United States Patent

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[73] Assignee **Whirlpool Corporation**

[54] **ICEMAKER WITH WATER DISTRIBUTOR**
16 Claims, 10 Drawing Figs.

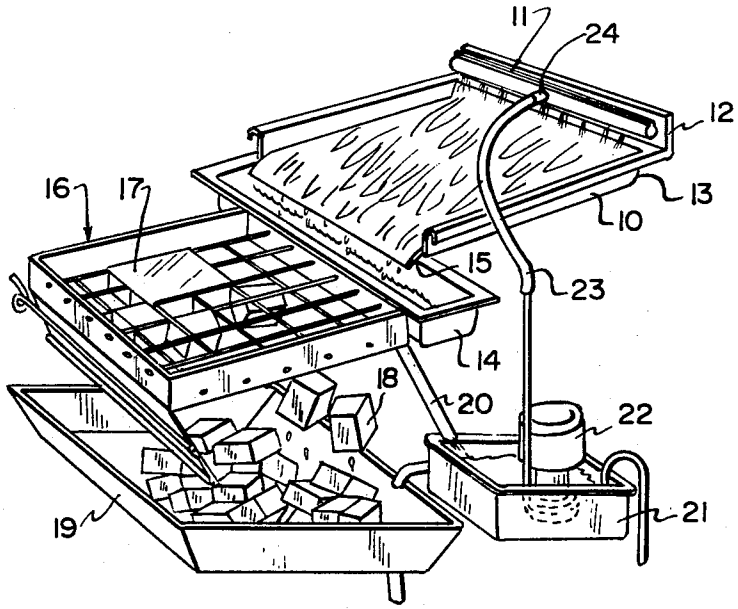
[52] **U.S. Cl.** **62/347,**
165/117, 239/553.5, 239/567
[51] **Int. Cl.** **F25c 1/12**
[50] **Field of Search** 62/74, 347;
239/566, 553.5, 567; 165/117

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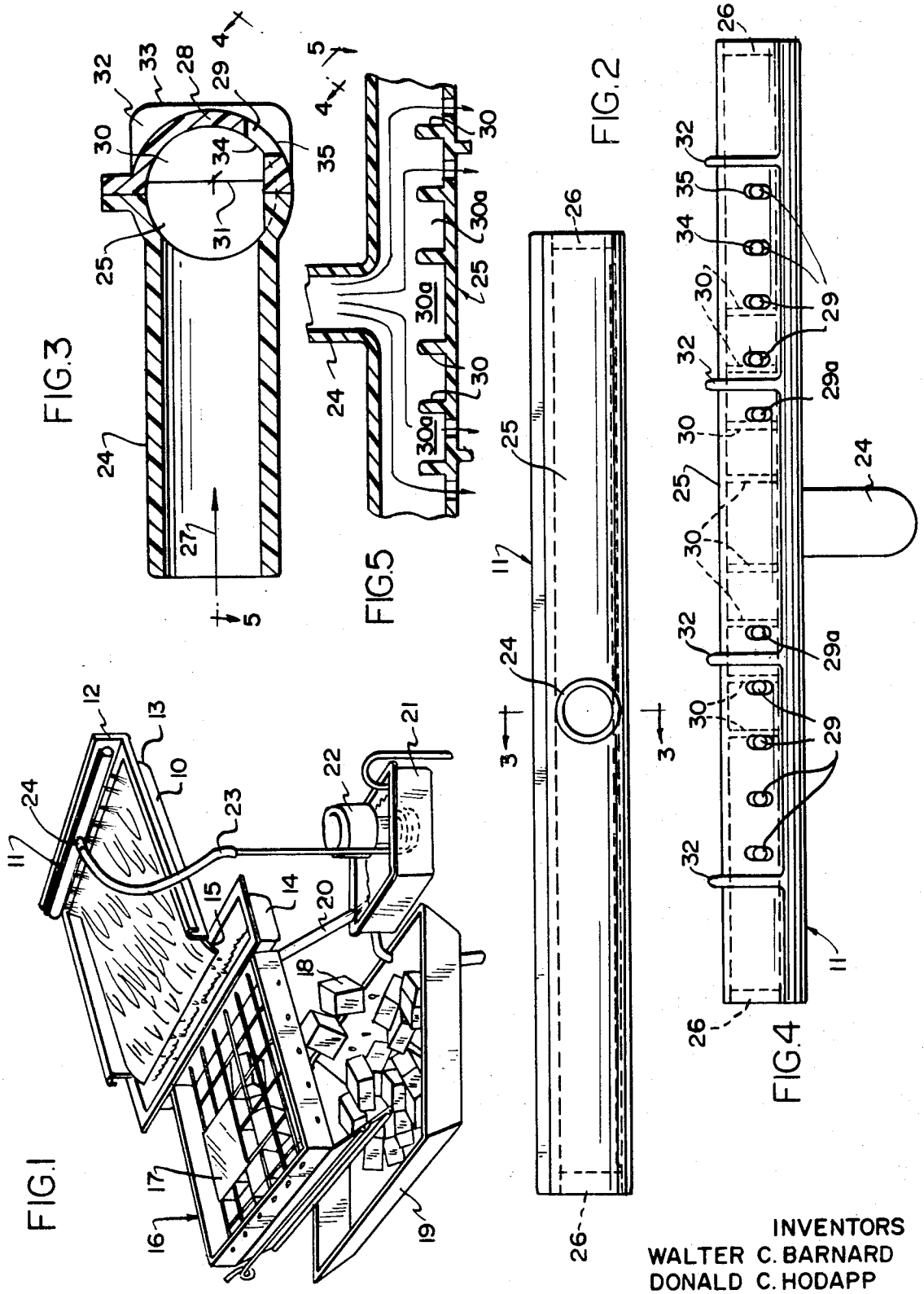
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ABSTRACT: An icemaker having a refrigerated member over a surface of which water is directed to form an ice slab and including a water distributor with an internal reservoir means for receiving water and a plurality of outlets for distributing water along the width of the ice slab portion of the refrigerated member and flow-impeding means in the reservoir for impeding flow of water through the reservoir for achieving substantially even distribution of water within the reservoir means before flow through the outlet means in order that the water distribution is even onto the refrigerated member to aid in the formation of an ice slab of substantially uniform thickness.



