

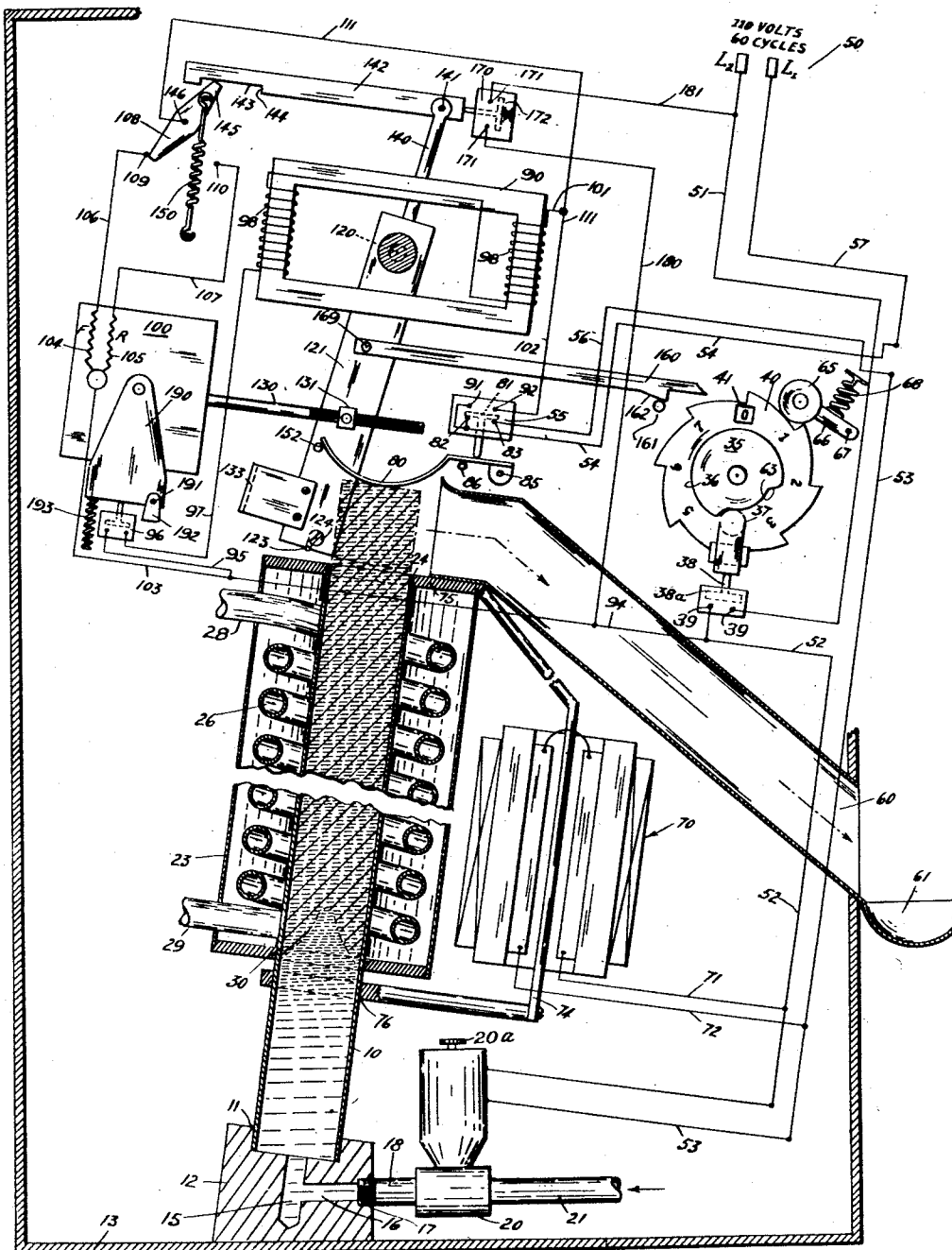
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ICE CUBE DISPENSER

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ICE CUBE DISPENSER

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My present invention relates to refrigerators and more particularly to automatic means for producing and dispensing ice cubes therefrom.

In mechanical refrigerators now in commercial and home use, the means provided for the production of ice cubes in almost all cases comprises a tray adjacent to the freezing chamber or compressor. Water is placed in the tray which may be divided into cells by suitable devices and the tray is placed in the compartment adjacent the compressor. When the tray is left in the freezing compartment for a sufficient period of long time, the water freezes solid in the various cells within the tray. Then, in order to obtain ice cubes, the tray must be removed from the refrigerator and the ice cubes removed from the cells in the tray. This, as is commonly known, frequently involves a difficult task in first removing the tray itself from its compartment, and then in removing the ice cubes.

