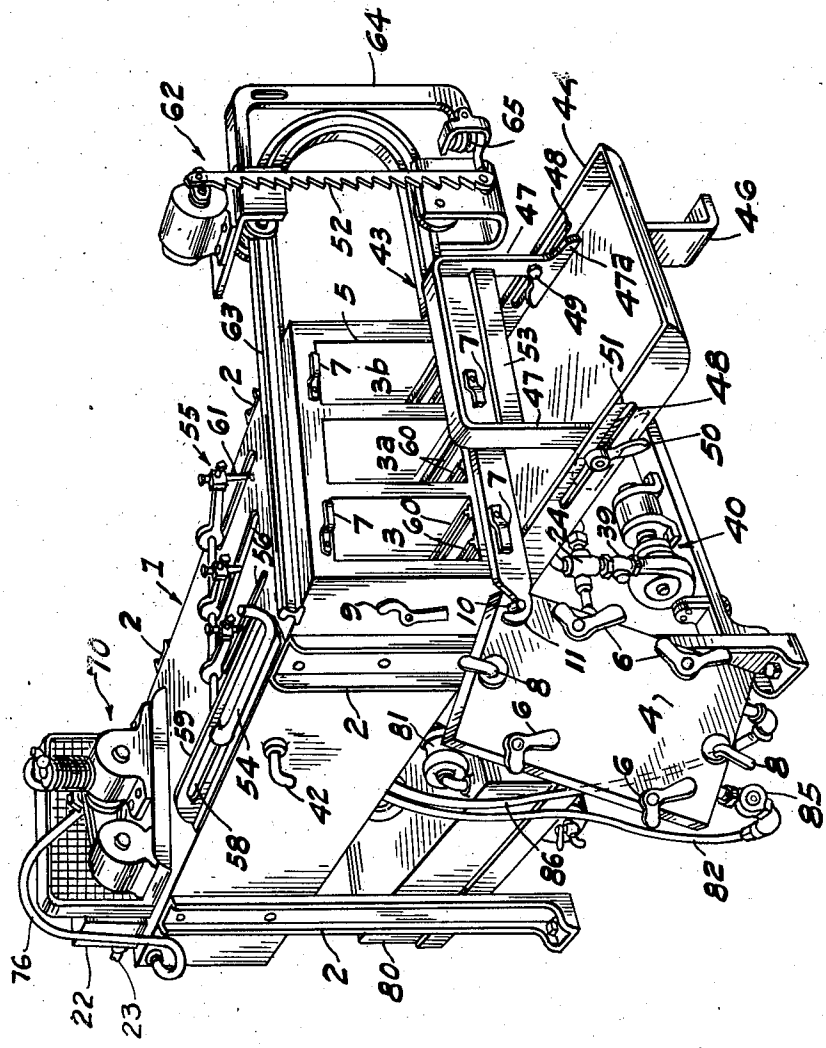
Oct. 28, 1947. R. J. SHARP 2,429,699

ICE MAKING MACHINE

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Fig. 1.



