Sept. 22, 1931. A. R. TOWERS 1,824,638

ICE MELTING DEVICE

Filed Jan. 12, 1929 2 Sheets-Sheet 1

Fig. 1.

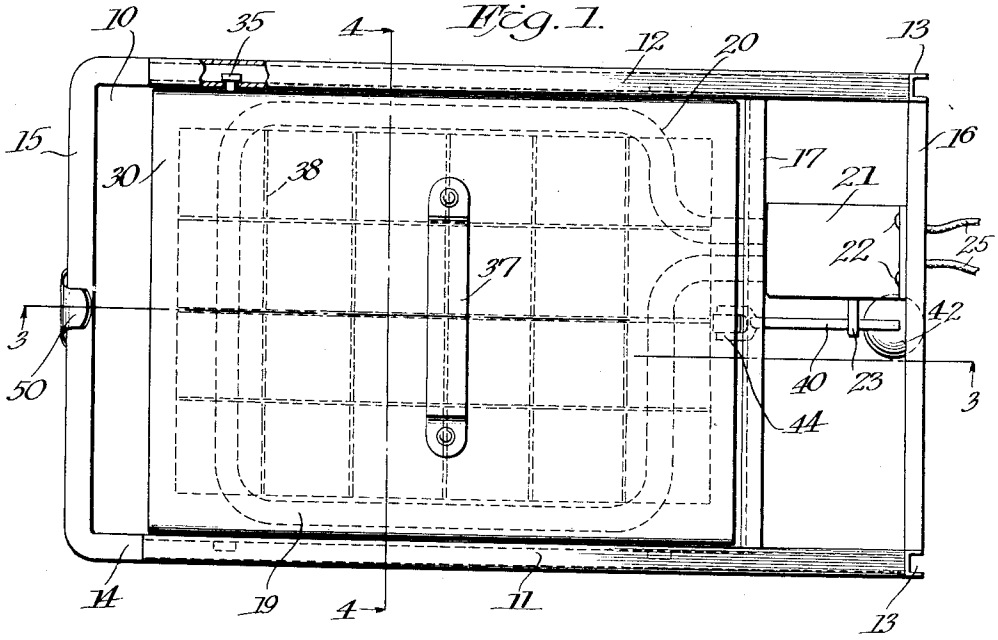
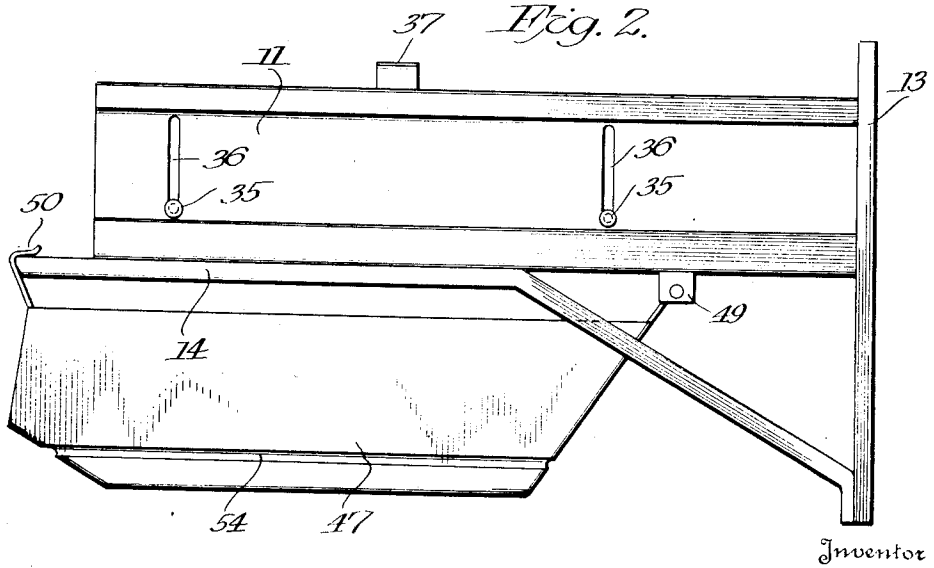



Fig. 2.




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2 Sheets-Sheet 2

Fig. 3.

