Aug. 12, 1952 J. B. TUCKER 2,606,426

WATER DISPOSAL ARRANGEMENT FOR REFRIGERATORS

Filed Oct. 31, 1950

Fig. 1

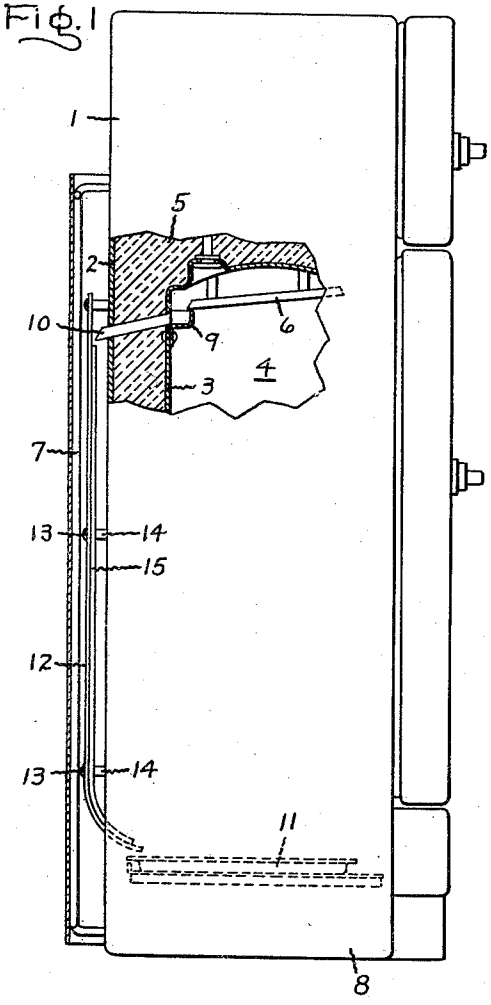


Fig. 4

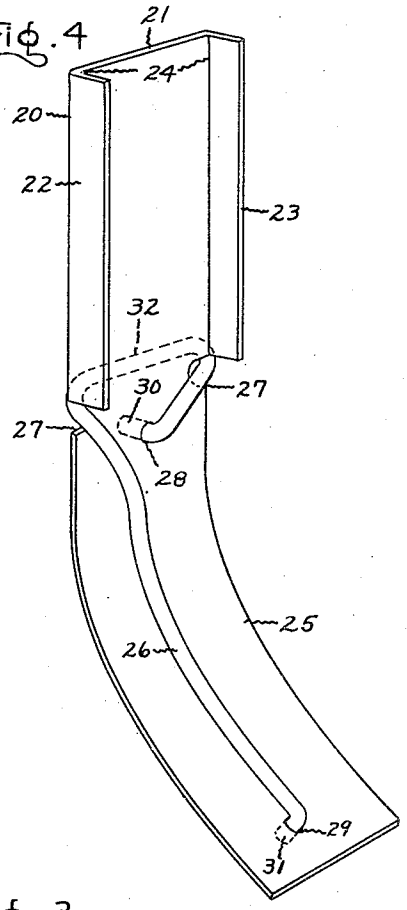


Fig. 2

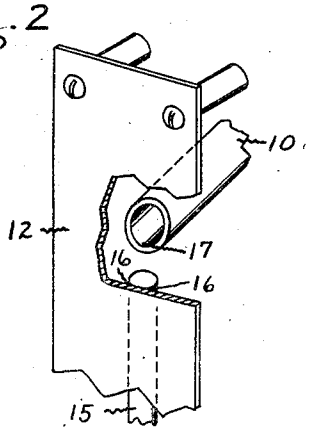
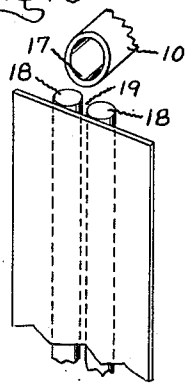


Fig. 3



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WATER DISPOSAL ARRANGEMENT FOR REFRIGERATORS

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10 Claims. (Cl. 62—103)

1

My invention relates to refrigerators and more particularly to arrangements for disposing of water collecting therein.