During the process of obtaining ice cubes from the tray, the cubes are frequently individually handled and subject to contamination. Also, as commonly occurs, water must be flowed over the tray and ice cubes in order to release the cubes from the cell walls. This results in a loss in volume of the ice cubes and consequent waste.

Many devices have been used in order to facilitate the release of the tray from its compartment and release of the ice cubes from the cells within the tray. If frequently happens however that the elements of these various facilitating means freeze solid at their joints and must be melted by hot water or considerable manipulation; this also leads to loss in volume or contamination of the ice cubes.

Some few attempts have been made to provide means for freezing and ejecting ice cubes without requiring any manipulation of the same, but these means have been complex and difficult in operation, and virtually impossible to operate or handle by the ordinary unskilled home user. Consequently, they have not gone into commercial use.

My present invention contemplates an automatic means for freezing and dispensing ice cubes up to any desired number or predetermined maximum, wherein the unskilled home user or operator need merely operate a dial or indicator to predetermine the number of ice cubes to be delivered at any particular time. Thus, in actual operation where the unskilled home user desires ice cubes, he need merely turn a dial to, say, the number 3, and immediately

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thereafter three separate ice cubes will be delivered to a container or holder secured or manually held adjacent an opening in the refrigerator wall.

In carrying out my invention, I utilize a combination of hydraulic and electrical operating means which are simple in construction and readily adaptable for use in ordinary household refrigerators as well as in commercial refrigerators. Nor need my invention necessarily be combined with household or commercial refrigerators; it may comprise a separate ice cube freezing and dispensing unit by itself.

Essentially, my invention comprises a vertical tube to the bottom of which water under ordinary or household pressure may be admitted when required. The upper portion of the tube is surrounded by a freezing coil which freezes the water. When the dial is set to dispense ice cubes, a valve is automatically opened which connects the main or household supply under pressure to the bottom of the tube, thus admitting water under pressure to the bottom of the tube and creating upward pressure on the bottom of the ice column. At the same time, the upper wall of the tube adjacent the ice column is heated in order to loosen the ice column and to permit the hydraulic pressure at the bottom of the tube to force the ice column up. Also at the same time a cutting wire is heated and actuated to cut off sections of the ice column as they emerge from the top of the tube and to push these cut off sections out through a dispensing chute.

When the dial is set for a specific number of ice cubes, then immediately on the setting of the dial, the unit will continue to operate and repeat itself until the set number of ice cubes is delivered, at which time it will automatically cut itself off.

Accordingly, a primary object of my invention is the provision of a simplified and automatic ice cube making and dispensing unit.

Another object of my invention is the provision and arrangement of simplified ice cube making and dispensing units so that the same may be incorporated in and made a part of an ordinary mechanical refrigerator.

Another object of my invention is the provision of an ice cube making and dispensing unit which requires no care or manipulation on the part of the user, except when he desires to obtain ice cubes, at which time it will only be necessary to turn a dial to obtain the desired number of cubes.

Another and corollary object of my invention is the provision of means for making and dispensing ice cubes which obviates the necessity for handling water trays or manually dealing with other sources of water supply and which obviates the need for handling the cubes in order to remove them from the unit which makes the same.

These and many other objects of my invention will become apparent in the following description and drawings in which the figures show schematically the construction, operation and function of the various units and electrical circuits of my invention.

Referring now to the figure, my invention comprises a substantially vertical metallic column or tube 10, the said tube being secured in any suitable manner in the socket 11 of the base block 12 which is mounted on the base 13 of the housing of the mechanism. Stainless steel is preferred for the tube 10 because of its mechanical strength, providing freedom from denting, its corrosion resistance and its relatively high electrical resistance (for purposes hereinafter pointed out). Other metals such as Nichrome, bronze alloys and other alloys and compositions may also be used.

The metal base block 12 is provided with connecting passages 15 and 16 forming a connection between the base of the tube 10 and the pipe 18. Pipe 18 is connected in any suitable manner to the passage 16, as, for instance, by being screwed into the tapped end 17 of the passage 16. The pipe 18 is connected by the solenoid operated valve 20 to the water supply pipe 21, which in turn is connected to a suitable source of water under pressure, ordinarily the ordinary household supply source. In most cases, pipe 21 may be connected to the cold water supply pipe in the kitchen.