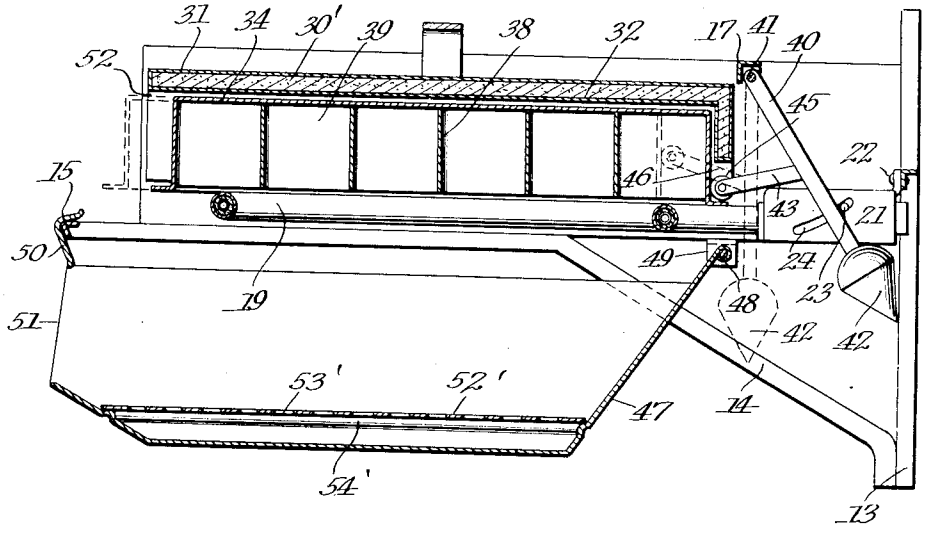
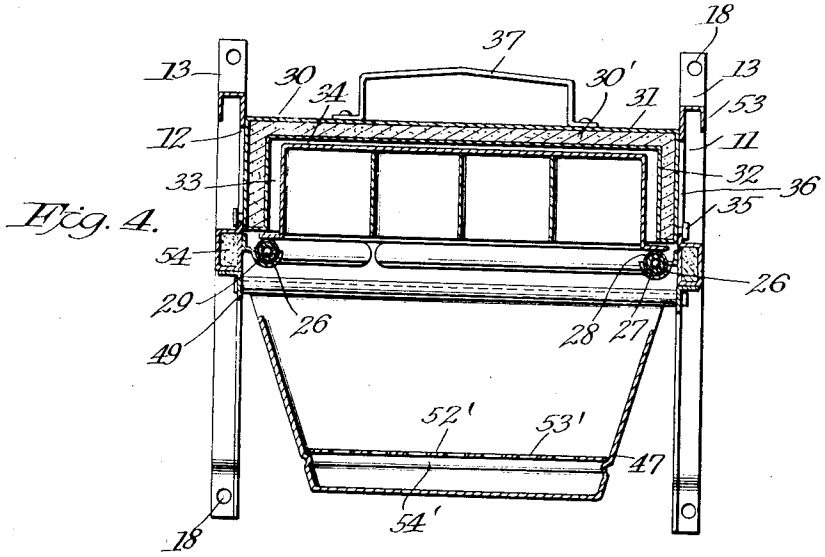



Fig. 4.




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Patented Sept. 22, 1931

1,824,638

# UNITED STATES PATENT OFFICE

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## ICE MELTING DEVICE

Application filed January 12, 1929. Serial No. 332,152.

The present invention relates to a device for melting and removing ice from receptacles, and more especially to an improved apparatus for liberating ice cubes or molds from refrigerator trays, containers or the like.

Heretofore it has been customary to remove the ice cubes from their trays by placing the tray under a faucet and allowing water to run over it until the cubes are liberated. This method is not only very inconvenient and wasteful, since considerable ice melts before the cubes are finally separated from the tray, but it is also very disagreeable and slow, on account of the splashing of the water and the time consumed in extracting the ice.

It is an object of the present invention to overcome the defects and inconveniences above noted by providing a simple, economical and efficient means for liberating ice cubes or molds from their trays or containers, which means essentially comprises a heating chamber in which the ice tray is arranged to be inserted, and associating with the chamber an electrical heating element for causing the liberation and removal of the ice cubes from their trays with a minimum melting of the ice.

A further object comprehends the provision of automatic means for causing the heating of the electrical heating element when the ice tray is placed within the heating chamber and the cutting off of the heating element circuit upon the liberation of the ice from the tray.

