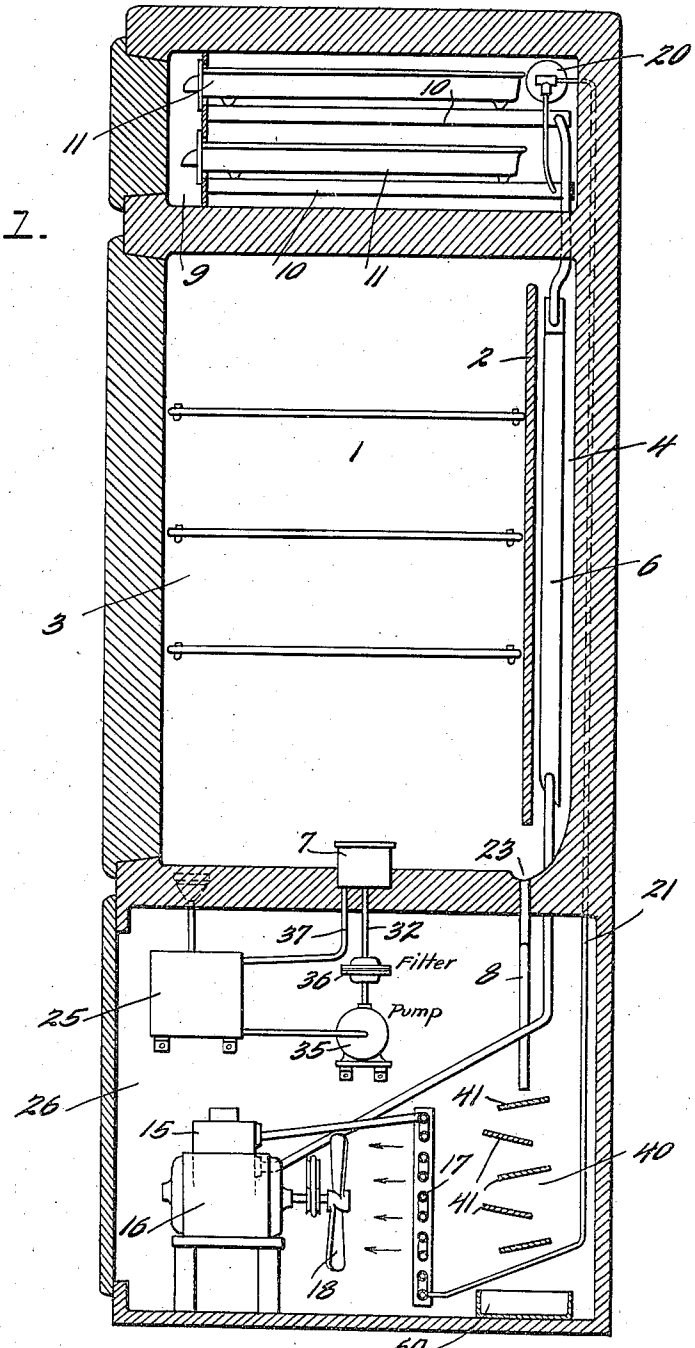
June 29, 1937. C. G. VRETMAN 2,085,346

AIR CONDITIONING SYSTEM FOR REFRIGERATORS

Filed Feb. 26, 1935 2 Sheets-Sheet 1

FIG. 1.



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AIR CONDITIONING SYSTEM FOR REFRIGERATORS

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FIG. 2.