The vertical stainless steel column or tube 10 is surrounded over its entire upper extent by the insulated housing 23 which extends from the top level 24 of tube 10 down to within 6 or 8 inches of the socket 11 in block 12 in which the tube 10 rests. Depending upon the size of the refrigerator in which my ice cube apparatus is to be incorporated or the size which the housing of the ice cube manufacturing unit is to fit, the tube 10 may be from 2 to 5 feet long. When a single unit is to provide hundreds of ice cubes, the tube may be made in spiral form with no change in its curvature from some point below the freezing chamber up to where ice cube ejection occurs.

A refrigerating coil 26 is provided in the space supplied by the insulated housing 23 in order to freeze the water in that part of the tube 10 which the said refrigerating coil and housing surrounds.

The refrigerating coil may be connected to any suitable source of refrigerant, any suitable compressor and other mechanical equipment for cooling the refrigerant by means of the pipes 28 and 29 which are connected to the coil 26 at opposite ends thereof.

Assuming for the time being that the unit has already been placed in operation with water filling the tube 10 up to the top level 24, then as the cooling operation proceeds, owing to the passage of refrigerant through the cooling coil 26, the water in the tube 10 freezes above the level 30 and up to the level 24. The water between level 30 of the tube and the socket 11 in which the tube rests remains in the liquid state. In extreme cases where no ice cubes have been extracted from

the tube 10 for a long period of time, the water in the tube may freeze down below the level 30 by reason of conduction along the sides of the tube 10 and possibly some slight convection through the water; but for obvious reasons which are well known will not under any circumstances freeze solidly down to the very bottom of the tube 10.

In ordinary circumstances, however, where ice cubes are extracted from the mechanism at least daily or even less frequently, but at relatively closely spaced intervals, the water in the tube will rarely, if ever, freeze below the level 30, and in most cases where ice cubes are frequently withdrawn from the unit, the water level in the tube or the ice level will often be above the level 30.

In order to place the device initially in operation, the cam 35 is rotated in a manner hereinafter pointed out so that the ledge 36 thereof rides on the roller 37 to press down the contact arm 38 and bridging contact 38a to bridge the contacts 39, 39 against the action of a compression spring (not shown). For this purpose, a handle (not shown) attached to the cam 35 may be rotated until the numeral "1" on the ratchet 40 attached to the cam 35 is visible in the window 41. This will close an operating circuit to the solenoid operated valve 20 in order to open the said valve and to open the connections from the pipe 21 to the bottom of the tube 10.

The circuit to valve 20 will be made from the source of current 50 along the conductor 51 to the contacts 39, 39 which are bridged by the contact arm 38, then along the conductor 52 to the solenoid operated valve 20, then along conductor 53 to conductor 56 through the lower contacts 52-53 of the microswitch 55 to the conductor 54, then to conductor 57 and back to the source 50.

Water under household pressure will then flow from pipe 21 through the valve 20 through the conduits 16 and 15 and into the lower end of the tube 10 and will fill up the tube 10 up to the upper level 24. The operator, when placing the apparatus initially in operation will watch the outlet of the chute 60 and container 61. As soon as the water rising in the tube 10 overflows at the level 24 and flows down the chute 60 into the container 61, the operator should then rotate the cam 35 so that the numeral "0" will appear in the window 41, thus moving the cam 35 from the portion where the ledge 36 bears against the roller 37 to the portion where the recessed surface 63 bears against the roller 37 so that the spring operated bridging contact 38 may raise the same. This will open the circuit to the solenoid operated valve 20 to close valve 20 and thus shut off the water supply to the tube 10. The water level in tube 10 will then initially be maintained at the upper level 24.

The introduction of the circulating refrigerant into the coil 26 through pipes 28 and 29 will now chill the water in the tube 10 to form ice from the upper level 24 substantially down to the level 30. After the column of water in the tube 10 has been frozen in the manner above described and should it now be desired to obtain ice cubes, the operator will turn the handle (not shown) of the cam 35 until the indicia in the window 41 will show the number of ice cubes desired.

A roller 65 rotatably mounted on the lever 66 which is pivoted on the pin 67 is spring loaded by compression spring 68 to bear on the outer surface of the ratchet 40 which is attached to the

cam 35 and maintains its predetermined position. Should, for instance, three ice cubes be desired, the operator need merely turn the cam 35 until the numeral "3" appears in the window 41. When any number other than zero appears in the window 41, the surface 36 of the cam 35 will depress the roller 37 of the bridging contact 38 to bridge the contact 39, 39.