In many household refrigerators an evaporator is employed which is exposed to the air within the food storage compartment and, since the evaporator is operated at a temperature substantially below the freezing point of water, moisture collects on the evaporator in the form of frost. This frost must be removed from time to time either by manually stopping the operation of the refrigerator or by some automatic defrosting arrangement. Particularly in the latter case it is desirable to dispose of the water in some manner which does not require the user's attention. In some cases the water is allowed to run directly down the liner of the refrigerator, through a drain opening in the bottom, and then into a receptacle in the machinery compartment where it gradually evaporates because of the heat present in the machinery compartment. Alternatively, the water may be conducted from the evaporator through a conduit extending through the rear wall of the refrigerator and then discharged downwardly in some manner for ultimate collection in the receptacle in the machinery compartment. For example, a generally vertical strip may be employed and the water from the evaporator discharged onto this strip and allowed to flow down the strip into the receptacle. However, water flowing in this manner has a tendency to zigzag or oscillate and, hence, tends to splash off the sides of the strip and onto the floor unless the strip employed is quite wide. By my arrangement, however, even with a relatively narrow strip the surface tension of the water itself is utilized to insure that the water follows a definite path into the collecting receptacle and does not splash off the sides of the strip onto the floor.

It is an object of my invention to provide a drain water disposal assembly for a refrigerator including an improved arrangement for assuring a definite path for the water.

It is another object of my invention to provide a water disposal assembly outside the food storage compartment of the refrigerator and including an improved arrangement for minimizing the amount of water falling onto the floor.

It is a further object of my invention to provide an improved arrangement for conducting water from an evaporator in the upper portion of a refrigerator to a receptacle in the machinery compartment and including an improved arrangement utilizing the surface tension of the water for guiding the water along a definite path.

2

Further objects and advantages of my invention will become apparent as the following description proceeds and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In carrying out the objects of my invention a collecting receptacle is disposed in the machinery compartment at the bottom of the refrigerator and a conduit extends from the region of the evaporator in the food storage compartment through the back wall of the refrigerator for discharging water from the evaporator. An elongated vertical strip is provided for conducting the water from the conduit to the receptacle in the machinery compartment, and several constructions are provided for guiding the water along this strip. One or more rods are provided on the vertical strips so that the surface tension of the water causes the water to flow along the space of capillary size between the rod and the strip or between the two parallel rods. Alternatively, sides may be formed on the strip, that is, in effect, a channel member may be employed, so that water is guided along the corners at the junction between the strip and the side members.

For a better understanding of my invention reference may be had to the accompanying drawing in which Fig. 1 is a side view partly broken away of a refrigerator including an embodiment of my invention; Fig. 2 is an enlarged view of a portion of the structure of Fig. 1 illustrating the water disposal assembly; Fig. 3 is a view similar to Fig. 2, showing a modified form of my invention; and Fig. 4 is a view of another modified form of my invention.

Referring to Fig. 1, there is shown a refrigerator 1 including an outer wall 2 and an inner wall or liner 3 which defines a food storage compartment 4. The space between the inner and outer walls is filled with a suitable heat-insulating material 5. A relatively flat inclined evaporator 6 is supported at the top portion of the food storage compartment 4 for refrigerating this compartment. The evaporator 6 is connected in a conventional refrigerating system including a condenser 7 through which refrigerant is circulated by refrigerating unit (not shown) located in the machinery compartment 8 at the bottom of the refrigerator.

The evaporator 6 normally operates at a temperature substantially below the freezing point of water and, hence, moisture from the air in the food storage compartment condenses on the

evaporator and collects thereon as frost. To operate the evaporator at a relatively high efficiency, it is necessary to remove this frost from time to time, and, in connection with such removal of frost, a substantial amount of water resulting from the melted frost must be discharged in some manner. In the arrangement shown the evaporator 6 is inclined somewhat to the rear so that water from the melting frost tends to flow to the rear. A collecting trough 9 is secured to the rear wall of the liner 3 for receiving water from the evaporator 6. A conduit 10 which extends through the rear wall of the refrigerator is provided for discharging water from the trough 9 to the exterior of the refrigerator. A receptacle 11 is disposed within the machinery compartment 8 for ultimately collecting water discharged through the conduit 10. Since the temperature in the machinery compartment is relatively high because of the presence of the refrigerating unit therein the water collecting in the receptacle 11 evaporates relatively rapidly without any attention from the user.

To conduct the water from the end of the conduit 10 to the receptacle 11 an assembly is provided which includes a flat elongated vertical strip 12. The strip 12 is supported in any suitable manner on the rear wall of the refrigerator, for example by screws 13 and spacers 14. A cylindrical rod or guide element 15 extends vertically along the strip 12 substantially centrally thereof. The rod 15 is brazed to the strip 12 and spaces or recesses 16 of elongated capillary size are formed between the strip 12 and the surface of the rod 15. Water is discharged onto the strip 12 from the end 17 of the conduit 10 above the top of the rod 15. As the water begins to flow down the strip 12 it collects in the capillary spaces 16 and, because of the surface tension of the water, it preferentially flows along these capillary spaces throughout the length of the strip. Thus any tendency which might otherwise be present for the water to begin to oscillate and splash off the sides of the strip onto the floor is minimized. The lower end of the strip and the rod is curved so that the extreme end thereof is located above the receptacle 11 and water is discharged from the strip into the receptacle.

