July 24, 1934. J. R. REPLOGLE 1,967,431

REFRIGERATOR CONSTRUCTION

Filed Aug. 31, 1931 2 Sheets-Sheet 1

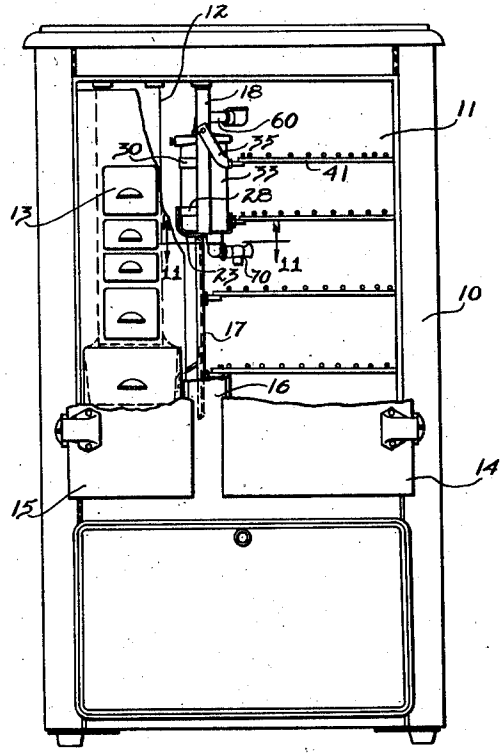


FIG. 1.

FIG. 2.

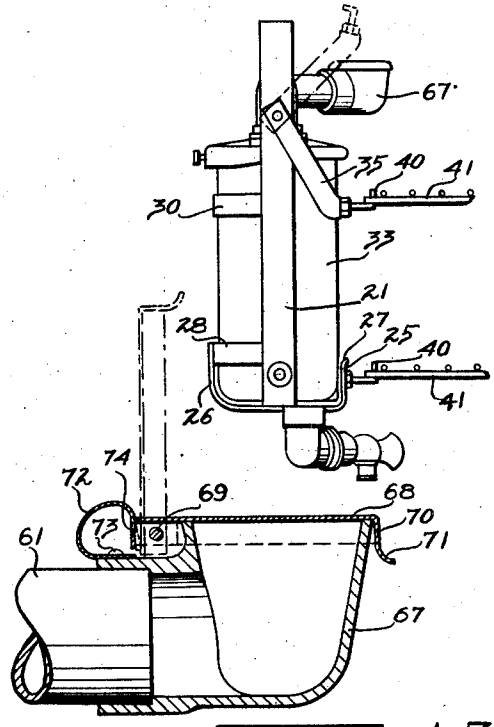


FIG. 13.

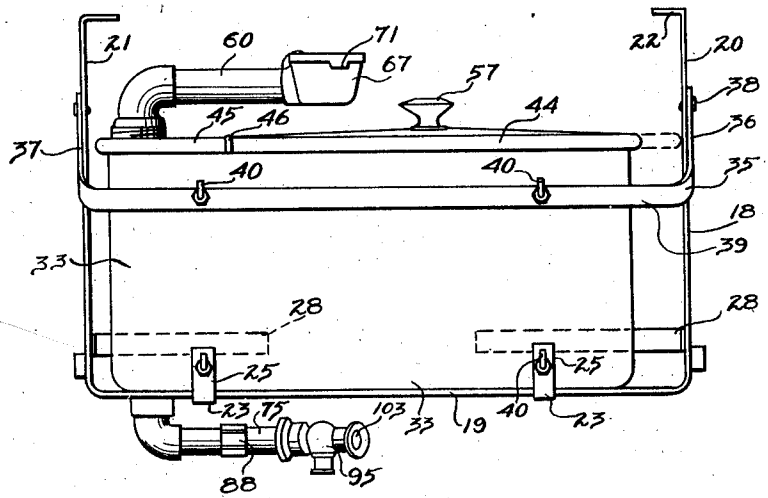


FIG. 3.

INVENTOR
John R. Replogle.
BY
Harness, Dickey, Pierce & Mann
ATTORNEYS.