This, as previously described, will close the circuit for the solenoid operated valve 20 thereby opening the valve and admitting water under household pressure from the pipe 21 to the bottom of the tube 10, thus exerting an upward and outward pressure on the column of ice above the level 30.

At the same time, and when the contacts 39, 39 are bridged by the bridging contact 38, the transformer 70 is energized from conductors 71 and 72 connected respectively to conductors 52 and 53. The transformer 70 is a low voltage transformer with a through type secondary 74. Secondary 74 is brazed to the top of the tube 10 at 75 and to the lower part of the tube 10 at 76 just below the refrigerated section. The material of the tube 10 is employed as the resistance element in the secondary circuit of the transformer 70.

The transformer 70 is so designed that when energized from a 110 volt 60 cycle supply, about 600 amperes will flow in the heavy current circuit of the secondary which includes the tube 10 at a voltage of about 1 volt, thus producing about 600 watts of heat in the refrigerative portion of tube 10. In this case, as soon as the transformer and the solenoid are energized by the bridging of the contacts 39, then within a few seconds, the heat generated in tube 10 will free the ice column above the level 30 and permit the household water pressure which is pushing up below the frozen column to move the column vertically at a rate of speed determined by the water pressure and the adjustment of the valve 20.

A manual adjustment may be provided for valve 20, as indicated by the adjusting screw 20a, to permit satisfactory rate of feed under pressure variations which might occur in different localities. Adjusting screw 20a may adjust the pressure of the resetting spring of the valve to vary the opening obtained by the valve, or it may adjust a stop predetermining maximum travel of the valve.

When the column of ice is raised up a distance determined by the position of the limit arm 80, this arm will be moved vertically a small distance operating the micro-switch 55 so that the bridging contact 81 thereof will move away from the contact 82 and 83 which were connected respectively to conductors 54 and 55. This will open the solenoid operated valve circuit 20 and the transformer circuit, thus de-energizing the solenoid of valve 20 and the transformer 70, cutting off the water supply which produces the pressure to lift the ice column and cutting off the heat which frees the ice column.

The limit arm 80 may be a piece of spring metal mounted at 85 and supported by the pin 86. The essential function of the limit arm 80 therefore is that when it is struck by the upwardly moving column of ice, it will stop the column of ice from rising by closing the valve which forces the column of ice up.

At the same time, when the limit arm 80 is thus raised to open the circuits of the transformer 70 and the solenoid operated valve 20, it is raised

to close a circuit to the small low voltage transformer 90 and the split series universal motor 100.

The circuit to motor 100 and transformer 90 is closed by reason of the fact that when the limit arm 80 is raised, the bridging contact 81 of the micro-switch 55 bridges the contacts 81 and 82. When the upper contacts 81, 82 of the micro-switch 55 are bridged by the bridging contact 81, the low voltage transformer 90 is energized over the following circuit; from the source of current 50 over the conductor 51 to the contacts 39, 39 (which have been bridged by the bridging contact 38 operated by the cam 35) to the conductor 94, then to conductor 95, through the micro-switch 96, the conductor 97, the primary 98—98 of the low voltage transformer 90, the conductor 101, the conductor 102, then through contacts 92—81—91 of the micro-switch 55, the conductor 54, and back to the source of current 50.

The split series universal motor 100 is energized from the source of current 50 over conductor 51 through the bridge contacts 39, 39 which has been bridged by the bridging contact 38 over conductor 94, over conductor 103 and through the coil 104 or 105 of the motor 100; then over conductors 106 or 107 to the limit switch 108 which has the contacts 109 and 110; then over conductor 111 to conductor 102, then over the contacts 92—81—91 of the micro-switch 55, then over conductor 54 back to the source 50.

The secondary of the low voltage transformer 90 consists of a copper rod 120 which has fastened to it at its two ends, two copper side pieces 121; their assembly together with the copper secondary 120 forms a U-shaped secondary circuit. This assembly is mechanically carried on bearings (not shown) surrounding extended portions of secondary conductor 120. The lower end of these copper side pieces 121 represents the secondary transformer terminals, the circuit being completed by a piece of resistor wire 123 which is caught under screws 124 on the end of the side pieces 121. The transformer 90 is so designed that when it is energized from a 110 volt 60 cycle line, a current on the order of 100 amperes at 1 volt will flow through the resistor wire 123.

