

[54] **CONTAINER FOR SUPPLYING CHILLED WATER FROM A REFRIGERATOR OR THE LIKE**

2,914,218	11/1959	Korodi.....	222/131
3,299,663	1/1967	Butcher	62/339
3,429,140	2/1969	White	62/339
3,511,415	5/1970	Crowe.....	62/339

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[52] U.S. Cl..... **62/338, 62/339, 62/389, 62/390**

[51] Int. Cl..... **F25d 23/12**

[58] Field of Search..... **62/338, 339, 390**

[56] **References Cited**

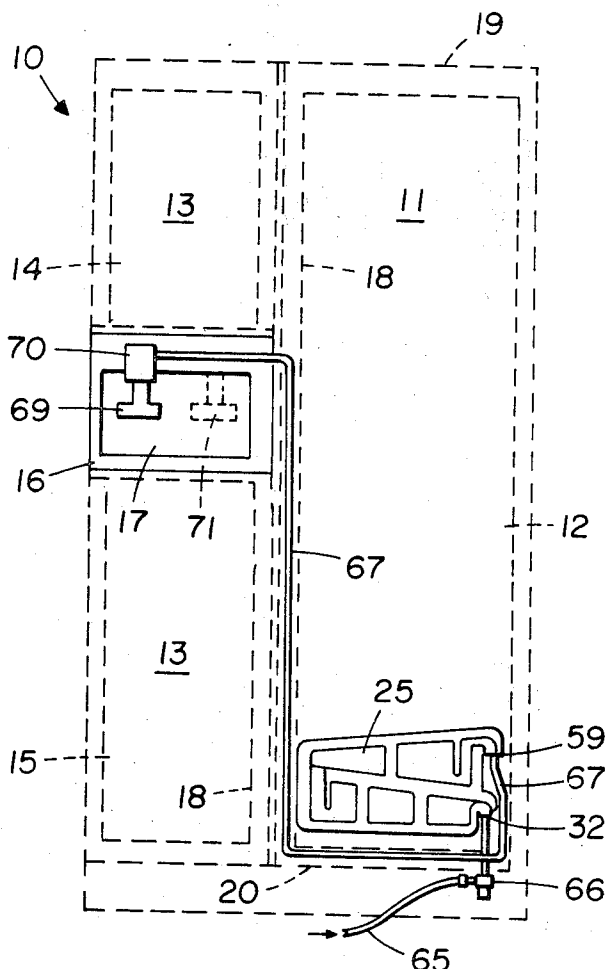
UNITED STATES PATENTS

1,692,223	11/1928	Pinkerton	62/339
2,045,009	6/1936	Shle	62/338
2,644,318	7/1953	Sebens	62/339

[57] ABSTRACT

An unpressurized container for dispensing chilled water from a freezer-refrigerator or the like is connected into a water supply line through a valve upstream of the container. The container itself consists of a pair of elongated tanks disposed one above the other and constructed so as to impede mixing of warm water entering the lower tank with chilled water in both tanks as the chilled water is drawn off through an outlet from the upper tank.