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REFRIGERATOR CONSTRUCTION

Filed Aug. 31, 1931 2 Sheets-Sheet 2

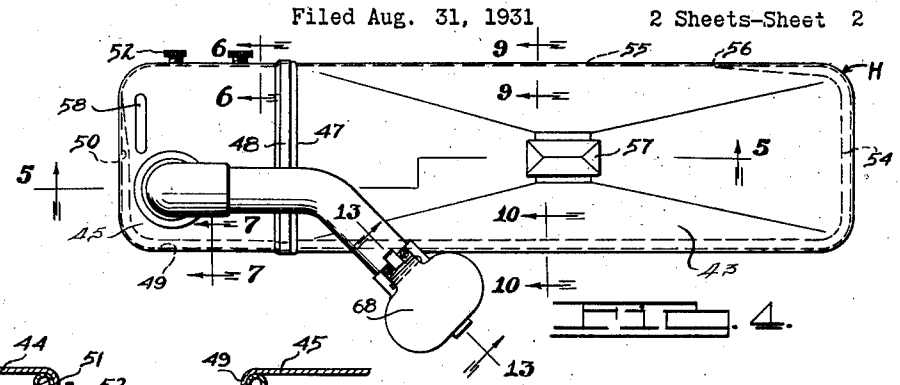


FIG. 4.

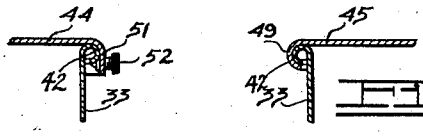


FIG. 7.

FIG. 6.

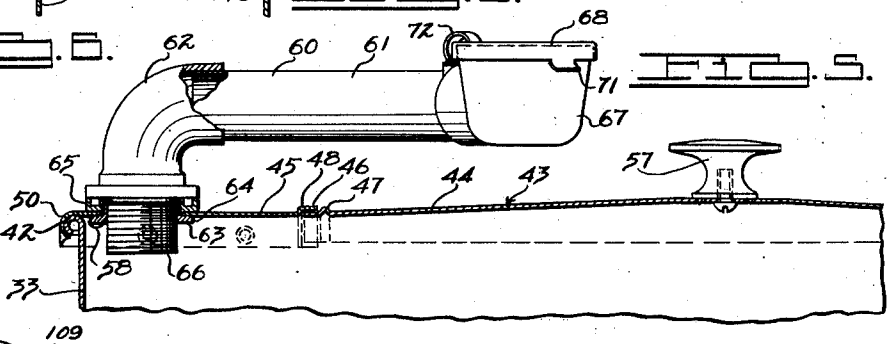


FIG. 5.

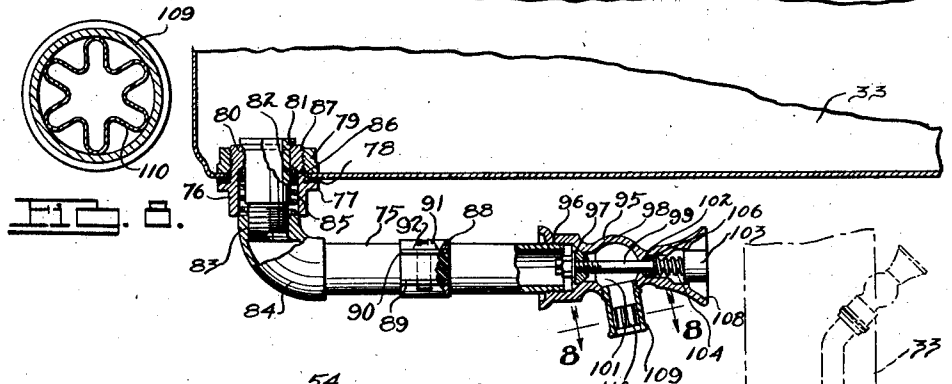


FIG. 8.