As previously mentioned, both the low voltage transformer 90 and the split series universal motor 100 are simultaneously energized when the column of ice rises to the predetermined position. The toggle limit switch 108 is, in the position shown in the figure at the initiation of the operation, arranged so that it will energize the coil 104 of the motor 100 to rotate the threaded shaft 130 to drive trunnion nut 131 toward the right. The trunnions of nut 131 are mounted in holes on the inside surfaces of the side pieces 121, and are insulated in any suitable manner as, for instance, by insulating caps over the ends of the trunnions. Consequently, any motion of trunnion nut 131 toward the right or toward the left will be communicated to the side pieces 121 and cause them to rotate with the pivotally mounted conductor 120.

Thus, when the trunnion nut 131 is moved to the right, the entire swinging assembly constituting the secondary circuit of transformer 90 is swung to the right. This action presses hot wire 123 against the protruding portion of the ice column and when the entire stroke is completed, the upper portion of the ice column is free from the lower part. Further motion of the secondary assembly causes the U-shaped insulated bracket

133 mounted across the side pieces 121 to push this free ice block to the right into the chute 60 of the refrigerator and down through the opening thereof into the basket or receptacle 61.

When the extreme right hand travel of the secondary circuit of transformer 90 has accomplished the above movement, it will be obvious that the upper arm 140 attached to one of the side pieces 121 will be rotated toward the left. This end 140 is connected by the pin 141 to the arm 142 which has a slot 143 which engages end 145 of the limit switch arm 108. Consequently, on completion of the movement of the entire secondary assembly of the transformer 90 to the right, the upper arm 140 will have been moved to the left and the surface 144 of the arm 142 will bear against the portion 145 of the limit switch arm 108 to cause the same to rotate about its pivot 146 and break the contact between the switch 108 and contact 109 and make the contact between the switch 108 and contact 110.

This will de-energize coil 104 of motor 100 which drives the trunnioned nut 131 toward the right and will energize the reverse coil 105 which will drive the trunnioned nut 131 toward the left. The limit switch 108 is maintained in appropriate contacting position by the over-center snap spring 150. The reverse movement of the trunnioned nut 131, owing to the reversal of the universal split series motor 100, will therefore return the swinging secondary unit of the transformer 90 to the original position shown in this figure.

It will be observed that the initiation of the cut-off equipment was caused by the rising column of ice actuating the micro-switch 55 by raising the limit bar 80. As soon as the secondary moving assembly 121 and associated units has progressed a short way toward the right, the pin 152 fastened between the arms 121 rides on the bottom edge of the limit bar 80 maintaining the upward position of the limit bar 80 and its associated micro-switch 55 even after the ice block which contacted the lever 80 has been ejected. This condition is maintained until the above described reversing function has taken place, and the moving assembly carried by the bars 121 has returned to its initial neutral position.

The manual operating mechanism or pre-set, which may be set for any number of ice cubes up to a predetermined maximum, has already been described. This comprises a cam 35 and an appropriate operating handle therefor, the ratchet 40 which is attached to and rotates with the cam 35, and the spring loaded roller 65 which maintains the ratchet in selected position. The knob (not shown) which operates the cam 35 may be rotated in either direction so that the indicia on the ratchet 40 will pass through the window 41. As the cam 35 and associated ratchet are rotated so that indicia other than zero appear through the window 41, the roller 37 is depressed by the surface 36 of the cam, bridging the contacts 39, 39 by the bridging contact 38 as previously described. Whatever number appears in the window 41, or is caused to appear in the window 41, will predetermine the number of ice cubes which will successively be delivered without further attention through the chute 60 and into the basket or receptacle 61. The ratchet 40 has one tooth for each number of ice cubes desired.

The ratchet 40 is engaged by the pawl 160 during the operation of the device. The pawl 160 is supported by the stationary pin 161 acting on the chamfered surface 162 of the pawl 160 so

that pawl 160 will not drop into engagement with the teeth of the ratchet 40 until the pawl is moved toward the right. Pawl 160 is pivotally mounted at 169 on one of the arms 121 which are supported from the copper conductor 120. Consequently, pawl 160 will be moved to the right once during each movement of the arms 121 and the associated secondary assembly of the transformer 90 toward the right.

In order to illustrate the continuous operation of the device to automatically eject the desired number of ice cubes, let it be assumed that everything is in neutral position, and the contacts 39, 39 are not connected by the bridging contact 38. The micro-switch 170 having the contacts 171, 171, which are bridged by the bridging contact 172, is in parallel with the micro-switch 38 which has the contacts 39, 39 bridged by the bridging contact 38a. The contacts of micro-switch 170 are normally closed at any time when the mechanism is in operation, but these contacts are normally open when the elements are in the neutral position shown in the figure.