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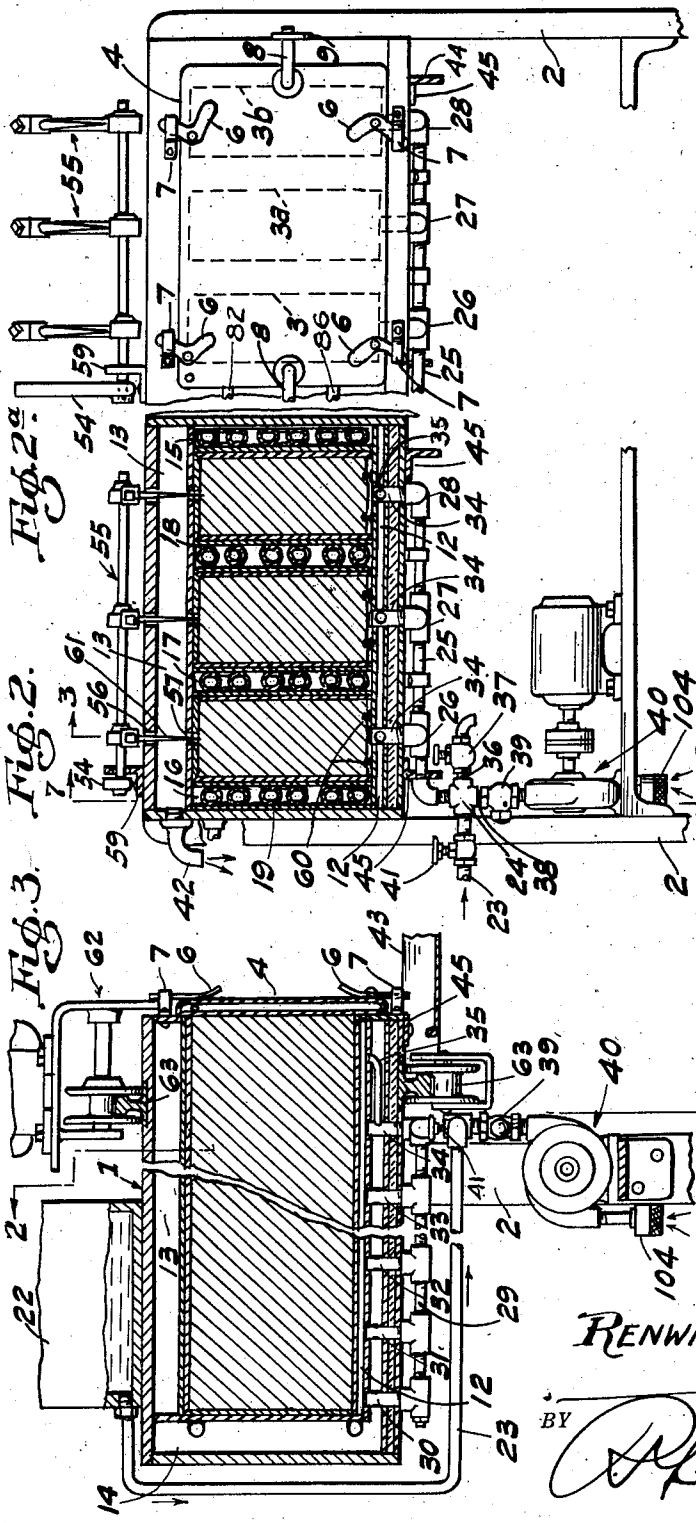


Fig. 2a.

Fig. 2.

Fig. 3.

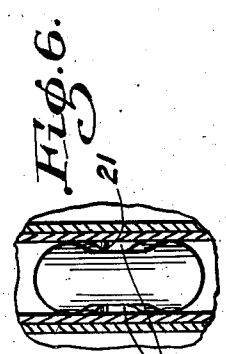


Fig. 6.

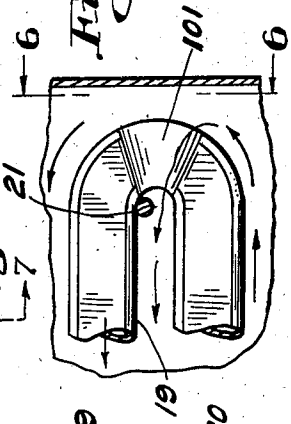


Fig. 5.

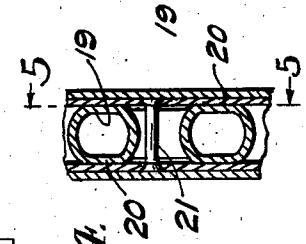


Fig. 4.