2 Sheets-Sheet 1



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FIG.6

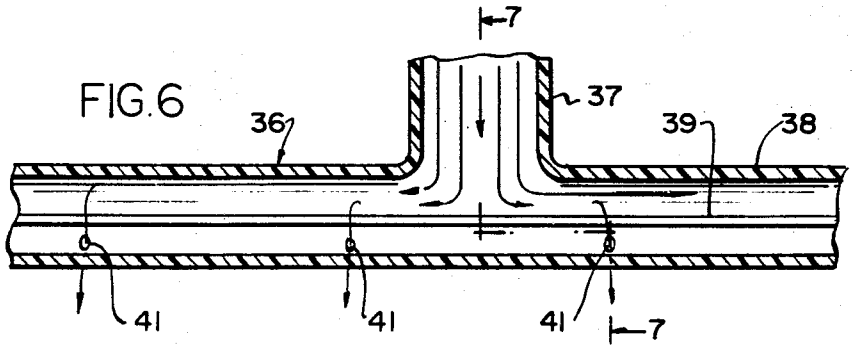


FIG.7

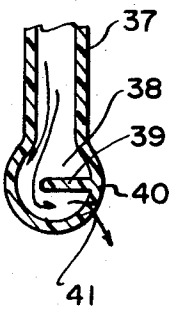
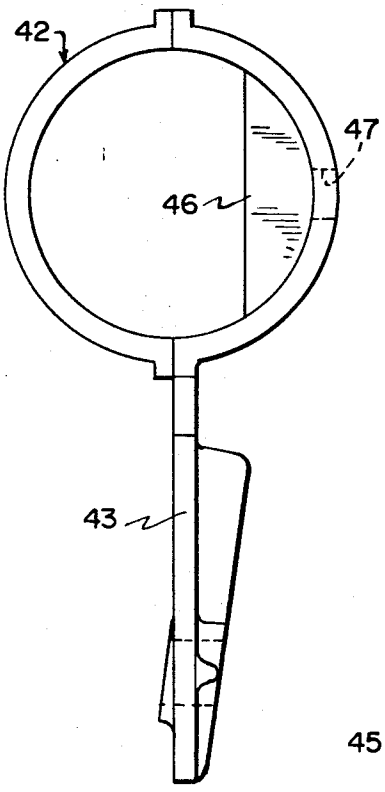