Assuming, now that, for instance, three ice cubes are desired, the adjusting knob which rotates the cam 35 is manually turned in either direction until the number "3" appears in the window 41. This manual operation causes the cam 36 to close the micro-switch 38a energizing the transformer 70 and the solenoid operated valve 20 simultaneously. As previously described, the frozen ice column rises until limit bar 80 is moved upward starting the cut-off cycle, as previously described.

This cycle of operation was previously described in all its details, except for its relation to the manually operated automatic pre-set controller. As the cut-off assembly swings to the right, pawl 160 moves down and to the right, engaging the ratchet wheel 40 and moving it one tooth. Successive operations of this entire cycle will each cause the ratchet wheel 40 to move clockwise one tooth per operation.

If, as assumed, the device has been set for three ice cubes, ratchet wheel 40 would have moved clockwise three teeth, and the instant that this would occur, the cut-off assembly would be in its right hand (non-neutral) position. Simultaneously with this, the surface 63 of the cam 35 will have moved opposite the roller 37, thus opening the micro-switch 38a. If nothing were done to maintain this master circuit at this time, the cycle of operation would not be completed, and the operators would remain stationary at the point where the cutting wire 123 has moved completely to the right. This, however, is taken care of by the micro-switch 170 whose main function is to maintain power on the cut-off assembly from the time when the last desired ice cube has been ejected until the cut-off assembly has returned to its neutral position. An additional function of micro-switch 170 is to ensure the return of the cut-off assembly to its neutral position even if the operator should rotate cam 40 until "0" is in window 41 prior to the completion of a cut-off cycle. Micro-switch 170 parallels micro-switch 38a and will be closed and maintain the circuit initially closed by micro-switch 38a at any time other than that at which the elements are in the neutral position. Only in the neutral position will the micro-switch 170 be opened, thereby terminating the operation of the entire apparatus.

It will be obvious from an examination of the figure that micro-switch 172 is in parallel with

micro-switch 38a: Conductor 94 connects conductor 94 with one terminal of the micro-switch 170, the said conductor 94 being connected to one terminal of the micro-switch 38, and conductor 181 connects to the other terminal of micro-switch 170 with a conductor 51 which is connected to the other terminal of micro-switch 38a.

The split series universal motor 100 is mounted on the bracket 190 which is pivotally mounted at 191 on the bracket 192. The motor assembly 100 is maintained in appropriate position by the compression spring 193 which biases the same upwardly.

I have found that if sufficient current is passed through the wire 123 to cut off the ice cube in a satisfactorily short time, wire 123 would become overheated and possibly be destroyed if it were not in contact with the ice cube.

Micro-switch 96 assures that the only time current passes through wire 123 is when wire 123 is pressing against the ice column.

Micro-switch 96 is mounted beneath the bracket 190 in such position that the rotation in a counterclockwise direction of the bracket 190 about its pivot 191 against the pressure of compression spring 193 will close the circuit between conductors 95 and 97. The compression spring 193 is so adjusted as to resist rotation of the bracket 190 about the pivot 191 for any normal force which may be expected to be exerted on the bracket 190. That is, the compression spring 193 bearing against the bracket 190 normally biases the motor 100 upwardly and toward the right. The low voltage transformer 90 is thus not energized as long as the micro-switch 96 is open.

When the wire contacts the ice column in the cutting direction, as the motor operates the trunnioned nut 131 toward the right, the back pressure on the motor shaft 130 tends to rotate the motor 100 and its bracket 190 about the pivot 191 compressing the compression spring 193 and hence closing the micro-switch 96, thus connecting the conductors 95 and 97, and thus energizing low voltage transformer 90. The current in the secondary circuit assembly of the low voltage transformer 90 will now heat up the wire 123 so that the cutting operation will be performed. Consequently, the wire 123 will not be heated up until sufficient back pressure on the motor bracket 190 about the pivot 191 develops owing to engagement of the wire against the ice column.

The apparatus of my invention is neither complex nor space consuming, and is readily adapted for incorporation into existing refrigerators, although it is primarily intended that it be incorporated in newly manufactured refrigerators. It may also be embodied in separate units which may readily be inserted in the refrigerator itself, or alongside the same, and requires only a single electrical plug, a single connection to a source of water under pressure and a connection to a source of refrigerant. Since these connections commonly exist in many refrigerators, no additional outside connection may be necessary. In such refrigerators as do not utilize a water supply as part of the cooling system, the only additional connection required is the connection to the cold water pipe in the house.