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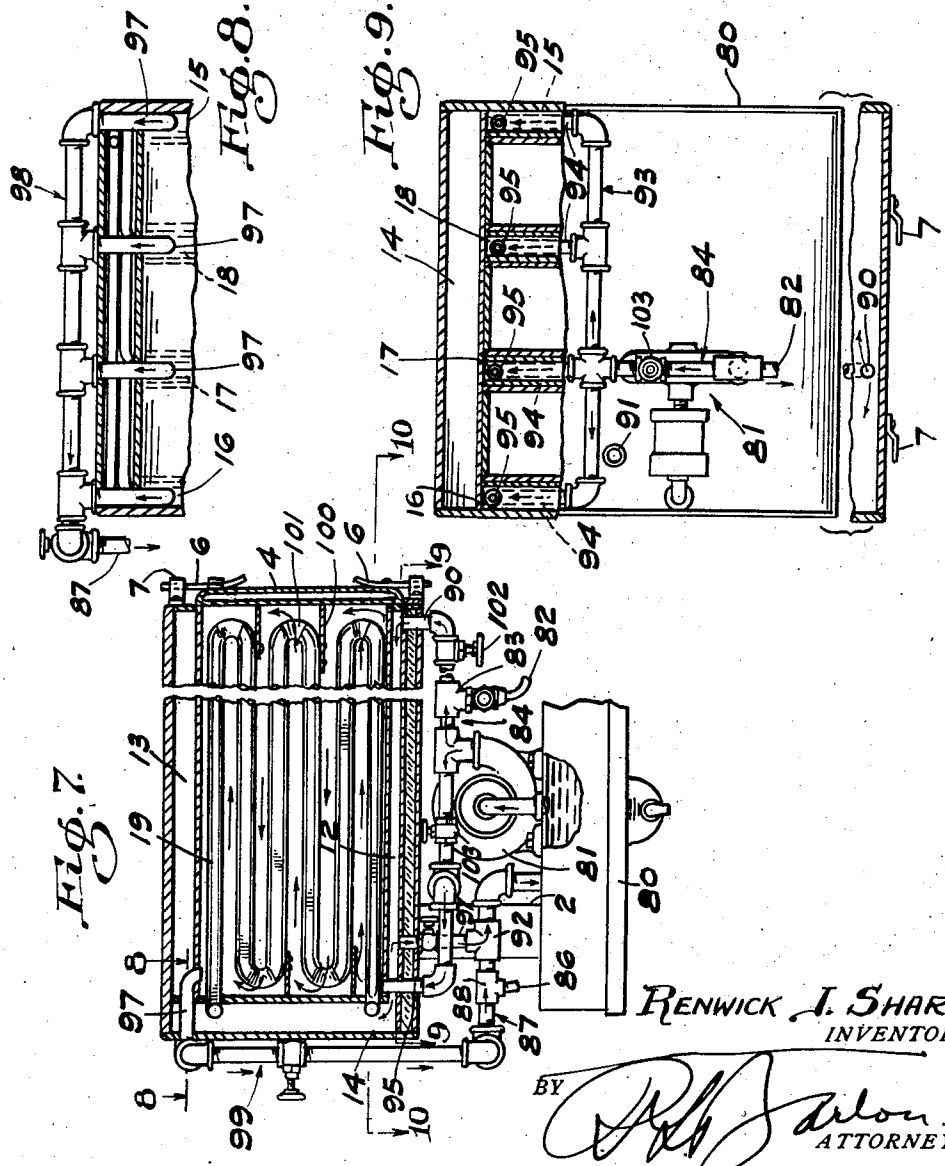
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Fig. 11.

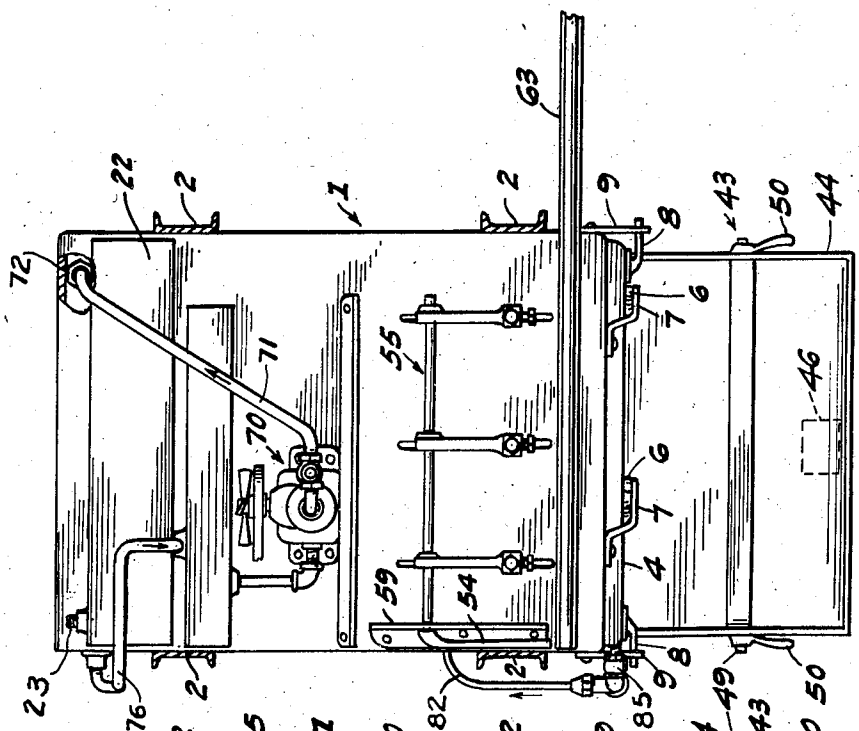
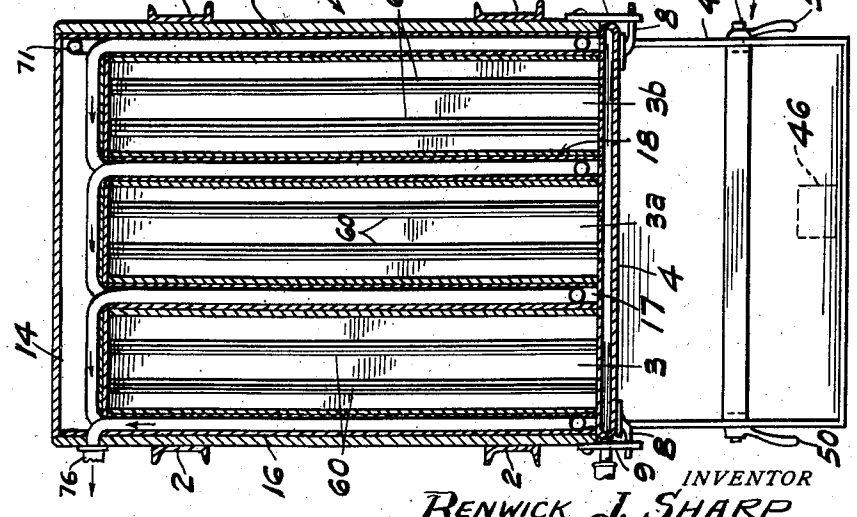