Alternatively the rod 15 in Fig. 2 may be mounted on the strip 12 so as to be spaced slightly therefrom, say about $\frac{1}{32}$ inch, and the water will then tend to collect and drain down through the narrow capillary space between the strip 12 and the adjacent surface of the rod 15. The space of $\frac{1}{32}$ inch is suggested by way of example but any spacing sufficiently small that the surface tension of the water is effective to cause the water to tend to collect and flow in the space, that is, any space which may be considered of capillary size, is satisfactory. I have found that the maximum spacing should be approximately $\frac{1}{16}$ inch. The minimum diameter of the rod 15 is approximately $\frac{1}{16}$ inch.

A modified arrangement for conducting the water from the conduit 10 to the receptacle 11 is illustrated in Fig. 3, this modification differing from that just described in that two parallel rods are employed in lieu of the single rod shown in Fig. 2. The same numerals have been employed to designate corresponding parts in Fig. 3 and in Figs. 1 and 2. In the form shown in Fig. 3 two rods 18 are secured in parallel relationship in a vertical position generally centrally of the elongated vertical strip 12. The rods 18 are secured directly to the strip 12 in any suitable manner, as by brazing, and are spaced slightly from each other so as to provide a narrow passage or space of capillary size between the two rods. Water is discharged from the conduit 10 onto the strip 12 above the tops of the rods 18 and, as it begins to flow down the strip 12, it preferentially, because of the surface tension of the water, follows a path through the space 19 of capillary size wherein the surface tension of the water causes it to collect and remain within this space. The water then flows throughout the length of the strip through this space and is ultimately discharged into the receptacle 11 without any tendency for the water to oscillate in its movement down the strip and to flow over the sides of the strip and onto the floor.

Another modified form of my invention is shown in Fig. 4. In this figure a channel member 20 is substituted for the flat strip and rod constructions of Figs. 2 and 3 for conducting water from the conduit 10 vertically toward the bottom of the refrigerator. The channel member 20 in effect consists of a flat strip or back section 21 and two side sections 22 and 23 which join the flat strip 21 at its edges. Water is discharged from the conduit 10 onto the upper portion of the strip and as it begins to flow down the strip it tends, because of its surface tension, to collect in the corners 24 which form the junction between the side sections 22 and 23, and the back section or flat strip 21. Thus two preferential paths along the junction lines of the side sections and the back section are provided for conducting the water toward the bottom of the refrigerator. Since the channel member 20 is spaced slightly from the back wall of the refrigerator and since the receptacle 11 is normally located within the machinery compartment it is necessary, as in the forms previously described, to provide a curved portion at the bottom end for conducting the water into the machinery compartment and into the receptacle 11. The channel construction of the member 20 does not lend itself to bending in the desired manner and, accordingly, at the lower end of the channel member 20 the side sections 22 and 23 are omitted leaving only the flexible strip 25 formed by the back section 21. To guide the water along this flexible strip 25 and into the receptacle 11 a rod 26 is secured to the flexible strip 25. To facilitate the mounting of the rod 26 the flexible strip 25 immediately below the side sections 22 and 23 is notched as indicated at 27 to provide two recesses at opposite sides thereof. Two openings 28 and 29 are formed in the flexible strip 25 at the top and the bottom respectively thereof. The rod 26 is formed, as illustrated, with two bent portions 30 and 31 at opposite ends thereof which are received within the openings 28 and 29 respectively. In addition, the rod is formed near its upper end into a loop 32 which substantially encircles the flexible strip 25 and has portions received within the notches of recesses 27 for assisting in holding the rod 26 in position. The rod 26 is of cylindrical construction similar to the rods 15 and 18 previously described and is arranged either in direct contact with the flexible strip 25 or slightly spaced therefrom, in either event providing a passage of capillary size between the flexible strip 25 and the adjacent surfaces of the rod. It can be seen that water flowing down the channel member 20 and reaching the ends of the side sections 22 and 23 tends to collect between the flexible strip 25 and the

rod 26, is conducted by the rod 26 to the end thereof, and is discharged into the receptacle 11. Any tendency of the water to oscillate and fall off the side edges of the flexible strip 25 is overcome by the effect of the surface tension of the water in tending to cause the water to follow a path between the strip 25 and the rod 26.