FIG.9



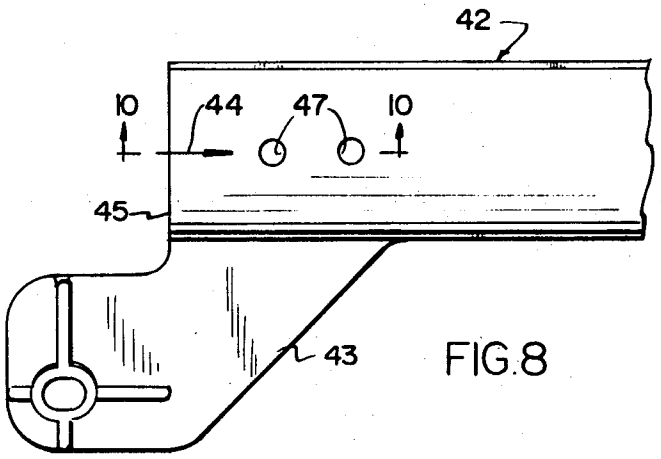
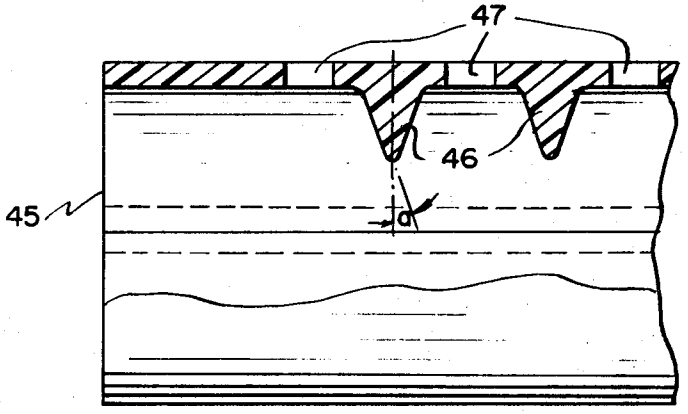


FIG.8

FIG.10



ICEMAKER WITH WATER DISTRIBUTOR

One of the features of this invention is to provide an icemaker having an improved water distributor for distributing water evenly across a refrigerated member in order that the water and thus the resulting ice slab will be of substantially uniform thickness throughout.

Other features and advantages of the invention will be apparent from the following description of several embodiments thereof taken in conjunction with the accompanying drawings. Of the drawings:

FIG. 1 is a perspective view of an icemaker embodying the invention.

FIG. 2 is a front elevational view of one embodiment of the water distributor shown in FIG. 1.

FIG. 3 is a sectional view taken substantially along line 3–3 of FIG. 2.

FIG. 4 is an elevational view of the distributor of FIG. 2 taken from the position of line 4–4 of FIG. 3.

FIG. 5 is a fragmentary longitudinal sectional view taken substantially along line 5–5 of FIG. 3.

FIG. 6 is a fragmentary longitudinal sectional view through a second embodiment of a water distributor.

FIG. 7 is a sectional view taken substantially along line 7–7 of FIG. 6.

FIG. 8 is a fragmentary elevational view of one end of another embodiment of the water distributor.

FIG. 9 is an end elevational view taken from the left end of FIG. 8.

FIG. 10 is a fragmentary sectional view taken substantially along line 10–10 of FIG. 8.

In the embodiment of FIGS. 1—5 the icemaker as shown in FIG. 1 in perspective is of the same general type as shown and described in Swanson U.S. Pat. No. 3,230,736 assigned to the same assignee as the present application. This icemaker comprises a refrigerated member **10** in the form of an inclined plate having refrigerant passages (not shown) therein, a water distributor **11** mounted adjacent the upper end of the plate **10** on a vertical flange **12** extending upwardly from the raised rear end **13** of the evaporator plate **10**, a water-receiving trough **14** beneath the lower end **15** of the plate **10**, an electrically heated wire grid **16** onto which the formed slab **17** slides when released from the plate **10** to be cut into cube size portions **18** and an ice receiver **19** into which the cubes **18** fall.

In order to provide distribution of water over the evaporator plate **10** to form the ice slab there is provided a drain **20** from the trough **14** into a water receptacle **21** and a water circulating pump **22** having its inlet within the water in the receptacle and its outlet connected to a tube **23** that connects to the inlet means **24** to the water distributor **11**.

With the icemaker as described the pump **22** circulates water over the top inclined surface of the evaporator plate **10** by way of the trough **14**, drain **20**, receptacle **21**, pump **22**, tube **23** and back to the water distributor **11**. When the ice slab **17** is of the desired thickness it is automatically released to slide onto the heated cutter wires **14** which subdivide the slab into cubes **18** which fall into the trough **19**, as previously described.