Fig. 10.



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2,429,699

ICE MAKING MACHINE

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Application September 10, 1945, Serial No. 615,387

13 Claims. (Cl. 62—106)

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This invention relates to ice making machines.

More particularly the invention relates to a machine for the freezing of ice, said machine including a double walled mold and cooling coils therefor, provision being made for introducing a heat medium into the walls and around the cooling pipes to defrost the walls engaged by the ice; and it is an important object of the invention to provide a machine capable of producing ice, embodying these characteristics.

Another novel characteristic embodied in the present invention and constituting a further important object of the invention is the improved means for agitating the water to be frozen. This, in the past, has usually been accomplished by passing a single thin tube into the center of the mold which hangs in the cold brine and passing a stream of clean air down to as near the bottom of the mold as possible. The rising bubbles cause a gentle current inside the mold and as a result only pure water is passing into a solid state leaving the natural salts in the water to be progressively concentrated in the center of the forming block. Before this process has continued to such an extent that there is danger of the air tube sticking into the freezing mass the tube is withdrawn and then the core of brackish water is sucked out from above.

In regard to above stated prior art my machine is unconventional. My device is moldless and once the ice making compartments are filled to the overflow point with raw water and the freezing cycle commenced, air is introduced into the water from below at the floor level of the ice compartment. The air bubbles float to the surface and cause a gentle current similar to the conventional way as just explained, but with this difference however, when the ice has formed to such a thickness onto the side walls, that it is imperative for the core water to be removed, this centered brackish core water is allowed to gravitate out of the same pipe through which the air was formerly introduced. After these core centers have been removed as just stated, fresh water can then be introduced via the same air line from a water source governed by a different valve in the line which leads into the air line under the ice compartments.

A still further object resides in the provision of guide means in the bottom of the compartments to restrain the ice block from sliding around, sticking to the walls and maintaining it motionless while being sawed into the proper lengths as it is projected from the compartments. In this respect still further objects reside in the provision of improved means for gaging, jig-sawing and collecting the ice blocks as they leave their respective compartments.

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Another object of the invention is the provision for defrosting the double floor independently of the freezing walls, thus keeping a "weepy-seat" under the ice blocks to insure their being slidably removable.

Remaining objects include the provision of an ice making machine wherein the ice blocks are pulled horizontally; the provision of a machine which can be sold in units with provision for adding other units as desired; the provision of a machine wherein installation costs are less, and fewer dismantled parts are to be re-set up.

Together with the foregoing and other objects in view, the invention still further resides in the novel arrangement and combination of parts and the novel details of construction hereinafter more fully described and claimed, it being understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and being practiced or carried out in possible other various ways. Also, it is to be understood that the phraseology or terminology herein employed is for the purpose of description and not one of limitation, and it is not intended to limit the herein claimed invention beyond the requirements of prior art.

Referring to the accompanying drawings, which illustrate what at present is deemed to be a preferred embodiment of the invention,

Fig. 1 is a fragmentary perspective view of the device, the cover for the triple ice freezing unit being shown in the down-swung, open position.

Fig. 2 is a fragmentary front elevation partly in section.

Fig. 2*a* is a fragmentary front elevation of the structure shown in Fig. 2, the ice-removing picks being shown in an elevated position.

Fig. 3 is a fragmentary section on line 3—3 of Fig. 2.

Fig. 4 is a sectional detail taken through one of the freezing walls.

Fig. 5 is a section taken on line 5—5 of Fig. 4.

Fig. 6 is a section taken on line 6—6 of Fig. 5.