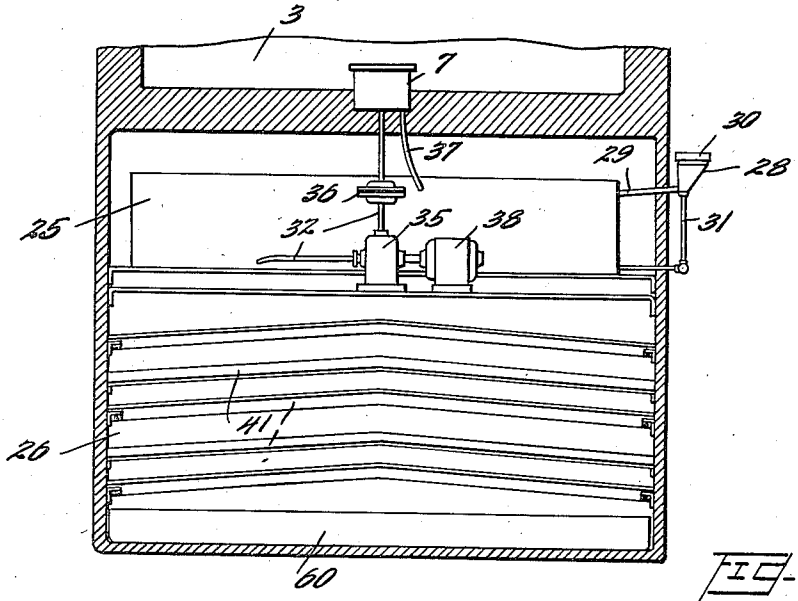


FIG. 3.

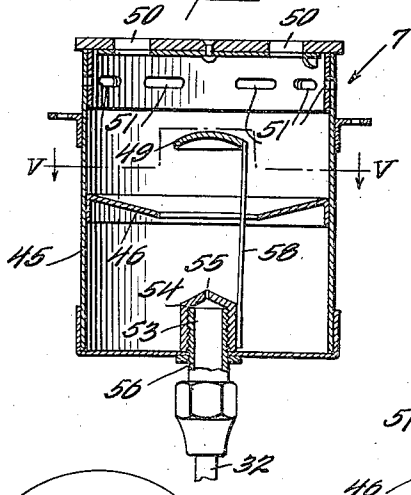
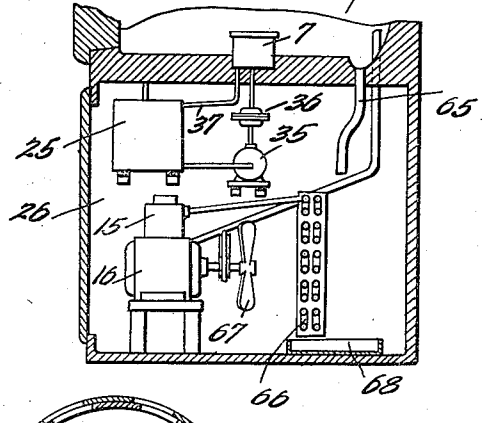


FIG. 6.



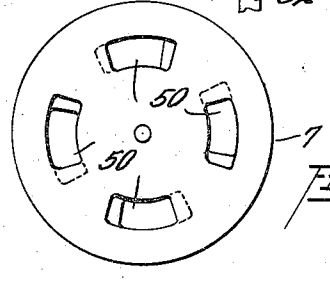


FIG. 4.

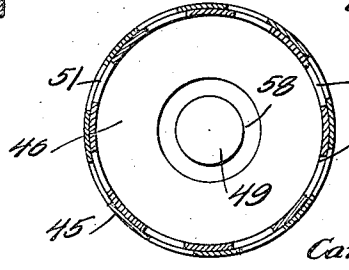


FIG. 5.

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Patented June 29, 1937

2,085,346

UNITED STATES PATENT OFFICE

2,085,346

AIR CONDITIONING SYSTEM FOR REFRIGERATORS

Carl G. Vretman, Atlanta, Ga.

Application February 26, 1935, Serial No. 8,368

1 Claim. (Cl. 62—89)

This invention relates to improvements in air-conditioning systems for refrigerators, particularly of the type disclosed in my prior patents, Nos. 1,979,589 and 1,979,590, both dated November 6, 1934.

Practice of the inventions according to the said patents encounters in some cases the inconvenience and expense of providing the necessary plumbing to connect the refrigerators with water supply sources. This is a substantial difficulty particularly in installing refrigerators in houses not already equipped with water supply and drainage systems, and also in certain municipalities in which regulations are such as to make the cost of making the necessary connections with the plumbing excessive.

The present invention has for an object to avoid the above-mentioned difficulties by making it unnecessary to connect the refrigerator with the house water supply system or with a drain.

A further object of the invention is to provide self-contained means for supplying the necessary water for humidification and air-purification, and for readily disposing of the contaminated discharged water from the refrigerator.