Another object is to provide means for insuring the removal of the ice cubes from the tray, which means is responsive to the difference in weight of the tray when filled with ice and when the ice is removed therefrom for effecting movement of the tray relative to the heating element, so as to dislodge and remove any of the ice cubes that might otherwise be prevented from falling away from the tray.

Another object of the invention is to provide a support for an ice melting apparatus, which support is so constructed that it may be made a part of a refrigerating machine, or conveniently placed near the machine, so as to receive the ice trays immediately upon their removal from the machine, in order that the cubes can be extracted therefrom.

Other objects and advantages will become apparent from the following description when taken in conjunction with the accompanying drawings and claims.

Referring to the drawings, in which is shown a preferred embodiment of the invention,

Figure 1 is a plan view of a supporting frame showing the ice melting device associated therewith.

Figure 2 is a side elevation of Figure 1.

Figure 3 is a sectional view taken substantially along the line 3—3 of Figure 1.

Figure 4 is a sectional view taken substantially along the line 4—4 of Figure 1.

Referring to the drawings, in which like numerals indicate like parts in the several views, 10 generally denotes a supporting frame or rack preferably composed of any suitable light metal, and may be provided with the spaced laterally extending side bars 11 and 12, that are connected to the vertical bars 13 in any suitable manner such as by welding or the like. The outer free ends of the bars 11 and 12 are each supported by the substantially U-shaped bar 14, the transverse arm 15 of which is positioned slightly in advance of the adjacent ends of the bars 11 and 12 (Fig. 1), while the ends of the bar 14 are suitably connected to the lower portions of the vertical bars 13. A transverse bar 16 connects the vertical bars 13 and is spaced from an intermediate transverse bar 17, that is connected to the side bars 11 and 12 respectively. The ends of the bars 13 are provided with openings 18 for receiving screws or the like, in order to permit the frame to be readily connected to a refrigerating machine or positioned close to the machine for the purpose hereinafter described.

An electrical heating element 19, which may be of any suitable configuration, but preferably is formed as shown in dotted lines in Figure 1, with rounded corners 20 so as to eliminate sharp bends that would tend to break the same, is suitably connected to a switch box 21, secured by the bolts 22 to the transverse bar 16. A switch actuating arm

23 extends laterally from one side of the box 21 and is arranged to move in an arcuate slot 24, in order to operate any conventional type of switch that may be mounted within the switch box 21, for controlling the flow of current to the heating element 19. Conducting wires 25 lead from the switch and are connected to a suitable electric circuit, (not shown). The heating element 19 is preferably composed of a resistance wire 26, that is wrapped with a substance 27 which is a good electric insulator and likewise a heat conductor, such as mica or the like, in order to obtain quick thermal conduction while a protecting shield or tube 28 of aluminum or other heat conducting material encloses the mica. It will be seen that the heating element is so constructed and formed as to be completely protected from moisture and may be bent or assume any desired configuration, in order to conform with the particular shape of either the supporting frame or the ice tray, as may be found expedient. The heating element 19 is connected to the frame 10 by the brackets 29 that are secured to the inside walls of the side bars 11 and 12 respectively (Fig. 4).

A metallic receptacle or hood 30 is preferably formed with an outer section 31 and a spaced inner section 32, the space between the sections being filled with any suitable heat insulating material 30', such as asbestos or the like. Additionally, the receptacle 30 may have its bottom and outer end opened, so as to provide a heating chamber 33 positioned immediately above the heating element 19 and arranged to receive an inverted ice tray or container 34 of the general type used with domestic refrigerating machines. In order that the receptacle 30 may accommodate, within the heating chamber 33, ice trays of varying sizes, it is arranged to be vertically adjustable relative to the heating element by means of the pins or screws 35, which extend laterally from the side walls of the receptacle and fit within vertically disposed slots 36 formed in the side bars 11 and 12 (Fig. 2). A handle 37 connected to the top of the receptacle 30, permits the receptacle to be manually raised or lowered, when necessary.

The ice tray 34 is provided with the transverse partitions or combs 38, that form separate ice compartments 39, that are usually removably mounted in the tray, but may be permanently fixed therein, so as to constitute a part of the drawer of artificial ice making or refrigerating machines. The tray 34 upon its withdrawal from the refrigerating machine is arranged to be invertedly supported on the shield 28. However, instead of resting on the heating element, it may be supported within the heating chamber in any other suitable fashion.