Fig. 7 is a fragmentary longitudinal section, the line of section being indicated by irregular line 7—7 in Fig. 2.

Fig. 8 is a fragmentary transverse section taken on line 8—8 of Fig. 7.

Fig. 9 is a fragmentary transverse section taken on line 9—9 of Fig. 7.

Fig. 10 is a fragmentary longitudinal section taken on line 10—10 of Fig. 7; a fragmentary top portion being shown in plan.

Fig. 11 is a fragmentary top plan view.

Referring in detail to the drawings, the elongated box or casing 1 is supported by and between anchored uprights 2 and containing a plurality of longitudinally extending ice-containing chambers interiorly lined with stainless steel, in the present instance there being three such chambers numbered 3, 3a and 3b, in the single unit shown. Said chambers are furnished with a double-walled door 4 which is held in a water tight relation to the three chamber openings 5 by upper and lower tightening latches 6 which cooperate with keepers 7 and side fastenings 8 engagable by the catches 9. Said door is supported in the open position by means of a pin 10 and the cooperating hooked piece 11.

There is a double walled floor space 12, Figs. 2 and 3, below said chambers, a double walled ceiling space 13 above said chambers, a double walled rear end space 14 (Fig. 10) and double walled side spaces 15 and 16 at the right and left of the chambers with double walled intervening spaces 17 and 18 between said double walled side spaces. The double walled spaces 15, 16, 17 and 18 constitute the four freezing walls inside of which are located the expansion coils 19 of calculated size.

The round pipe which ordinarily forms the expansion coil is, in the present instance, rolled in such a manner that on either side it is partially flattened at 20 as shown in increased scale in Fig. 4. This allows for a larger area of contact between the pipe and its side walls which walls must transmit the heat from the water to be frozen. The expansion coils are not rigidly fixed inside their supporting walls but are sustained suspended therebetween by means of countersunk rivets 21 external to the coiled pipes as shown clearly in Figs. 4 to 6.

Water to be frozen is introduced to the several ice chambers from the bottom it being supplied from a tank 22 located atop of the casing 1. The conduit means whereby this supply is rendered possible consists of the valved conduit 23 which connects the water tank to the 4-way connection 24. From this connection the water is conducted through a conduit 25 which is supplied with three distributing connections 26, 27 and 28 and these connections in turn individually supply the longitudinally extending conduits 29, one under each chamber, from which the water is conducted vertically upward through longitudinally spaced pipe sections 30, 31, 32 and 33 into the chambers 3, 3a and 3b, there being a pipe section 34 extending vertically from each connection 26, 27 and 28 which communicates with a chamber bottom and to each pipe section 34 is connected a horizontal extending branch conduit 35 whose mouth is directed vertically upward and also communicates with a chamber bottom at a point spaced forwardly of the pipe sections 34.

Connection 24 has the opening opposite the intake opening of the valved conduit 23 connected to a nipple 36 to which in turn is fastened a drain valve 37 and opening into said connection opposite the one which connects with the conduit 25 has connected to it a nipple 38 to which in turn is connected the check valve 39. The numeral 40 indicates a rotary washed air producer which blows clean air past the check valve 39 and thence through the openings of the pipe sections 30, 31, 32, 33, 34 and 35 in the bottom of the ice chambers 3, 3a and 3b into the freezing water. When it is desired to remove the core water, instead of sucking a plurality of mold cores, it is only necessary to open the drain valve 37, after first closing the valve 41 in the supply line, and the core water flows out. Then fresh water can be introduced to the point of over-flow controlled by the raw water faucet 42 provided for the box for the three ice chambers and the freezing of the ice completed.

A combination ice pan and ice-measuring device 43 (Fig. 1) is provided comprising a horizontally supported pan 44, the rear side portions of which are attached to the lower part of the front portion of the machine as shown by the flanged part 45 in Figs. 2 and 2a, the front thereof being supported by one or more floor-engaging feet 46. Said measuring device also includes an upstanding bail-like member having at its ends downwardly directed legs 47 which are secured in an adjustable manner to the side walls of the pan. Legs 47 of said device 43 have flat bottomed feet 47a which engage the floor of the pan 44 to keep said device in an upstanding position in all of its adjustments.

By preference and as shown the adjustment is obtained by providing said side walls with horizontal slots 48 through which extend threaded studs 49 fixed to the legs, clamping arms 50 screwing onto the outer end portions of these studs. The slotted portions 48 of the pan sides are provided with graduated scales 51 to indicate how far the ice has been projected from the ice chambers preparatory to sawing it off adjacent to the door openings by means of the traveling motor-driven jig-saw 52 provided for that purpose. The aforementioned bail-like member is provided with a horizontal brace bar 53, the ice abutting against this bar when it has been forced out to the predetermined measured extent.