8 Claims, 6 Drawing Figures



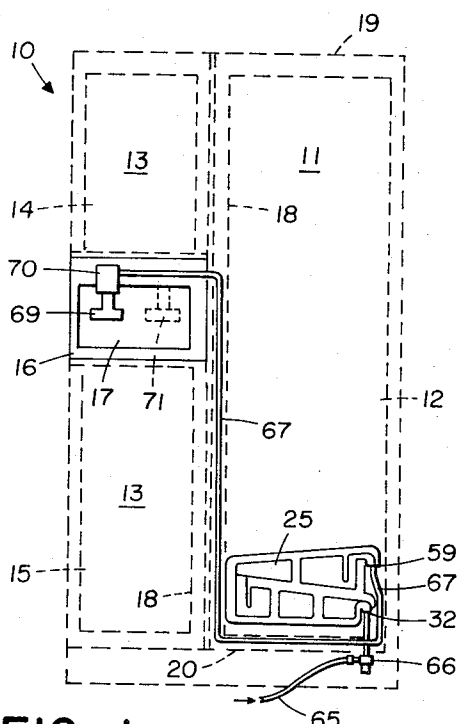


FIG 1

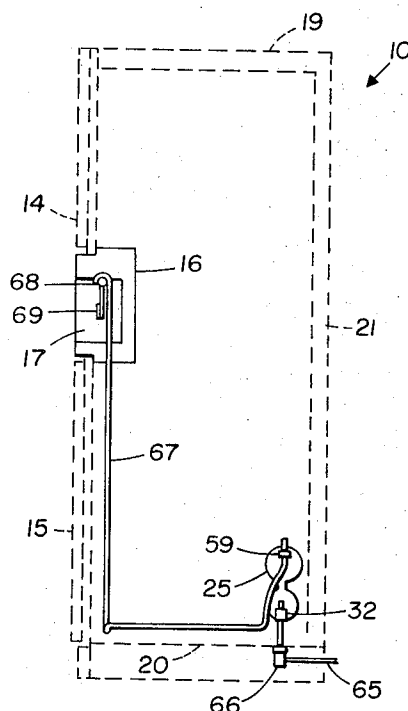


FIG 2

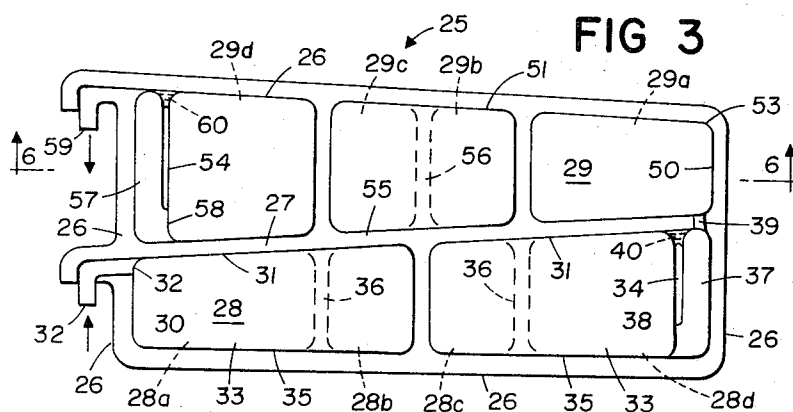


FIG 3

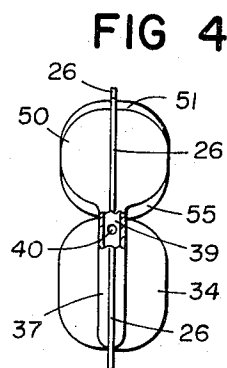


FIG 4

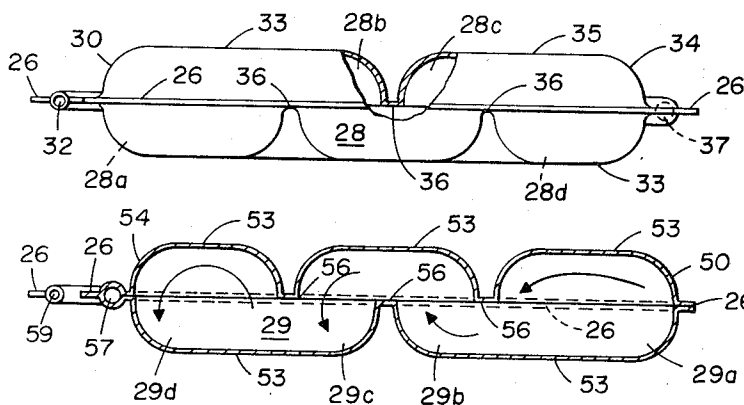


FIG 5

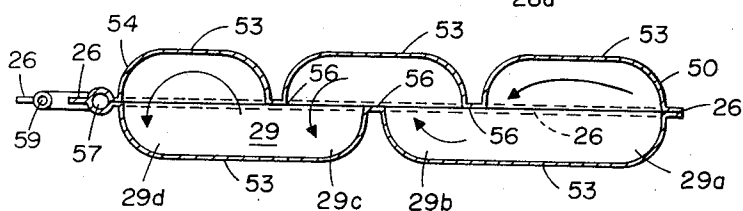


FIG 6

CONTAINER FOR SUPPLYING CHILLED WATER FROM A REFRIGERATOR OR THE LIKE

BACKGROUND OF THE INVENTION

In one design of a freezer-refrigerator of the side-by-side type, ice is dispensed through a fixed exterior panel across the freezer access opening, the remainder of the freezer access opening being closed by a pair of doors above and below the panel. That arrangement is described and claimed in the co-pending application of John J. Pink et al., Ser. No. 271,797, filed July 14, 1972, now U.S. Pat. No. 3,798,923. It is also desirable to be able to dispense chilled water at the same location and for this purpose, of course it is necessary to provide a suitable container in the refrigerator compartment for chilling the water, a supply line to the container from a source of water, a discharge line from the container to the panel, and a water control valve. If the valve is placed at the outlet of the container or of the discharge line, one or both of these, as the case may be, is subject to the full water pressure in the supply line. Consequently, container and discharge line would have to be sturdy enough to withstand the supply line pressure and otherwise comply with plumbing codes. If the valve is placed at the inlet to the container, then the latter and the discharge line are not subject to line pressure when the valve is closed and so can be of lighter materials and otherwise avoid plumbing code requirements.