In order to automatically control the flow of current to the heating element 19, means are provided for moving the switch to its "on" position upon the insertion of the ice tray within the heating chamber 33, said means also being used to cut off the switch and move the tray 34 relative to the heating element 19, when the ice cubes have been liberated from the tray. This means preferably comprises a swinging lever or pendulum 40, which is pivoted at its upper end as at 41, to the transverse bar 17 and has a ponderous member or weight 42 connected to its opposite extremity for urging the lever to assume a vertical position as shown in dotted lines in Fig. 3. An arm 43 extends outwardly from the lever 40 and has a forked end 44, in which is journalled a roller 45, that extends through an opening 46 in the end wall of the receptacle 34, so as to engage the adjacent end of the ice tray 34 when the latter is inserted within the heating chamber 33. The switch arm 23 extends so as to engage the lever 40 and be actuated thereby during its swinging movement to either its "on" or "off" position.

A hopper or trough 47, which is pivoted at 48 to the brackets 49 on the under side of each of the side bars 11 and 12, receives the ice cubes as they fall from the tray. The outer end of the hopper may have a spring clip 50, arranged to be detachably connected to the transverse arm 15 of the bar 14, normally to maintain the hopper in a fixed position and allow it, when the clip is released from the arm 15, to be swung downwardly on its pivot so as to facilitate the removal of the ice therefrom.

It will be seen that when the ice tray 34 is removed from the heating chamber 33, the weight 42 tends to swing the arm 40 to the dotted line position as shown in Figure 3, so that the arm 43 will extend an appreciable distance within the heating chamber 33. When the arm 40 moves to this position, it allows the switch arm 23 to swing downwardly in the slot 24, so as to open the circuit leading to the heating element 19. Upon the ice tray being inserted within the heating chamber through the end opening 52, the inner end of the tray will engage the roller 45 in the manner as shown in dotted lines in Figure 3 and as the tray is moved into its proper position, will cause the lever 40 to be moved upwardly to assume its full line position and at the same time actuate the switch arm 23 to close the circuit, so as to permit current to flow through the heating element 19. The combined weight of the tray and ice is normally sufficient to maintain the arm 40 in its raised position and prevent the removal of the tray from the receptacle 30. However, as the ice is heated and falls from the tray 34, into the trough 47, the reduced weight of the tray will not be sufficient to maintain the lever 40 in its raised position against the downward pressure exerted by

the weight 42 and consequently the arm 43, when the ice cubes are extracted from the tray, will swing to its dotted line position, as shown in Figure 3, which in turn causes the tray to be moved outwardly relative to the heating chamber 33 and also allows the switch to break the circuit to the heating element 19. This is very desirable since a few of the ice cubes might not be removed from the tray, due to the extended portions of the frame preventing them from falling into the trough 47. However, as the tray is moved, it will allow such cubes to fall into the trough and thus insure a complete extraction of all the cubes from the tray.

The upper ends of each of the side bars 11 and 12 may be of channel formation, such as shown at 53, while the lower end portions of these bars may be shaped so as to form a space 54, in which is inserted a suitable heat insulator, such as asbestos or the like, in order to increase and retain as much of the heat within the chamber 33 as possible.

When the parts are in the position as shown in Figure 1, it will be seen that the switch is moved, so as to permit the current to pass to the heating element 19 and as the inverted tray 34 rests directly upon the heating element 19, the heat will be conducted by thermal contact and radiation to the area of the heating chamber 33 surrounding the tray. As the ice tray 34 and the partitions 38 are good thermal conductors and in direct contact with the heating element, the heat will be conducted to all points of the tray that are in contact with the ice cubes and will cause the liberation of the cubes with a minimum melting of the ice and allow them to fall into the trough 47, where, upon release of the spring clip 50, they may be conveniently removed for use. In view of the fact that the asbestos lining 30′ tends to retain the heat in the chamber 33 at points where it is most needed, the ice will be removed from the tray in a comparatively very short time after the tray is inserted in the chamber. Moreover, by utilizing the difference in weight of the tray when the ice is removed therefrom, for automatically cutting off the current, it eliminates the danger of overheating the element 19 and also prevents the unnecessary consumption of the current.