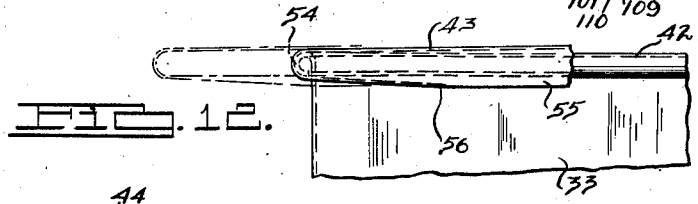


FIG. 12.

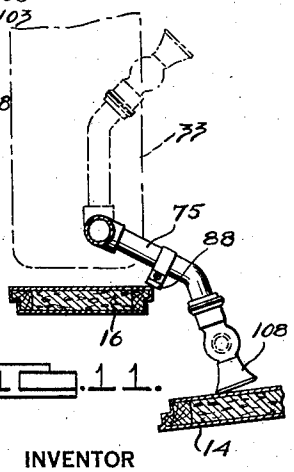


FIG. 11.

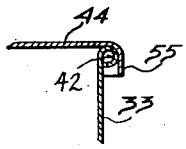


FIG. 9.

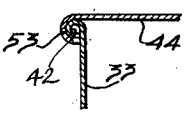


FIG. 10.

INVENTOR
John R. Replogle.
BY
Harness, Dickey, Pierce & Mann
ATTORNEYS.

Patented July 24, 1934 1,967,431

UNITED STATES PATENT OFFICE

1,967,431

REFRIGERATOR CONSTRUCTION

John R. Replogle, Detroit, Mich., assignor, by mesne assignments, to Copeland Refrigeration Corporation, Mount Clemens, Mich., a corporation of Michigan

Application August 31, 1931, Serial No. 560,355

18 Claims. (Cl. 62—141)

The invention relates to refrigerators and it has particular relation to refrigerators of the mechanically operated type.

More specifically it constitutes an improvement over the subject matter embodied in the application for patent to William D. McElhinney, Serial No. 437,997, filed March 22, 1930.

In addition to the general object of providing a water cooling receptacle or tank between the cooling unit and storage space in the refrigerator, which also serves as a baffle for aiding the circulation of air in the latter, the objects of the present invention are to provide a water cooling tank which may be readily and easily removed from the refrigerator for the purpose of cleaning it; to provide a water cooling tank having a removable cover which efficiently seals it against odors emanating from the storage space of the refrigerator; to provide an outlet conduit for the tank, movable through the door opening in the refrigerator and which has a valve of such construction that accidental closing of the door against the valve will not open the latter, but to the contrary will move the conduit into the refrigerator without affecting the valve; to provide an inlet conduit for the tank which is provided with a cover that effectively seals the open end of the conduit but which may be moved into an open position easily and quickly; to provide a support for the tank which includes a latching means normally retaining the tank in position, and also constitutes a support for one or more of the trays in the food compartment of the refrigerator; and in general to provide a water tank for the refrigerator which may be easily kept in a sanitary condition and the water therein free from tainting by food in proximity thereto.

For an understanding of the invention reference may be had to the accompanying drawings, wherein:

Fig. 1 is an elevational front view of a refrigerator with parts broken away, which is provided with a water cooling tank constructed according to one form of the invention;

Fig. 2 is an elevational end view on a larger scale illustrating more clearly the detailed construction of the tank;

Fig. 3 is a side elevational view of the construction shown by Fig. 2;

Fig. 4 is a plan view of the construction shown by Fig. 3 on a larger scale, with the supporting frame work removed;

Fig. 5 is a cross sectional view on a larger scale; taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a cross sectional view on a larger scale, taken substantially along the line 6—6 of Fig. 4;

Fig. 7 is a cross sectional view on a larger scale, taken substantially along the line 7—7 of Fig. 4;

Fig. 8 is a cross sectional view on a larger scale taken substantially along the line 8—8 of Fig. 5;

Fig. 9 is a cross sectional view on a larger scale taken substantially along the line 9—9 of Fig. 4;

Fig. 10 is a cross sectional view on a larger scale taken substantially along the line 10—10 of Fig. 4;

Fig. 11 is a cross sectional view on a larger scale taken substantially along the line 11—11 of Fig. 1 but with the outlet conduit of the tank turned to a position in which it projects through the doorway of the refrigerator;

Fig. 12 is a fragmentary elevational view on a larger scale, of that portion of the construction shown by Fig. 4 and illustrated by the arrow H, also illustrating by broken lines how the cover for the tank is removed;

Fig. 13 is a cross sectional view on a larger scale taken substantially along the line 13—13 of Fig. 4.