One embodiment of the water distributor **11** is shown in FIGS. 2—5. As is disclosed here, the water distributor **11** is in the form of an elongated member or tube **25** whose interior serves as a reservoir means for receiving the water to be distributed. The elongated tube **25** is closed at its opposite ends by removable closures, here shown as rubber plugs **26**. The tubular inlet **24** is located at about the center of the elongated tube **25** and as shown in FIG. 1 is substantially horizontal and is positioned at the front of the tube **25** so that water entering the tubular inlet **24** as indicated by the arrow **27** projects water toward the rear **28** of the elongated tube **25**.

The location of the water distributor inlet means relative to the water distributor outlet holes affects the water flow as the more direct the flow path the greater the flow of water. Thus, the more remote distributor outlet holes may not deliver the desired flow of water. This problem is solved by the present invention as described below.

Located within the elongated reservoir member tube **25** are flow-impeding means **30** for impeding or retarding flow of water between the inlet means tube **24** and spaced outlet means **29** which are in the form of a plurality of holes in the elongated tube **25**. In the embodiment of FIGS. 3—5 this impeding means is in the form of spaced baffle members **30** located at the rear **28** of the tube **25**. The baffle members **30**, between the end ones of which are located the water outlet holes **29**, have vertical inner edges **31** that are substantially in a common plane that is generally at right angles to the central axis of the tubular inlet **24**. Thus this common plane is also parallel to the longitudinal axis of the elongated reservoir tube **25**. Thus, as shown, these inner edges **31** of the baffles **30** are substantially vertical and the water outlet holes **29** are positioned adjacent the bottoms of the vertical baffles **30** and at the rear **28** of the tube **25**. As shown most clearly in FIG. **3**, the holes **29** are positioned adjacent the bottom of the lower rear quadrant of the tube **25**.

The baffle members or ribs **30** prevent a direct line flow of the water from the inlet means tube **24** to any of the outlet holes **29**. Also, the baffle members **30** define chambers **30*a*** (FIG. **5**) in which the water pressure is substantially equal, assuring uniform water flow from the distributor.

As is shown most clearly in FIG. **4** all of the water outlet holes **29** are spaced laterally of the water inlet tube **24** in order that this even distribution of water through all holes will be maintained.

Additionally, the spacing between certain of the outlets is varied to facilitate uniform water distribution. Specifically, as shown in FIG. **4**, the spacing between adjacent holes **29*a*** and **29*b*** on either side of the inlet **24** is approximately four times greater than the spacing between adjacent holes **29** at locations more remote from the inlet means. This increased spacing between the outlet holes closest to the inlet ensures a relatively indirect water flow path between the inlet and all outlet holes.

Thus, there will be substantially even distribution of water in the interior which serves as the reservoir means prior to the flow of the water from the outlet holes **29**, **29*a*** and **29*b***. This results in an even volumetric flow of water through all of the outlet holes **29**, **29*a*** and **29*b*** as indicated in FIG. **5** with the result that the slab **17** of ice that is formed on the refrigerated plate **10** is of substantially uniform thickness throughout and this of course ensures the production of uniform ice cubes **18**.

The present invention provides an even flow of water over the evaporator plate **10** despite variations in the supply water pressure or flow. In addition, the provision of the rib members **30** defining chambers **30*a*** prevents a directed velocity "pressure" in association with certain of the water outlet holes **29**.

As mentioned earlier, the water distributor **11** is positioned against the vertical flange **12** on the rear raised end of the evaporator plate **10**. In order to aid the proper positioning of the member **12** on this flange there are provided on the rear **28** of the tube **25** spaced flanges **32** having coplanar vertical rear surfaces **33** adapted to bear against this flange **12**.

As shown in FIG. **3** each water outlet hole **29** is flared outwardly from its inner end **34** to its outer end **35**. In the illustrated embodiment this flare is about 90° and is in a vertical plane (FIG. **4**) with the inner end **34** being substantially circular and the outer end **35** vertically oval.

In the embodiment of FIGS. **6** and **7** the water distributor **36** is likewise an elongated cylinder and has a tubular inlet **37** at about the center. Within the reservoir portion **38** of the distributor there is provided a single longitudinal baffle **39** extending upwardly from the bottom **40** of the cylinder **38** but short of the top thereof. The water inlet **37** is located on one side of the baffle **39** and the plurality of water outlets **41** are located on the other side of the baffle and adjacent the bottom **40** of the distributor.