While I have shown and described specific embodiments of my invention I do not desire my invention to be limited to the particular constructions shown and described and I intend, by the appended claims, to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a refrigerator, a water disposal arrangement comprising a flat elongated vertical strip, and a rod secured to said strip and extending longitudinally thereof, said rod forming with said strip an elongated recess of capillary size whereby water discharged onto said strip is caused to follow a path along said elongated recess because of the surface tension of the water.

2. In a refrigerator, a water disposal arrangement comprising a flat elongated vertical strip, and a rod secured to said strip in spaced relationship thereto, the space between said strip and said rod being of capillary size whereby water discharged onto said strip is caused to follow a path between said strip and said rod because of the surface tension of the water.

3. In a refrigerator, a water disposal arrangement comprising a flat elongated vertical strip, and a cylindrical rod secured to said strip and forming therewith an elongated recess of capillary size whereby water discharged onto said strip is caused to follow a path along said elongated recess because of the surface tension of the water.

4. In a refrigerator a water disposal arrangement comprising a flat elongated vertical strip, and a rod secured to said strip and spaced approximately $\frac{1}{32}$ inch from said strip to present a space of capillary size between said strip and said rod whereby water discharged onto said strip is caused to follow a path between said strip and said rod because of the surface tension of said water.

5. In a refrigerator a water disposal arrangement comprising a flat elongated vertical strip, two vertical rods secured to said strip, said rods extending parallel to each other and being spaced from each other to provide a space therebetween of capillary size whereby water discharged onto said strip is caused to follow a path between said rods because of the surface tension of the water.

6. In a refrigerator a water disposal arrangement comprising a flat elongated vertical strip, two vertical rods secured to said strip, each of said rods being approximately $\frac{1}{16}$ inch in diameter, said rods extending parallel to each other and being spaced from each other by approximately $\frac{1}{32}$ inch to provide a space of capillary size therebetween whereby water discharged onto said strip is caused to follow a path between said rods because of the surface tension of the water.

7. In a refrigerator having back and side walls and including a food storage compartment and a machinery compartment below said food storage compartment, a receptacle in said machinery compartment, means for conducting water from said food storage compartment to said receptacle, said means including a conduit extending from said compartment through said back wall,

and means including a vertical strip spaced from said back wall and adapted to receive water from said conduit, at least one guide element formed on said strip and providing with said strip a restricted path whereby the surface tension of water flowing down said strip causes said water to be confined to said path, said strip including a curved portion at its lower end for directing water inwardly into said machinery compartment and into said receptacle.

8. In a refrigerator having back and side walls and including a food storage compartment and a machinery compartment below said food storage compartment, a receptacle in said machinery compartment, means for conducting water from said food storage compartment to said receptacle, said means including a conduit extending from said compartment through said back wall of the refrigerator, a flat vertical strip spaced from said back wall and adapted to receive water from said conduit, and a rod secured to said strip and spaced therefrom to provide a space of capillary size between said rod and said strip whereby the surface tension of water flowing down said strip causes the water to be confined to said space.

9. In a refrigerator having back and side walls and including a food storage compartment and a machinery compartment below said food storage compartment, a receptacle in said machinery compartment, means for conducting water from said food storage compartment to said receptacle, said means including a conduit extending from said compartment through said back wall of the refrigerator, a flat vertical strip spaced from said back wall and adapted to receive water from said conduit, and two vertical rods secured to said strip and spaced slightly from each other to provide a space of capillary size between said rods whereby the surface tension of water flowing down said strip causes the water to be confined to said space.

10. In a refrigerator having back and side walls and including a food storage compartment and a machinery compartment below said food storage compartment, a receptacle in said machinery compartment, means for conducting water from said food storage compartment to said receptacle, said means including a conduit extending through said back wall, a vertical channel member adapted to receive water from said conduit, said channel member including a back section and two side sections whereby the surface tension of water flowing down said strip causes said water to be confined substantially to the regions of intersection of said side sections and said back section, said side sections being eliminated at the lower end of said channel member to provide a flexible strip curved into said machinery compartment above said receptacle, and a rod mounted on said flexible strip and providing a space of capillary size therewith for guiding water along said flexible strip and into said receptacle.

JOHN B. TUCKER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,433,825	Brothers	Jan. 6, 1948
2,510,758	Rundell	June 6, 1950