharges from said tubes, a pump having an intake in said tank for picking up the discharged ice water and returning it to said water boxes, liquid refrigerant connections from one evaporator to another, means for displacing liquid refrigerant from each evaporator at the end of the freezing period by admitting hot gaseous refrigerant under pressure to said evaporator from the hot gas line of said system, the heat of which thaws the ice columns from the walls of said tubes, ice cutting mechanism mounted beneath said tubes into the path of which the ice columns gravitate when detached from said ice tubes, the lower ends of said tubes extending beyond said evaporators in proximity to said ice cutting mechanism and out of the thawing zone of the hot gaseous refrigerant, means for applying thawing water to said tube ends, the evaporators of said battery being arranged in a determined order whereby all but one of said evaporators are simultaneously in various phases of the freezing period while the one remaining evaporator is in its thawing and discharging phase, liquid refrigerant conduits serially connecting said evaporators, a set of valves controlling the suction connections of said evaporators, a set of valves controlling the flow of ice water to the water boxes of said evaporators, a set of valves controlling the liquid refrigerant transfer conduits, a set of valves controlling the admission of hot gaseous refrigerant to said evaporators, and a set of valves controlling the flow of thawing water, and valve operating means for simultaneously opening the suction and ice water supplying valves of each evaporator for starting the freezing phase and maintaining them open during the freezing period, and for opening said hot gaseous refrigerant admitting valve, the thawing water supply valve, and the evacuating valve of that evaporator which has completed its freezing period, and the valve in the liquid refrigerant transfer conduits between that evaporator and the one next serially connected, and maintaining said valves open for a short thawing period, said means functioning to close the valves which are open during the freezing period and to open the valves which are directly concerned with the thawing functions.

10. An ice making apparatus of the type claimed in claim 2, including a connection from which the hot gaseous refrigerant is derived, said connection tapping the refrigeration system at a point where the refrigerant is in its hot gaseous phase and communicating with the evaporators.

11. An ice making apparatus of the type claimed in claim 2, including a connection, from which the hot gaseous refrigerant is derived, said connection tapping the refrigeration system at a point where the refrigerant is in its hot gaseous phase, and communicating with said evaporators, and a pressure reducing valve in said connection for controlling the evacuating pressure of said gas, and consequently controlling the thawing temperature of each of the evaporators.

12. An ice making apparatus of the type claimed in claim 2, including a back pressure valve on the suction limb to said evaporators for maintaining uniform and predetermined pressure in said evaporators and thereby determining the freezing temperature in said evaporators.

13. An ice making apparatus of the type set forth in claim 5, wherein the tank projects upwardly through the bottom of said water box forming a peripheral distributing channel below the level of the upper ends of said tubes into which the ice water supplying means discharges.

BENJAMIN F. KUBAUGH.