Referring to Fig. 1 a refrigerator 10 of conventional construction is provided, having a food storage space or compartment 11 and a cooling unit 12. The cooling unit may be of any standard construction wherein a brine tank or evaporating coil is arranged around a series of ice trays 13. Oppositely swinging doors 14 and 15 are provided for closing the refrigerator and engage, when in their closed positions, a vertically disposed pillar or post 16 forming a part of the door casing. In a refrigerator of this general construction, ordinarily a baffle plate extends vertically between the storage compartment 11 and the cooling unit 12 for the purpose of aiding and increasing the circulation of air in the cabinet around the cooling unit. In the present instance a baffle plate 17 is provided which extends between the rear wall of the refrigerator and the pillar 16, but the plate terminates a substantial distance from the top of the refrigerator. In the space between the upper edge of the plate 17 and the top of the refrigerator, a frame 18 is suspended from the top of the latter and extends to the upper edge of the plate 17.

As best shown by Fig. 3 the frame 18 is provided with a base 19 and upwardly extending end members 20 and 21 terminating in flanges 22 for securing the frame to the top wall of the refrigerator. U-shaped metal elements 23 have their base portions extending transversely of and connected to the base 19, and as best shown by

Fig. 2 a leg 25 of each element adjacent the storage space 11 is shorter than a leg 26 adjacent the cooling unit 12. Also the outer edge of the leg 25 is slightly flared away from the leg 26 as indicated at 27. The outer ends of the legs 26 are also connected to angular metal bands 28 which in turn are connected to the members 20 and 21. A U-shape metal band 30 connects the upper portions of the members 20 and 21 at the side thereof adjacent the cooling unit 12.

It will be apparent from this description that the frame 18 and associated parts thereof, constitute a cage which is reinforced at the back by metal strip elements 28 and 30, while it is open at the front except for the flanges 25 on the U-shaped elements 23. The cage is adapted to receive a water tank 33 of general elongate shape, which has considerable depth. As best shown by Fig. 2, the metal flanges 26, and elements 28 and 30 prevent movement of the tank toward the cooling element 12 while the flanges 25 of the U-shaped elements 23, prevent a horizontal bodily sliding movement of the tank 33 toward the space 11. The width of the tank is slightly less than the distance between the flanges 25 and 26 of the U-shaped elements 23 and this difference in width, in conjunction with the flaring of the outer edges of the flanges 25 as indicated at 27, is sufficient to permit a tilting of the tank 33 toward the space 11 and then removing it from the frame work 18.

Normally, such tilting movement of the tank 33 is prevented by a U-shaped latching member 35 having portions 36 and 37 pivoted to the frame members 20 and 21 as indicated at 38, and a portion 39 which is adapted to straddle the tank 33 and engage its side wall adjacent the space 11. When the latching member is in the position shown by full lines in Figs. 1 and 2, it is apparent that the tank 33 cannot be tilted in the manner previously described but if the latching member is moved upwardly into the position shown by broken lines, the tank 33 may be tilted and readily removed from the framework. The portion 39 of the latching member 35 is provided with hooks 40 for supporting a tray 41, and when the latching member is in its operative position, the food tray positively retains the latching member in its operative position. Similarly, the flanges 25 at the base of the frame 18 are provided with food tray supporting hooks 40.

In conjunction with the plate 17, the tank 33 efficiently constitutes a baffle for controlling the circulation of air around the cooling unit 12, It is evident that air around the cooling unit 12 will flow downwardly because it is heavier, and that the warmer air will be forced upwardly into the upper part of the storage space 11. The baffle, in reality, guides this warmer air into the space above the tank and then around the cooling unit, and also guides the colder air downwardly into the lower part of the refrigerator.