In the embodiment of FIGS. **8**, **9** and **10** the water distributor **42** is again an elongated cylinder but now has a mounting bracket **43** at each end for mounting on the icemaker and the water inlet is axial as indicated by the arrow **44** in FIG. **8** either

from one end **45** or from both ends. In this embodiment also there are provided a plurality of spaced baffles or rib members **46** at the rear of the distributor **42** with water outlet openings **47** located between the baffles **46**. It is preferred here also that the openings **47** be in the lower rear quadrant of the tubular distributor and that the baffles **46** extend upwardly therefrom.

The baffles or rib members **46** may advantageously be provided with sidewalls having an angular disposition of at least 15° with respect to vertical to facilitate periodic cleaning of the water distributor with a bottle brush. Such cleaning is more difficult where the sidewalls are vertical. In the embodiment shown in FIG. **10** the angle *a* is approximately 20°.

The water distributor of this invention not only results in an ice slab and thus ice cubes of substantially uniform thickness but also greatly reduces the noise level of water flowing through the icemaker so that additional noise suppressants are not ordinarily required.

Having described our invention as related to the embodiment shown in the accompanying drawings, it is our intention that the invention be not limited by any of the details of description, unless otherwise specified.

The embodiment of the invention in which we claim an exclusive property or privilege, is defined as follows:

1. An icemaker, comprising: a refrigerated member having a surface thereon with width and length over which water is directed to form an ice slab; a water distributor including an internal reservoir means for receiving water under pressure having an inlet means and a plurality of outlet means at the rear of said distributor and above said refrigerated member for projecting water along said width for flow over said length; and flow-impeding means in said reservoir means for impeding flow of water between said inlet means and outlet means and thereby achieving substantially even distribution of water in said reservoir means prior to flow from said outlet means.

2. The icemaker of claim **1** wherein said reservoir means comprises an elongated member positioned adjacent the rear of said refrigerated member for flow of water over said surface from rear to front thereof in the formation of said ice slab, and said reservoir inlet means is located adjacent the front of said reservoir means and projects water toward the rear of the reservoir means, and said impeding means are located at said reservoir means rear adjacent said outlet means.

3. The icemaker of claim **1** wherein said flow-impeding means comprises a plurality of spaced baffle members within said reservoir means.

4. The icemaker of claim **3** wherein said reservoir means comprises an elongated member, said baffle members extend inwardly from said rear thereof and have unconfined inner edges for flow of water thereover, and said outlet means are located between said baffle members.

5. The icemaker of claim **4** wherein said inlet means is located adjacent the front of said reservoir means elongated member and projects water toward the rear of said elongated member where said baffle members are located.

6. The icemaker of claim **5** wherein said inlet means has a central axis substantially at right angles to said elongated member, and said baffle members have said inner edges substantially in a common plane that is at right angles to said axis.

7. The icemaker of claim **6** wherein said baffle members and said edges are substantially vertical, and said water outlet means are located between and adjacent the bottoms of said baffle members.

8. The icemaker of claim **3** wherein said outlet means comprises a plurality of spaced holes and the spacing of a pair of holes adjacent the inlet means is greater than the spacing of a pair of holes more remote from the inlet means.

9. The icemaker of claim **3** wherein said baffle members are rib members having sides with an angular disposition of at least 15° with respect to vertical to facilitate periodic cleaning of the water distributor.

10. The icemaker of claim **4** wherein said water inlet means is located at at least one end of said elongated member.

11. The icemaker of claim **10** wherein each of said elongated member and inlet means has a longitudinal axis with the two axes substantially coinciding.

12. The icemaker of claim **1** wherein said flow-impeding means comprises an elongated baffle member within said elongated reservoir member extending upwardly from the bottom and short of the top thereof, the inlet means being located on the side of said baffle member that is opposite said baffle member.

13. The icemaker of claim **4** wherein said elongated member is substantially cylindrical and said outlet means are located in the bottom rear quadrant of said elongated member.

14. The icemaker of claim **13** wherein said inlet means has a central axis substantially at right angles to said elongated member, said baffle members have inner edges substantially in a common plane that is at right angles to said axis, said baffle members and said edges are substantially vertical, and said water outlet means are located adjacent the bottoms of said baffle members.

15. The icemaker of claim **4** wherein each of said outlet means comprises a hole that flares outwardly from its inner end to its outer end, thereby distributing an elongated spray of water on said refrigerated member.

16. The icemaker of claim **15** wherein each said flare is substantially entirely in a vertical plane.