The means for projecting the elongated frozen blocks of ice forwardly against the measuring device comprises the handle 54 and pick arrangement 55 mounted atop the machine, there being rows of slots 56 in the wall above the ceiling space 13 which vertically aline with slots 57 in the wall and adjacent lining therebelow in which the ice picks operate as the handle 54 is rocked in a slot 58 in the guide bar 59 and then pulled forwardly. Rails 60 situated longitudinally on either side of the openings of the pipe sections 30, 31, 32, 33, 34 and 35 cooperate with the ice picks 61 to keep the ice blocks from slipping during sawing, once they are freed from the surrounding walls by defrosting.

The jig-saw unit 62 is mounted to move backwardly and forwardly in front of the chamber openings, an iron rail 63 being provided as a track therefor, said rail being in the form of a U with the arms of the U embracing the top and bottom walls of the machine. The jig-saw unit is provided with a handle 64 whereby the saw 52 is held against the ice blocks during sawing, said handle being also used to propel the saw along its track. A spring 65 is also provided in the jig-saw unit for augmenting the downward cutting of the jig-saw. As the electric jig-saw is passed in front of the chamber openings the ice blocks are sawed into unit size whence they drop into the pan 44 from which they are either placed aboard a wagon or stored for future use.

Some standard form of refrigerating unit suitable to supply the expansion coils with a refrigerant, whereby the water in the supplied com-

partments is frozen, is furnished in the conventional unit 70 mounted atop the rear end of the machine. From this unit runs a pipe 71, provided with an expansion valve 72. Said pipe enters the top wall of the machine as seen in Fig. 11 and is projected downwardly in the space 14 (Fig. 3) to a point adjacent the floor in line with and in the rear of the space 15 (right portion of Fig. 2). From this point the pipe is directed horizontally and then is caused to run upwardly in a serpentine fashion throughout the length and height of the space 15, the upper run of the pipe then being directed horizontally through said space 14 to a point opposite to the next inter-wall space 18. Thereupon said pipe is directed downwardly to a point adjacent to the floor and opposite to the lower portion of said space 18. From this point said pipe is directed horizontally forward as the lower run of an ascending series of runs in said space 18 in the same manner as those in space 15, already described. This arrangement of communicating series of ascending serpentine pipe runs is continued through the inter-wall spaces 17 and 16, the pipe having a terminal run 76 (see Fig. 10) located on top of the casing to return the refrigerant to the refrigerating unit 70.

The continuity of travel of the refrigerant in a serpentine fashion as just described where it is changed from a liquid to a gas and vice versa is well known and constitutes per se no part of the present invention, hence further description thereof is deemed unnecessary. However, the presence of the coils in the double walls and the manner of defrosting whereby the ice is loosened from the freezing walls is an important object of this invention and the manner in which this result is achieved will now be set forth.

Subjacent the machine 1 is situated a tank 80 containing a suitable oil which is kept sufficiently hot for use in defrosting by electricity thermostatically controlled. For circulating the oil I provide a pump 81. Considering first the door 4, it is made double walled (see Figs. 3, 7 and 10) thereby providing an oil-containing chamber within it. Communicating with the upper portion of said door chamber is a flexible conduit 82 leading from the fixture 83 in the main distributing conduit 84. A check valve 85 is shown in the conduit 82 adjacent a side edge of the door. Leading from the lower side edge of said door is a second flexible conduit 86 through which the oil is drained back into the tank 80 through the medium of the conduit 87 including the fitting 88 to which the flexible conduit 86 is connected.

The spaces 12 and 14 in the double walled floor and end wall may be heated independently of the door and freezing walls 16, 17, 18 and 15. This is desirable in order to free the ice from the bottom of the ice compartments and to provide a "weepy-seat" for the ice to aid its slipping. For this purpose I provide a pipe section 90 (see Fig. 7) leading from the distributing conduit 84 and opening into the space 12. For the return of the heated floor and end wall liquid I provide the valved pipe section 91 which communicates with the fitting 92 in the conduit 87.