Referring now to Fig. 5 the side walls of the tank 33 terminate at their upper edges in laterally offset, cylindrically rolled portions 42 which results in the upper edge of the tank having a cylindrically arcuate surface. Normally the tank is closed by means of a cover 43 comprising sections 44 and 45 partially telescoped as indicated at 46. A transversely extending rib 47 is provided in the section 44 by forming the metal outwardly from the outer surface and this rib is located adjacent the telescoping portion 46 and is adapted not only to reinforce the end of the section 44 which in this instance telescopes into an offset portion 48 of the portion section 45, but also to insure a sealing engagement between adjacent ends of the sections of the cover.

The front edge of the section 45, as seen in Figs. 4 and 7, is rolled downwardly in an arcuate manner as indicated at 49 and engages the cylindrically rolled, front edge 42 of the container 33. The left end edge of the section 45 as seen best by Fig. 5, similarly is rolled downwardly as indicated at 50 and engages the end rolled edge of the tank. However, the end rolled edge 50, as it approaches the rear edge of the section as seen by Fig. 4 gradually changes in contour until it has a vertically projecting flange 51 (Fig. 6) which instead of curving downwardly and around the lower part of the rolled edge 42 of the container, is disposed vertically tangential to the outer surface of such edge. Constructing the edge of the section 45 in this manner permits moving the section to the left as seen in Fig. 4, until the end curved edge 50 of the section is disposed in such position that the section may be pivoted upwardly about the front rolled edge of the container. The section 45 normally is retained in its operative position by means of set screws 52 extending through the vertical flange 51 at the rear edge of the section, which engage the lower surface of the rolled edge 42 of the rear wall of the container.

The cover section 44 similarly is provided with a curved front edge as indicated in Fig. 10 at 53, a similarly curved end edge 54 indicated in Figs. 4 and 12, and a vertically flanged edge 55 at its rear edge shown best by Fig. 9. As best shown by Figs. 4 and 12, the curved end edge 54 of the section gradually tapers and merges into the vertical flanged edge 55 at the rear edge of the section at a point indicated at 56. The section is removed from the container first by moving it endwise until the end thereof is moved from telescoping engagement with the section 45 and the point 56 is beyond the end curved edge of the tank and then the section may be pivoted about its front edge and removed from the container. For facilitating movement of the section 44 in this manner a handle 57 is secured to the upper surface of the section. It will be noted particularly in Fig. 3 that the length of the tank 33 is less than the distance between the members 20 and 21 of the frame 18, and accordingly endwise movement of the sections 44 and 45 for the purpose of disassembling them and removing them from the container, is permitted. The manner in which the section 44 is moved longitudinally of the container in order to free the curved end edge of the former from the rolled end edge of the latter, particularly is illustrated in Figs. 3 and 12, in which the permissible amount of endwise movement of the container is shown in exaggerated amount for the purpose of clearness. In practice the amount is not sufficient to interfere with the baffling function of the container. For preventing accidental endwise movement of the section 45 sufficient to separate it from the container, the upper wall is provided with a grooved portion 58 particularly shown by Figs. 4 and 5 which is adapted to engage the end wall of the container if it moves, but this portion does not prevent movement of the section sufficiently to disengage the section edge 50 from the container edge 42. Also, the groove serves as a finger hold when it is desired to move the section.

An inlet conduit 60 having a horizontal portion 61 and an elbow 62 is pivotally connected to the section 45 as best shown by Fig. 5. This connection comprises an internally and externally

threaded sleeve 63 which projects through a circular opening in the section and has a flange 64 engaging the inner surface of the section around the opening for retaining the sleeve in position. A collar 65 threaded on the sleeve 63 outwardly of the section clamps the edges of the section bordering the opening therein against the flange 64 on the sleeve. The elbow 62 on the conduit 60 is provided with a portion 66 which is threaded into the sleeve 63.