In order to prevent the melted ice collected in the hopper from being removed with the ice cubes when the hopper is moved to its discharging position, a shelf 52′ having a series of perforations 53′, may be removably supported by the ledge 54′ extending from the inner sides of the hopper a slight distance above the bottom thereof, so as to separate the ice cubes from the water and permit only the removal of the ice.

Obviously, the heating device may equally be employed for removing blocks of ice from refrigerator drawers or containers, in which the transverse partitions or combs are not used and large molds of ice are desired. While the receptacle 30 and the heating chamber 33 are desirable, in that they tend to localize the heat and prevent the dissipation thereof, it is manifest that the receptacle 30 may be eliminated and the heating element 19 alone used to remove the ice from the tray.

It is to be understood that the form of the invention herewith shown and described is merely illustrative of a preferred embodiment and that such changes and modifications thereof may be made without departing from the spirit of the invention and the scope of the appended claims.

What I claim is:

1. An apparatus of the class described having in combination a heating element, an ice tray invertedly and perimetrically supported on said element, and means upon the generating of heat by said element for liberating the ice from said tray.

2. An apparatus of the class described having in combination an electrical heating element, a switch operatively connected to said element, an ice tray perimetrically supported on said element, and means upon the engagement of said ice tray with said element for actuating the switch to heat said element.

3. An apparatus of the class described having in combination an electrical heating element, a switch operatively connected to said element, an ice tray adapted to be perimetrically supported on said element, means upon the complete engagement of said ice tray with said element for actuating the switch to heat said element, and means upon the removal of the ice from said tray for cutting off the switch.

4. An apparatus of the class described having in combination a chamber having an opened bottom portion, an ice tray, means invertedly supporting said tray within said chamber, a heating element associated with said chamber for causing the liberation of the ice from the tray through said bottom, and means upon the insertion of the tray horizontally into the chamber for heating said element.

5. An apparatus of the class described having in combination chamber, an electrical heating element, a switch operatively connected to said element, an ice tray arranged to be positioned within said chamber, means upon the longitudinal insertion of the tray into the chamber for actuating the switch to heat said element, and means responsive to the variation in weight of the tray as the liberated ice drops therefrom for automatically cutting off the switch and moving the tray outwardly relative to said chamber.

6. An apparatus of the class described having in combination a heating chamber, a

heating element associated with said chamber, an ice tray arranged to be inserted horizontally within said chamber and invertedly supported by said heating element, and means in the path of said tray and adapted to be actuated thereby for heating the latter and causing the liberation of the ice from the tray.

7. An apparatus of the class described having in combination a heating chamber provided with an opening for the insertion of an ice tray, a heating element connected to said chamber and arranged to support the ice tray therein, a switch operatively connected to said heating element, means upon the insertion of the ice tray within the chamber for actuating the switch so as to cause the heating of said element, and a hopper pivotally connected to said apparatus for receiving the ice as it falls from the tray.

8. An apparatus of the class described having in combination a heating chamber having its bottom and one end open, an electrical heating element positioned against the bottom of said chamber, an ice tray arranged to be inserted in said chamber and invertedly supported on said heating element, a switch operatively connected to said heating element, means upon insertion of the tray within said chamber for automatically causing the actuation of the switch to permit the heating of said element, and means for moving the tray relative to the chamber, said last mentioned means being responsive to the variation in weight of the tray after the ice is removed therefrom for actuating the tray.

9. An apparatus of the class described having in combination a heating chamber having its bottom and one end open, an electrical heating element connected to said chamber adjacent the bottom thereof, an ice tray arranged to be inserted in said chamber and invertedly supported on said heating element, a switch operatively connected to said heating element, means upon insertion of the tray within said chamber for automatically causing the actuation of the switch to permit the heating of said element, and means upon the liberating of the ice from the tray for cutting off the switch and moving the tray relative to said chamber.

10. An apparatus of the class described having in combination a heating chamber, a heating element associated with said chamber, an ice tray arranged to be inserted in said chamber and invertedly supported by said heating element, means upon the insertion of the tray into the chamber for heating said element and liberating the ice from the tray, means for receiving the ice as it falls from the tray, and means for moving the tray longitudinally relative to the heating element, said last mentioned means being responsive to the difference in weight of the tray when filled with ice and when the ice is removed from the tray for actuating the same.