The container itself should prevent the incoming warm water, when the valve is opened, from reaching the dispensing outlet until it has had a maximum opportunity to be chilled. This requires that the warm water progress through the container along a "front" such that all of the chilled water ahead of the "front" will first be withdrawn before any of the warm water can reach the dispensing outlet. At the same time it is desirable that air trapped in the incoming warm water, as it emerges therefrom owing to the pressure drop in the water flowing into and through the container, be allowed to escape with water flowing from the container. Otherwise, when the valve is reclosed, some of the air would be trapped in the upper regions of the container and its pressure would cause the flow of water to continue for a few moments after closure of the valve.

Accordingly, the chief object of the present invention is to provide a container for dispensing chilled water from a freezer-refrigerator or the like which accomplishes the foregoing in an effective and economical fashion.

SUMMARY OF THE INVENTION

The chilled water container of the invention is integrally molded from a suitable plastic and consists of upper and lower horizontally extending tanks. One end of the lower tank is provided with a water inlet controlled by a solenoid valve disposed at the inlet and connected into the water supply line. On the exterior of the other end of the lower tank is formed an upright water exit chamber opening at its lower end into the lower tank, and at its top end into one end of the upper tank. The exterior of the other end of the upper tank is also provided with a similar water exit chamber opening at its lower end into the upper tank, and at its top end into a water outlet. From the latter a discharge line leads to the front exterior of the freezer-refrigerator

where a lever actuated switch, operated by a drinking glass or the like, opens and closes the water inlet valve. The sidewalls of each tank are provided with offset indentations to form a set of staggered, curved baffles in each tank, so that water flowing therethrough from the inlet to the outlet follows a horizontally swirling and sinuous path. The top wall of each tank inclines upwardly from its inlet end to the upper end of its water exit chamber, and a small air bleed passage connects the water exit chamber with the adjacent upper corner of the tank.

The baffles and the water exit chambers serve to impede mixing of incoming warm water with chilled water in the container, the warm water advancing along a vertical "front" first through the lower tank and then through the upper tank whenever the inlet valve is opened. The air bleed passages permit air emerging from the water to escape through the water outlet line without being trapped within the container and thus forcing some water to continue flowing after the inlet valve is closed. Other details of the structure and operation of the invention are set forth in the drawings and the more detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a phantom front, elevation of a typical side-by-side freezer-refrigerator illustrating the invention incorporated therein.

FIG. 2 is a phantom side elevation of the freezer-refrigerator of FIG. 1.

FIG. 3 is an elevational view of the water container of the present invention.

FIG. 4 is a right-hand end view of the container of FIG. 3, certain portions being broken away to illustrate interior details.

FIG. 5 is a bottom view of the container of FIG. 3, certain portions being also broken away to illustrate other interior details.

FIG. 6 is a sectional view taken along the line 6-6 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As noted, FIGS. 1 and 2 illustrate a typical side-by-side freezer-refrigerator 10 having a food compartment 11 closed by a door 12 and a freezer compartment 13 closed by a pair of vertically spaced doors 14 and 15. Between the latter is a fixed insulated panel 16, recessed in its front at 17, which closes the remainder of the freezer compartment 13. The two compartments 11 and 13 are separated by a vertical partition 18 between the cabinet top wall 19 and bottom wall 20, the partition 18 abutting the cabinet back wall 21.

The water container 25 of the present invention is blow molded from and between a pair of sheets of suitable plastic material such as polyethylene, which, except for the inlet and outlet openings hereafter described, are faced sealed to each other at 26 about their edges to form the perimeter of the container, and at 27 thereacross to provide an elongated lower tank 28 and an elongated upper tank 29 of substantially equal capacities. The lower tank 28 at the juncture of its end wall 30 and top wall 31 is molded to provide a water inlet passage 32 through the seal 26. From the end wall 30, sidewalls 33 extend laterally to the opposite end wall 34, and the top wall 31 is inclined uniformly upwards from the inlet 32 to its juncture with the end wall