In the foregoing, I have described my invention only in connection with the preferred schematic embodiment thereof shown in the figure. Many variations and modifications of my inven-

tion should now be obvious to those skilled in the art, and many applications of my invention to various devices should now also be obvious. Accordingly, I prefer to be bound not by the specific disclosures herein but only by the appended claims.

I claim:

1. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column; said cut-off member being periodically actuated into cutting action in response to the movement of said frozen column.

2. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; and manually operated switch means for initiating the operation of said column moving means; and a connection between said cut-off member and said manually operated switch means to re-set said switch to neutral position on completion of the cutting operation; means for setting said switch means for a predetermined number of cubes; said re-setting connection operating said switch means step by step to neutral as the predetermined number of cubes is cut.

3. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member; said cut-off member being controlled by electrically operated means; a circuit making member for said cut-off member in the path of movement of said frozen column, said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column, said circuit breaking member being moved by said frozen column to circuit breaking position on movement of said column for a predetermined distance.

4. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member; said cut-off member being controlled by electrically-operated means; a circuit making member for said cut-off member in the path of movement of said frozen column, said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined

distance; said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column, said circuit breaking member being moved by said frozen column to circuit breaking position on movement of said column for a predetermined distance; said circuit making and circuit breaking members being simultaneously operated by said moving column.

5. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member; said cut-off member being controlled by electrically-operated means; a circuit making member for said cut-off member in the path of movement of said frozen column, said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column, said circuit breaking member being moved by said frozen column to circuit breaking position on movement of said column for a predetermined distance; said circuit making and circuit breaking members having a common switch arm operated by said moving column.

6. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member; said cut-off member being controlled by electrically operated means; a circuit making member for said cut-off member in the path of movement of said frozen column, said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column, said circuit breaking member being moved by said frozen column to circuit breaking position on movement of said column for a predetermined distance; said circuit making and circuit breaking members having a common switch arm operated by said moving column; and switch means for initiating the operation of said column moving means.

7. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off mem-

ber being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member, said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column to circuit breaking position on movement of said column for a predetermined distance; and switch means for initiating the operation of said column moving means.

8. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member, said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column; said circuit breaking member being moved by said frozen column to circuit breaking position on movement of said column for a predetermined distance; and manually operated switch means for initiating the operation of said column moving means; and a connection between said cut-off member and said manually operated switch means to re-set said switch to neutral position on completion of the cutting operation.

9. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member; said cut-off member being controlled by electrically operated means; a circuit making member for said cut-off member in the path of movement of said frozen column, said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column, said circuit breaking member being moved by said frozen column to circuit breaking position on movement of said column for a predetermined distance; and manually operated switch means for initiating the operation of said column moving means; and a connection between said cut-off member and said manually operated switch means to re-set said switch to neutral position on completion of the cutting operation; and means paralleling said switch for maintaining said cut-off member in operation until the

return stroke following the completion of the cutting operation.

10. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member, said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column to circuit breaking position on movement of said column for a predetermined distance; and manually operated switch means for initiating the operation of said column moving means; said switch having a plurality of stepped positions predetermining different members of cutting operations; and a connection between said cut-off member and said switch to reset said switch step by step to neutral position, the number of steps being determined by the position at which the switch is manually set.

11. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube, a source of heat for said tube and a valve for controlling the connection between said source of fluid under pressure and said tube; a member for simultaneously actuating said valve and said heat source to cause said tube to be heated and the fluid under pressure to flow into said tube; and a cut-off member for cutting off sections of said column as it moves out of said tube.

12. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube; a transformer, said tube being metallic and inserted in the secondary circuit of said transformer and an electrically operated valve for controlling the connection between said source of fluid under pressure and said tube; a source of electrical energy; a switch member for simultaneously actuating said valve to admit water under pressure to said tube and energizing said transformer to heat the tube; and a cut-off member for cutting off sections of said column as it moves out of said tube.

13. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube, a source of heat for said tube and a valve for controlling the connection between said source of fluid under pressure and said tube; a member for simultaneously actuating said valve and said heat source to cause said tube to be heated and the fluid under pressure to flow into said tube; and a cut-off member for cutting off sections of said column as it moves out

of said tube; said cut-off member comprising a transformer; a wire connected in the secondary circuit of said transformer and an electrically operated member for moving said wire transversely with respect to said column adjacent the end of the tube from which the column emerges; a source of electrical energy; a circuit making member for connecting said transformer and electrically operated member to said source of electrical energy to heat said wire and move the same; said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance.

14. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube, a source of heat for said tube and a valve for controlling the connection between said source of fluid under pressure and said tube; a member for simultaneously actuating said valve and said heat source to cause said tube to be heated and the fluid under pressure to flow into said tube; and a cut-off member for cutting off sections of said column as it moves out of said tube; said cut-off member comprising a transformer; a wire connected in the secondary circuit of said transformer and an electrically operated member for moving said wire transversely with respect to said column adjacent the end of the tube from which the column emerges; a source of electrical energy; a circuit making member for connecting said transformer and electrically operated member to said source of electrical energy to heat said wire and move the same; said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said electrically operated member moving said wire in a cutting direction and, on completion of said cutting movement, returning said wire to initial position; and means for maintaining said circuit making member closed until completion of said return movement.

15. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube, a source of heat for said tube and a valve for controlling the connection between said source of fluid under pressure and said tube; a member for simultaneously actuating said valve and said heat source to cause said tube to be heated and the fluid under pressure to flow into said tube; and a cut-off member for cutting off sections of said column as it moves out of said tube; said cut-off member comprising a transformer; a wire connected in the secondary circuit of said transformer and an electric reversing motor and a driving connection between said motor and said wire for moving said wire transversely with respect to said column adjacent the end of the tube from which the column emerges; a source of electrical energy; a circuit making member for connecting said transformer and motor to said source of electrical energy to heat said wire and move the same; said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance.

16. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube, a source of heat for said tube and a valve for controlling the connection between said source of fluid under pressure and said tube; a member for simultaneously actuating said valve and said heat source to cause said tube to be heated and the fluid under pressure to flow into said tube; and a cut-off member for cutting off sections of said column as it moves out of said tube; said cut-off member comprising a transformer; a wire connected in the secondary circuit of said transformer and an electric reversing motor and a driving connection between said motor and said wire for moving said wire transversely with respect to said column adjacent the end of the tube from which the column emerges; a source of electrical energy; a circuit making member for connecting said transformer and motor to said source of electrical energy to heat said wire and move the same; said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said motor moving said wire in a cutting direction; a reversing switch for said motor; means for actuating said reversing switch to reverse said motor and return said wire to initial position on completion of the cutting stroke.

17. An ice cube freezer and dispenser comprising a tube, means for freezing a column of fluid in said tube and means for moving said frozen column toward and out of one end of said tube; said last mentioned means comprising a source of fluid under pressure connected to the opposite end of the tube, a source of heat for said tube and a valve for controlling the connection between said source of fluid under pressure and said tube; a member for simultaneously actuating said valve and said heat source to cause said tube to be heated and the fluid under pressure to flow into said tube; and a cut-off member for cutting off sections of said column as it moves out of said tube; said cut-off member comprising a transformer; a wire connected in the secondary circuit of said transformer and an electric reversing motor and a driving connection between said motor and said wire for moving said wire transversely with respect to said column adjacent the end of the tube from which the column emerges; a source of electrical energy; a circuit making member for connecting said transformer and motor to said source of electrical energy to heat said wire and move the same; said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance; said motor moving said wire in a cutting direc-

tion; a reversing switch for said motor; means for actuating said reversing switch to reverse said motor and return said wire to initial position on completion of the cutting stroke; and means for maintaining said circuit making member closed until completion of said return movement.

18. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member; said cut-off member being controlled by electrically operated means; a circuit making member for said cut-off member in the path of movement of said frozen column, said circuit making member being moved by said frozen column to circuit making position on movement of said column for a predetermined distance.

19. An ice cube dispenser comprising means for freezing a column of fluid; means for moving said frozen column in one direction; and a cut-off member for cutting off sections of said column as it moves in said one direction; said cut-off member being mounted for transverse movement with respect to said column and having a stroke in a cutting direction and a return stroke; said means for moving said column being inoperative during substantially all of the movement of said cut-off member and being placed in operative condition on completion of the return stroke of said cut-off member, said means for moving said frozen column being controlled by electrically operated means; a circuit breaking member for said controlling means in the path of movement of said frozen column; said frozen column moving said member to circuit breaking position on movement of said column for a predetermined distance.

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