11. An apparatus of the class described having in combination a heating chamber having its bottom and one end open, an electrical heating element positioned adjacent to said chamber, an ice tray arranged to be inserted in said chamber and invertedly supported on said heating element, a switch operatively connected to said heating element, means upon insertion of the tray within said chamber for automatically causing the actuation of the switch to permit the heating of said element, and means pivotally connected to said apparatus for receiving the ice as it falls from said tray.

12. A support for ice trays comprising a frame, a receptacle mounted on said frame, an electrical heating element associated with said receptacle, means for supporting an ice tray within said receptacle, means upon the insertion of said tray within said receptacle for heating said element so as to cause the liberation of the ice from the tray, means upon the removal of the ice from the tray for automatically cutting off the heating of said element, and a hopper connected to said support for receiving the ice as it issues from the tray.

13. A support for ice trays comprising a frame, a receptacle adjustably connected to said frame, an electrical heating element carried by said frame and positioned adjacent said receptacle, means for supporting an ice tray within said receptacle, means upon the insertion of said tray within said receptacle for heating said element so as to cause the liberation of the ice from the tray, and means upon the removal of the ice from the tray for automatically cutting off the current to said element.

14. A support for ice trays comprising a frame, a receptacle having an opened bottom and side connected to said frame and arranged to form a heating chamber therein, an electrical heating element connected to said frame and positioned adjacent said chamber, a switch operatively connected to said heating element, a member for actuating said switch, means for invertedly supporting an ice tray within said chamber, means upon the insertion of said tray longitudinally within said chamber for actuating said member to heat said element, and means upon the removal of the ice from the tray for automatically causing the cutting off of the switch and the movement of the tray outwardly relative to said chamber.

15. In a device of the class described, the combination of a supporting frame, an electrical heating element mounted on said frame, a heat insulated receptacle adjustably connected to said frame above said heating element, a ponderous member pivotally connected to said frame and having an arm ex-

tending into said receptacle, a switch for controlling the flow of current to said heating element and operatively connected to said ponderous member, a hopper pivotally connected at one end to said frame and detachably connected to the frame at its opposite end, an ice tray arranged to be invertedly supported by said heating element within said receptacle and engage the arm of said ponderous member, means upon the insertion of said tray within said receptacle for automatically heating the heating element, said ponderous member being operative to move the tray when the weight of the tray is reduced by the liberation of the ice therefrom.

16. An open bottom support for inverted ice trays having heating means connected therewith for causing the liberation of the ice blocks from the tray when the latter is placed on the support, said open bottom permitting the free downward removal of the ice blocks from the tray.

17. A heating device of the class described comprising an electrical heating element arranged to support perimetrically an inverted ice tray, means upon the heating of said element for causing the liberation and downward removal of the ice from the tray, and means for moving the tray longitudinally relative to the heating element upon the withdrawal of the ice from the tray.

18. A heating apparatus of the class described comprising a support, a heating element associated therewith, and an inverted ice-tray mounted on said support, said support having an opening in the bottom thereof to permit the ice liberated from the tray to fall freely therethrough.

19. A heating apparatus of the class described comprising an opened bottom support, a heating element thermally associated therewith, and an inverted ice tray on said support whereby upon the generating of heat by said heating element the ice is liberated from the tray and falls freely through the support.

20. A heating apparatus of the class described having in combination a chamber provided with an opened bottom support, an inverted ice tray mounted on said support, a heating element disposed within said chamber and thermally associated with said support, and means upon the insertion of the inverted tray within the chamber for heating said element whereby the ice is liberated from the tray and falls freely through the opening in the support.

21. A heating apparatus of the class described having in combination a chamber provided with an opened bottom support, an inverted ice tray mounted on said support, a heating element disposed within said chamber and thermally associated with said support, means upon the insertion of the inverted tray within the chamber for heating said element whereby the ice is liberated from the tray and falls freely through the opening in the support, and means upon the removal of the ice from the tray for causing the movement of the tray outwardly relative to the chamber.

22. A heating apparatus of the class described having in combination a chamber provided with an opened bottom support, an inverted ice tray employed in said chamber, an electrical heating element thermally associated with said support, an electric switch for controlling the supply of current to said heating element, means upon the insertion of the tray within the chamber for turning on the switch, and means when the ice is liberated from the tray for cutting off the switch.

In testimony whereof I have hereunto set my hand.

AUGUSTUS R. TOWERS.