As best shown by Fig. 13 the free end of the horizontal portion 61 of the conduit 60 is rigidly secured to a cup 67 into which water may be poured for the purpose of filling the tank 33. A cover 68 is pivoted to the cup 67 at one side of the opening therein as indicated at 69 and is provided with a depending flange 70 around its edge which overlaps the edges of the cup. This flange terminates at one point in a lip 71 which facilitates opening and closing the cover. The cover 68 is normally retained in a closed position by means of a spring 72 rigidly connected to the cup at one end as indicated at 73 and having a freely movable, vertical outer end portion 74 engaging the edge of the cover at the side of the pivot 69 opposite the opening in the cup. This spring is so arranged that it resists opening of the cover and therefore positively retains the cover in a closed position unless the latter is manually opened, and also retains the cover in open position as shown by broken lines in Fig. 13 when the cover has been opened.

An outlet opening or conduit of the tank 33 is indicated at 75 and is pivotally connected to the bottom wall of the tank. The pivotal connection between the outlet conduit 75 and the bottom wall of the tank 33 comprises a sleeve 76 projecting through an opening in the wall and which is provided outwardly of the wall with an annular shoulder 77 engaging a packing 78 and retaining the latter against the wall of the tank around the opening. That part of the sleeve in the tank, is externally threaded and a collar 79 threaded on this portion clamps the edges of the tank wall around the opening against the packing 78 and shoulder 77 on the sleeve. At its inner end the central opening in the sleeve is provided with a tapered seat 80 which normally engages a tapered seat 81 of a second sleeve 82 extending through the first mentioned sleeve. The outer end of the sleeve 82 projects beyond the outer end of the sleeve 76 and is threaded as indicated at 83 into an elbow 84 on the conduit 75. The seat 81 on the member 82 is resiliently retained against the seat 80 on the sleeve 76 by means of a helical spring 85 encircling the sleeve 82 which is disposed in an enlarged portion of the opening in the sleeve 76. The spring at its inner end engages a packing 86 disposed against a shoulder 87 on the inner periphery of the sleeve 76, and at its outer end engages the elbow 84. This arrangement of parts permits pivoting the outlet conduit 75 and at the same time maintaining a sealed connection which prevents leaking of water around it.

As particularly shown by Fig. 1, the inlet and outlet conduits 60 and 75 may be turned about their connections to the tank 33 and through the right door way in the refrigerator when the door 17 is opened. Hence, the tank 33 may be filled with fresh water readily, and cold water may be removed from the tank without difficulty. The position of the outlet conduit 75 when it is desired to drain water from the tank is clearly shown in Fig. 11, while the normally inoperative position of the conduit is shown in broken lines in the same figure. For the purpose of limiting movement of the conduit when it is moved through the door way of the refrigerator it is provided with a resilient rubber block 88 that is retained between outwardly flanged ends 89 and 90 (Fig. 5) of a contractible clamping band 91 secured to the conduit by means of a screw 92. This block of rubber prevents the conduit from assuming a position (Fig. 11) in which it would become jammed between the door 14 and the container.

The outer end of the conduit 75 (Fig. 5) is provided with a valve 95 which is threaded on the end of the conduit as indicated at 96. A tapered valve seat 97, provided in the valve, normally engages a valve disc 98 which is retained thereagainst by means of plunger 99. The plunger extends through a relatively large central opening 101 in the valve and slidably through a wall 102, to the exterior of the valve. At its outer end the plunger 99 is provided with an enlarged portion 103 by means of which it may be moved through the valve body, and the valve disc 98 unseated from the seat 97. A spring 104 encircling the plunger 99 between the enlargement 103 and the wall of the valve, normally retains the valve disc against the valve seat. For preventing leakage of the water through the wall of the valve around the plunger 99 a packing 106 is disposed between the wall and end of the spring. The outer end of the plunger, and particularly the enlarged portion 103 thereof, are located in a conically shaped housing 108, and when the valve is in its closed position the outer surface of the enlarged portion 103 is substantially aligned with, or disposed slightly inwardly of, the end edges of the housing, and accordingly the plunger cannot be moved except by some means which moves into the housing. The central opening 101 communicates with an outlet tube 109 which extends downwardly and is provided with a star shaped element 110 therein shown best by Fig. 8 which is of conventional construction and found desirable in valves of this character.