34, each of the walls 30, 31, 33, and 34 and the bottom wall 35 being radiused into its respective adjoining walls as illustrated. At laterally spaced intervals the sidewalls 33 are vertically indented between the top and bottom walls 31 and 35 to provide a series of staggered, radiused baffles 36 which divide the tank 28 into several laterally connecting compartments 28a, b, c and d. On the outer face of the end wall 34 is integrally formed a relatively small, upright water exit chamber 37 which extends down from the level of the adjacent end of the top wall 31 and opens at 38 through the end wall 34 laterally into the bottom of the adjacent compartment 28d. The upper end of the chamber 37 is provided with a vertical outlet passage 39 through the seal 27 up into the adjacent end of the upper tank 29. A small, lateral air bleed passage 40 through the juncture of the top wall 31 and end wall 34 connects the tops of the compartment 28d and the exit chamber 37 just below the outlet 39.

The upper tank 29 is substantially a mirror image of the lower tank 28, having end wall 50 adjacent the outlet 39, top wall 51, sidewalls 53, opposite end wall 54 and bottom wall 55, the top wall 51 also inclining uniformly upwards from the end wall 50 to its juncture with the end wall 54, each of the walls 50, 51, 53, 54 and 55 being radiused into its respective adjoining walls. The upper side walls 53 are also indented to form a series of staggered, radiused baffles 56, which divide the tank 29 into laterally connected compartments 29a, b, c and d. Likewise, on the outer face of the end wall 54 is formed a small upright water exit chamber 57, which extends down from the level of the adjacent end of the top wall 51 and opens at 58 through the end wall 54 laterally into the bottom of the adjacent compartment 29d. The upper end of the exit chamber 57 is laterally connected to a water outlet passage 59 through the seal 26, and a small, lateral air bleed passage 60 through the juncture of the top wall 51 and end wall 54 connects the tops of compartment 29d and exit chamber 57 at a point opposite the outlet 59.

The container 25 is mounted upright adjacent the rear wall 21 of the food compartment 12. A water supply line 65 connects the container inlet 32 to a source of water under pressure through a solenoid operated water valve 66. From the container outlet 59 a discharge line 67 passes downwardly to and then forwardly along the side edge of the cabinet bottom wall 20, down into the latter and then across to and up inside the partition 18 along the food compartment side in order to prevent freezing of water in the line 67. Finally the line 67 travels through the partition 18 into and across the top of the panel 16, opening at 68 down into the panel recess 17 adjacent one side thereof. Below the outlet 68 a depending arm 69, pivoted for actuation by a water glass or the like, operates a switch 70 to energize and thus open the inlet valve 66 when the arm 69 is pushed rearwardly, the arm 69 being biased forwardly so that the switch 70 is otherwise normally open. If desired, a similar arm 71, indicated in broken lines, may also be located in the recess 17 for dispensing ice through the panel 16, as in the aforesaid Pink et al. application.

Assuming first that the container 25 is filled with chilled water, which of course is at atmospheric pressure only owing to the fact that there is no valve or other closure between the valve 66 and the outlet 68 of line 67, when the valve 66 is opened, warm water en-

ters the lower tank 28 through the inlet 32 into the compartment 28a. If the valve 66 is then closed, the water in compartment 28a will gradually stratify with the warm water until chilled lying at the top, the first baffle 36 tending to keep it from progressing into the adjacent compartment 28b. Frequent successive or prolonged openings of the valve 66 will result in the compartment 28a being filled with warm water. When that occurs the warm water, owing to the adjacent baffles 36, will move along a more or less vertical "front" into the compartment 28b and thence in the same manner into compartments 28c and 28d, the warm water following a generally horizontally sinuous path owing to the baffles 36 as its "front" moves through the tank 28. Should the valve 66 then be closed, the water in the various compartments of the tank 28 will stratify until chilled to a uniform temperature. Not until the compartment 28d is substantially filled with warm water will any of the latter, when the valve 66 is reopened, pass through the opening 38 into the exit chamber 37 and thence through the outlet 39 into compartment 29a of the tank 29. To put it another way, the warm water in the lower tank 28 is trapped by convection in the upper regions of the tank and the chilled water therein is drawn off only from the bottom of tank 28 through the opening 38. Whether the amount of warm water which enters the lower tank 28 is small or large, the air escaping therefrom owing to its pressure drop collects against the top wall 31, and, since the latter is inclined, moves therealong up to and through the bleed passage 40 and thence up into the upper tank 29 through the outlet 39.