The spaces 16, 17, 18 and 15 in the freezing walls are supplied with a hot liquid by means of the conduit 93 which branches off in a direction both to the right and to the left from the main distributing conduit 84 as seen in Fig. 9. From said branched conduit 93 horizontal pipe sections 94 conduct the liquid through the openings in the vertical pipe sections 95 into the bottoms of the respective hollow freezing walls. The pump

81 forces the liquid upwardly in a sinuous direction between the piping to the top of said freezing walls and out at the top through the bent pipe sections 97 (Figs. 7 and 8) into the conduit 98, through the vertical conduit 99 (Fig. 7) and conduit 87 to the tank. The upward sinuous flow is prevented from short-circuiting by the baffle plates 100 (Fig. 7) and the denting of the pipe's elbows as indicated by the numeral 101 in Figs. 5, 6 and 7. Shut-off valves 102 and 103 are provided in the main distributing conduit 84 for independently controlling the flow of the hot liquid to the floor and end wall spaces 12 and 14 and the freezing wall spaces 16, 17, 18 and 15.

Operation

With the door or cover 4 locked in place, water is permitted to flow from the tank 22 into the ice compartments 3, 3*a* and 3*b* through the pipe sections 30, 31, 32, 33, 34 and 35, until the point of overflow determined by the faucet 42 is reached. With the compartments filled to the predetermined mark the compressor of the refrigerating unit is started and the refrigerant passes continuously into the expansion pipes 19 situated inside the freezing walls 16, 17, 18 and 15 and which are in plain contact with them. Heat is withdrawn from the water slowly, which at the same time is being gently agitated by air bubbles rising from the pipe sections 30, 31, 32, 33, 34 and 35 supplied by the air compressor 40 after the closing of the valve 41, fresh air being filtered by means of a suitable air filter 104 attached to the compressor.

The concentration of brackish water towards the center line of the individual compartments takes place as the pure water loses its latent heat and deposits itself by freezing on the growing bulge of ice forming on the freezing walls as they advance to join at the middle. This advance to join is halted before its completion because of the necessity to remove as much of the salty water as possible from the freezing ice, tending to shorten freezing time and to keep as little as possible of a white center or core in the finished ice blocks. This action is temporarily arrested by stopping the air compressor and opening the drain valve 26 thus allowing the brackish core water between the forming ice bulges to flow out. Next the valve 26 is closed and the valve 41 opened in order to introduce pure water into the ice cores vacated by the brackish core water and filling to the overflow mark as before, whence the freezing process is continued with the only difference that this time no more air is sent into the center. The mass freezes slowly, finally closing the center line solid, leaving a white line of minimum thickness at the point of closing contact of the two oppositely formed bulges.

Thereupon, refrigeration is stopped and the centrifugal pump 81 is started operating. By opening the valve 103 the hot liquid is pumped into the freezing walls at the bottom through pipe sections 95 and zig-zags its way to the top of said walls. Simultaneously the hot liquid is sent into the double metal face of the door 4 melting it away from the ends of the ice blocks. This defrosting is kept up until the walls are melted clear of the ice blocks after which the hot liquid is caused to circulate between the double bottom 12 up to and including the end space 14, thus freeing the ice blocks on five sides, and the top is not stuck to anything being free from the ceiling cover of the compartments.

The pick handle 54 is then operated to drive

the picks 56 into the ice blocks within the compartments, after which the handle is pulled and the three blocks of ice slide forwardly on the rails 60 and "weepy" floors to emerge from the openings of their compartments. Once these blocks are fully out and touching the gage 43, the picks together with the rails serve to clamp the ice blocks while the saw 52 saws off the pre-calculated sized pieces.

The two track rails 60 of each refrigerating compartment project upwardly as to their widths from the floor of the compartment and therefore become embedded in the lower portion of each ice-block formed. When these rails become heated by the defrosting liquid the ice block no longer adheres to them so that they then loosely occupy grooves in the lower face of the block. Hence, while projecting end portions of the block are being sawed in the manner which has been described, said rails stabilize the block against displacement notwithstanding the lateral pressure of the saw thereagainst.

I claim:

1. In a refrigerating apparatus of the kind described, a casing containing an elongated ice compartment with a door opening at an end thereof, a door for said opening, track means in the lower part of said compartment and positioned to guide ice blocks therefrom through said door opening, an ice saw unit including a saw proper and an operating motor therefor, and a track for said saw unit positioned to guide it back and forth in front of said door opening while being operated to saw off the protruding portion of an ice block.

2. The subject matter of claim 1, and said saw track having two parallel portions one of which is located above said door opening and the other therebelow and said saw unit having a two part means for mounting the saw proper, one part of said means traveling along said upper portion of the track and the other part thereof traveling along said lower track portion with the saw proper extending between them.

3. In a refrigerating apparatus of the kind described, a casing containing an elongated rectangularly shaped ice compartment with a door opening at an end thereof, a door for said opening, there being a longitudinally extending row of apertures opening into the bottom side of said ice compartment, and a rail on the floor of said compartment a parallel spaced relation to each side of said row of apertures and extending from front to rear of said ice compartment.