It will be apparent from Fig. 11 that should the door 14 be closed before moving the conduit 75 into its inoperative position, the door will engage the edges of the housing 108 of the valve 95 without engaging the plunger 103. Accordingly movement of the door against the conduit cannot accidentally cause discharge of water therefrom. Furthermore, the rubber block 88 on the conduit 75 acts as a resilient stop for the conduit in its outward swinging movement to such an extent that should it be forgotten to swing the conduit in before the door is closed, the door in striking the skirt or housing 108 of the valve will cam the conduit 75 inwardly without danger of damaging either the conduit or the container.

It will be apparent from the above description that a very efficient water tank for refrigerators has been provided which serves as a baffle between the cooling unit and the storage space of the refrigerator and therefore facilitates a proper circulation of air in the latter. The water tank provided is readily removable for the purpose of cleaning it and is provided with easily removable cover sections which normally maintain it sealed against odors emanating from food in the storage space. This is of particular importance because water that remains in the tank in a refrigerator for a period required to cool it properly is apt to become tainted with food odors unless properly sealed in the tank. It will be apparent that the tank is provided with pivoted outlet and

inlet conduits which are movable through one of the doorways of the refrigerator and that although this desirable feature is provided, the tank is retained sealed in the manner previously stated.

The provision of a sectional cover for the tank enables connecting the inlet conduit to one of the sections and retaining that section on the tank while permitting removal of the other section when it is desired to clean the tank. The fact that the section to which the inlet conduit is pivotally connected is of shorter length than the other section of the cover, is of importance because it facilitates cleaning the tank without removing the inlet conduit. The provision of the conical housing around the outer end of the plunger in the valve of the outlet conduit prevents accidental discharge of water from the valve in the event that the conduit is not moved into the refrigerator before the door of the refrigerator is closed, in which event movement of the door engages the valve. The invention comprises an arrangement which will encourage the public demand for a refrigerator having a water cooling tank therein because it provides a tank that may be maintained in a very sanitary condition and one which keeps the water in a fresh and untainted condition.

Although only certain forms of the invention have been shown and described in detail it will be apparent to those skilled in the art that various modifications may be made without departing from the scope of the appended claims.

I claim:

1. A refrigerator having a storage space and a cooling unit adjacent thereto, a support secured to a wall of the refrigerator and extending between the cooling unit and the storage space, a water tank on the support and serving as a baffle for controlling the circulation of air in the refrigerator, and a quickly releasable latch for retaining the tank in an upright position on the support.

2. A refrigerator having a storage space and a cooling unit adjacent thereto, a support secured to a wall of the refrigerator and extending between the cooling unit and storage space, a removable water tank on the support, means for preventing movement of the tank towards the cooling unit, and a latching member normally preventing movement of the tank toward the storage space but when inoperative permitting a quick release of the tank.

3. A refrigerator having a storage space and a cooling unit adjacent thereto, a support secured to a wall of the refrigerator and extending between the cooling unit and storage space, a removable water tank on the support, means for preventing movement of the tank towards the cooling unit, and a latching member normally preventing movement of the tank toward the storage space but when inoperative permitting a quick release of the tank, and means on said member adapted to support a food tray.

4. A refrigerator having a storage space and a cooling unit adjacent thereto, and an upwardly open channel support extending between the storage space and unit in a direction substantially normal to the rear wall of the refrigerator, and a water tank located in said channel and extending thereabove.

5. A refrigerator having a storage space and a cooling unit adjacent thereto, and an upwardly open channel support extending between the storage space and unit in a direction substantially normal to the rear wall of the refrigeartor, and a water tank located in said channel and extending thereabove, means for preventing tilting of the tank toward the cooling unit and a releasable latch normally preventing tilting of the tank towards the storage space, but which when released permits removal of the tank.