The passage of warm water through the upper tank 29 is identical, the water moving sinuously along a vertical "front" through the compartments 29a, b, c and d owing to the baffles 56. In fact, the water in both tanks 28 and 29 swirls somewhat in each compartment, as indicated by the arrows in FIG. 6, owing to the curved end walls 34 and 54 and baffles 36 and 56. Only when all the chilled water has been drawn off from the container 25 will any substantial amount of warm water then pass through the opening 58 in the compartment 29d into the exit chamber 57 and up through the latter and the outlet 59 into the discharge line 67. Any remaining air escaping from the warm water in the upper tank 29 is joined by that entering the same through the outlet 39 from the lower tank 28, and all the air moves up along the top wall 51 through the air bleed passage 60 and into the line 67 through the outlet 59. Hence no air is or can be trapped in the container 25, so that when the valve 66 is closed the flow of water is cut off substantially instantaneously.

It will be appreciated, of course, that the capacity of the container 25 could be increased by forming additional tanks above tank 29 and connecting them as are tanks 28 and 29, the outlet 59 then being placed at the uppermost tank. Likewise, it will also be appreciated that the container 25 can be adapted to other configurations of multi-door freezer-refrigerators as well as to simpler refrigerators. Nor need the outlet 68 of the discharge line 67 be placed on the exterior of the unit. It could just as well be located within the food compartment for easy access.

Though the present invention has been described in terms of a particular embodiment, being the best mode known of carrying out the invention, it is not limited to that embodiment alone. Instead, the following claims

are to be read as encompassing all adaptations and modifications of the invention falling within its scope and spirit.

I claim:

1. An unpressurized water container for installation in an above freezing portion of a refrigerator to chill water supplied to the container through a water valve connected between the container and a source of water under pressure, the container comprising: an elongated tank extending generally horizontally between opposite end walls, the end walls being interconnected by side walls and top and bottom walls; a water inlet adjacent one end wall; an upright water exit chamber disposed adjacent the other end wall and opening at its bottom into the tank adjacent its bottom wall, the tank top wall between the inlet end wall and the exit chamber inclining upwards from the former to the latter; a water outlet disposed adjacent the top of the exit chamber; and an air bleed passage disposed at the juncture of the tank top wall and the exit chamber, the air bleed passage communicating with the water outlet.

2. The container of claim 1 wherein the tank side walls are provided with inwardly extending baffles between the top and bottom walls of the tank, the baffles on one side wall being offset from those on the other side wall and effective to provide a horizontally sinuous path for water flowing through the tank from the inlet end wall towards said other end wall.

3. The container of claim 2 wherein the water exit chamber is disposed on the exterior of the other tank end wall, the tank top wall inclining upwardly from the inlet end wall to said other tank end wall, and wherein the air bleed passage is located at the juncture of the tank top wall and said other end wall.

4. The container of claim 3 wherein the air bleed passage extends through said other end wall and into the upper end of the exit chamber.

5. The container of claim 1 including a second elongated tank extending generally horizontally between opposite end walls and disposed above the first tank, the end walls of the upper tank being interconnected by side walls and top and bottom walls; an upper water

inlet at one end wall of the upper tank adjacent its juncture with its bottom wall, the water outlet of the lower tank being disposed directly below and connected to the upper water inlet for flow of water from the lower tank up into the upper tank; an upper upright water exit chamber disposed adjacent the other upper tank end wall, the upper exit chamber extending downwards from the level of the adjacent end of the upper tank top wall and opening at its bottom into the upper tank adjacent its bottom wall, the upper tank top wall between the upper inlet end wall and the upper exit chamber inclining uniformly upwards from the former to the latter; an upper water outlet disposed adjacent the top end of the upper exit chamber; and an air bleed passage disposed at the juncture of the upper tank top wall and the exit chamber, the air bleed passage of the upper tank communicating with the upper water outlet.

6. The container of claim 5 wherein the side walls of each tank are provided with inwardly projecting baffles formed by indentations therein extending between the top and bottom walls thereof, the baffles on one side wall being offset from those on the other side wall of each tank to define a series of laterally connected compartments in each tank, the walls of each baffle being curved into its adjoining side wall, all effective to provide a horizontally sinuous and swirling path for water flowing through each tank from its water inlet end wall towards its said other end wall.

7. The container of claim 6 wherein the water exit chambers of both tanks are disposed on the exterior of their respective other tank end walls, the respective tank top walls inclining upwardly from their respective inlet end walls to their respective said other tank end walls, and wherein the air bleed passages of both tanks extend through their respective said other end walls into the tops of their respective exit chambers.

8. The container of claim 7 wherein the lower and upper tanks, the water inlets and outlets thereof, and the water exit chambers and the air bleed passages, are all integrally formed as a single molding.

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