4. In a refrigerating apparatus of the kind described, a casing containing an elongated ice compartment with a door opening at an end thereof, a door for said opening, track means in the bottom of said compartment and positioned to deliver ice blocks therefrom through said door opening, ice-receiving means in front of said door opening to underlie projecting end portions of ice blocks protruding through said door opening, an ice saw unit including a saw proper and an operating motor therefor, a track for said saw unit positioned to guide it back and forth in front of said door opening while being operated to saw off the protruding portion of an ice block, and ice measuring means comprising a stop carried by said ice-receiving means and adjustable at varying distances from the door opening, the projecting ends of the ice blocks being abuttable against said stop.

5. In a refrigerating machine of the kind described, an elongated refrigerating compartment

substantially rectangular in cross section and having a door opening in an end thereof through which ice-blocks frozen therein are withdrawable, a floor for said compartment, and an ice track in the bottom portion of said compartment comprising a plurality of rails which as to their heights upstand from said floor so as to have their upper portions embedded in the ice-block formed in said compartment, defrosting means constructed and arranged to defrost the ice from wall portions and the floor of said compartment and warm said rails so as to loosen a formed ice-block from them, means to move said ice-block along said track in a direction to project its end portion outwardly through said door opening predetermined distances, and means mounted adjacent to said door opening to saw off the projecting portion of said ice-block.

6. The subject matter of claim 5, and said ice sawing means comprising a vertically extending saw blade mounted to cut into one of the vertical sides of the projecting portion of the ice-block occupying said door opening, said rails at such time loosely occupying grooves in the lower face of the ice-block to hold the block stationary against the action of the saw blade.

7. In a refrigerating apparatus of the kind described, a casing comprising double walls, means to introduce water to be frozen in the space surrounded by said double walls, refrigerating means including a sinuous refrigerant conduit having reversely directed runs fitted between the side portions of said double walls, said conduit runs being fastened where they engage said side portions, thereby increasing the refrigerating action, baffle plates associated with alternate bends in said sinuous conduit thereby forming between the runs of said conduit a second back-and-forth fluid flow channel, and means to cause a defrosting liquid to enter and fill said second back-and-forth fluid flow channel, said sinuous conduit having back and forth runs united by bent portions, said bent portions having depressions in them through which the defrosting liquid passes as it flows through said second back-and-forth fluid flow channel.

8. In a refrigerating apparatus of the kind described, a casing containing an elongated ice compartment with a door opening at an end thereof, a door for said opening, track means in the bottom of said compartment and positioned to guide ice blocks therefrom through said door opening, ice-receiving means in front of said door opening to underlie projecting end portions of ice blocks protruding through said door opening, ice measuring means comprising a stop carried by said ice-receiving means and adjustable at varying distances from the door opening, the projecting ends of the ice blocks being abuttable against said stop, and means for projecting an elongated frozen ice block forwardly from said ice compartment against said measuring device, the latter means comprising a pick and handle therefor mounted atop the casing, there being a longitudinally extending slot in the top wall of said casing which vertically alines with a longitudinally extending slot in the ceiling of said ice compartment therebelow in which said pick operates by manually rocking said handle and pulling said handle forward.

9. In a refrigerating apparatus of the kind described, a casing containing an elongated ice compartment with a door opening at an end thereof, a door for said opening, track means in the bottom of said compartment and positioned

to guide ice blocks therefrom through said door opening, and means mounted atop said casing and extendable into said ice compartment for projecting said ice blocks through said door opening.

10. The subject matter of claim 9, and, said track means comprising a plurality of rails which as to their heights upstand from the bottom of said compartment so as to have their upper portions embedded in the ice-block formed in said compartment.

11. In a refrigerating apparatus of the kind described, a casing containing an elongated ice compartment with a door opening at an end thereof, a door for said opening, track means in the bottom of said compartment and positioned to guide ice blocks therefrom through said door opening, means mounted adjacent to said door opening to saw off the projecting portion of said ice-blocks, and means mounted atop said casing and extendable into said ice compartment for projecting said ice blocks through said door opening.

12. The subject matter of claim 11, and said ice sawing means comprising a vertically extending saw blade mounted to cut into one of the

vertical sides of the projecting portion of the ice-block occupying said door opening, said ice projecting means cooperating with said track means to keep the ice blocks from slipping during the sawing operation.

13. The subject matter of claim 8 and, a guide bar including a longitudinally extending slot secured atop the casing, said handle being slidably mounted in said guide bar slot to move the ice blocks forwardly through the medium of said pick.

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