6. A refrigerator having a storage space and a cooling unit adjacent thereto, and an upwardly open channel support extending between the storage space and unit in a direction substantially normal to the rear wall of the refrigerator, and a water tank located in said channel and extending thereabove, means for preventing tilting of the tank toward the cooling unit and a releasable latch normally preventing tilting of the tank towards the storage space, but which when released permits removal of the tank, said latch in its operative position being adapted to support a food tray and be retained in such position thereby.

7. A refrigerator having a storage space and a cooling unit adjacent thereto, and an upwardly open channel support extending between the storage space and unit in a direction substantially normal to the rear wall of the refrigerator, and a water tank located in said channel and extending thereabove, means for preventing tilting of the tank toward the cooling unit and a releasable latch normally preventing tilting of the tank towards the storage space, but which when released permits removal of the tank, said latch comprising an arm pivoted above the tank and having a portion adapted to engage the side of the tank adjacent the storage space.

8. A refrigerator having a storage space and a cooling unit adjacent thereto, a water tank disposed between the unit and storage space, an outlet conduit pivotally connected to the tank and adapted to be moved through the door opening in the refrigerator, a valve on the free end of the conduit and having an operating element, and means on the valve for preventing engagement of the element by the door, should the latter be closed prior to moving the conduit into the refrigerator.

9. A refrigerator having a storage space and a cooling unit adjacent thereto, a water tank disposed between the unit and storage space, an outlet conduit pivotally connected to the tank and movable in a horizontal direction through the door opening when the door is open until engaging the door casing, a valve on the free end of the conduit, an operating element on the valve, and means for preventing the door from engaging the element should the door be closed before the conduit is returned to its position within the refrigerator.

10. A refrigerator having a storage space and a cooling unit adjacent thereto, a support secured to a wall of the refrigerator and extending between the cooling unit and the storage space, a water tank on the support, and a quickly releasable latch for retaining the tank in an upright position on the support.

11. In a refrigerator, a water tank, a conduit pivotally connected to the tank and movable through a doorway in the refrigerator, and cushioning means for limiting movement of the conduit when it is swung toward the door casing.

12. In a refrigerator, a water tank, an outlet conduit pivotally connected to the tank and movable through a doorway of the refrigerator, said conduit having a valve and operating element therefor, and means for preventing engagement of the door with the valve operating element.

13. A refrigerator having a storage space and

a cooling unit adjacent thereto, an upwardly open channel support extending between the storage space and unit in a direction substantially normal to the rear wall of the refrigerator, and a water tank located in said channel and being removable therefrom.

14. A refrigerator having a storage space and a cooling unit adjacent thereto, a support in the refrigerator adjacent the cooling unit and having spaced side walls substantially normal to the rear wall of the refrigerator, and a water cooling tank removably mounted on the support and projecting vertically between said side walls.

15. A refrigerator having a storage space and a cooling unit adjacent thereto, a support suspended in the refrigerator adjacent the cooling unit and having spaced side walls substantially normal to the rear wall of the refrigerator, and a water cooling tank removably mounted on the support and projecting vertically between the side walls thereof.

16. A refrigerator having a storage space and a cooling unit adjacent thereto, a support mounted in the refrigerator adjacent the cooling unit and having a base portion disposed substantially horizontally, and spaced side walls directed substantially normal to the rear wall of the refrigerator, and a water cooling tank removably mounted on the support and normally resting on the base portion thereof and between the spaced side walls.

17. A refrigerator having a storage space and a cooling unit adjacent thereto, a water cooling tank in the refrigerator adjacent the cooling unit, and means for supporting and locating the tank so that the latter may be quickly removed from the refrigerator, said means comprising spaced side members directed substantially normal to the rear wall of the refrigerator and between which the tank vertically projects, and means for holding the tank against downward movement.

18. A refrigerator having a storage space and a cooling unit adjacent thereto, spaced means at one side of the cooling unit and disposed substantially in plane normal to the rear wall of the refrigerator for receiving a water cooling tank adapted to be laterally located and positioned between such means, a water cooling tank disposed between the spaced means, and means for supporting the tank against downward movement but permitting its ready removal from the refrigerator.

JOHN R. REPLOGLE.