Fig. 1 of the drawings is a side sectional view illustrating more or less diagrammatically a system of water supply and disposal according to the present invention, installed in a refrigerator equipped with air-conditioning mechanism in accordance with the principles disclosed in my above-mentioned patents;

Fig. 2 is a front sectional view of part of Fig. 1 showing diagrammatically the water supply and disposal systems of the present invention;

Fig. 3 is an enlarged vertical sectional view of an atomizer suitable for use in the refrigeator;

Fig. 4 is a plan view of the atomizer shown in Fig. 3;

Fig. 5 is a sectional view on line V—V of Fig. 3; and

Fig. 6 is a sectional view showing a modified system of disposing of the discharged water.

From the accompanying drawings, it will be seen that the main chamber 1 of the refrigerator is divided by a vertically extending plate 2 into a food compartment 3 and an air-cooling and dehumidifying compartment 4 in which cooling devices such as coils or vacuum plates 6 are located and that a moisture-supplying device 7 in the form of a water atomizer is provided for rehumidifying the dehumidified air in advance of its contact with the food in the food compartment. The lower portion of the refrigerator chamber is formed in such a way that moisture containing contaminating matter, such as gases and odors exhausted from the food which is precipitated on the cooling elements 6, is permitted to drain from the chamber through drain pipe 8 without permitting the contaminating matter to be returned to the food compartment. The humidifying device 7 supplies the dried air with sufficient moisture to prevent the air from absorbing moisture from the food and thereby drying the same, and also moisture for absorbing further contaminating matter which may exhaust from the food.

The refrigerator may also be provided with an ice freezing compartment 9 containing freezing coils or vacuum plates 10 for freezing water in vessels 11. These coils or plates 10 are supplied with refrigerant in any conventional manner as by a conventional compressor 15 driven by an electric motor 16. The gaseous refrigerant compressed by the compressor is passed through condenser coils 17 against which air may be blown or drawn by a fan 18 driven by the motor 16, whereby the compressed gas is cooled. The gas is then conveyed to an expansion valve 20, through pipe 21, and is expanded into the plates or coils of the freezing compartment. The coils or vacuum plate 6 may be connected with the refrigerant in series or in parallel with plates 10, and the temperature thereof is preferably adjusted or regulated so that during operative periods their temperature is slightly below the freezing point of water. During the cut out periods the temperature of these coils or plate 6 will rise above the freezing point and the frost or ice which has collected thereon during the operating period, and which contains contaminating matter such as gases and odors exhausted from the food, melts and runs out of the chamber 1 through sump 23 and drain pipe 8. In order to replenish the moisture in the air to prevent drying of the food and to absorb or dissolve contaminating matter, preferably in the form of an extremely fine mist or cloud, is supplied to the dried air at a point in advance of its further contact with the food by atomizer 7. The particular details of the atomizer form per se no part of the present invention, and, therefore, will not be specifically claimed herein.

A suitable atomizer for producing the extremely fine mist or cloud of moisture is shown in Fig. 3. This device may comprise a cylindrical casing 45 having an inwardly and downwardly extending annular baffle 46 disposed therein intermediate its ends. This baffle has the effect of dividing the chamber formed by the casing into

two compartments. The upper compartment contains a concave target disc 49 against which an extremely fine jet of water impinges, whereby the jet of water is broken into particles many of which will be extremely small. The finest of these particles are very buoyant and under the influence of the turbulence in the upper compartment will pass out of the casing through upper and side openings 50 and 51, respectively. These openings are made adjustable in size to regulate the quantity of mist supplied the food compartment. The larger particles produced are naturally less buoyant and tend to settle under the influence of gravity. Upon reaching the compartment below baffle 46 these particles will be protected from the turbulence of the upper compartment and will readily settle and collect and be conducted out of the casing through drain pipe 37.

The extremely fine jet of water is provided by a nozzle 53 comprising a cap 54 having an extremely fine aperture 55 formed therein. The cap is screwed onto a nipple 56 attached to the bottom of casing 45. The nipple 56 is connected with a source of fresh clean water under pressure by pipe 32. The target disc 49 may be supported in the path of the jet of water by a rod 58 which may be attached to the cap 54.

According to the present invention self-contained means is provided for supplying the water to the humidifier 7. This means may comprise a reservoir 25 located in or on the refrigerator housing, and as herein shown is located in the machinery compartment 26, and has a sufficient storage capacity to provide the water for rehumidification of the air for any desired period of time. It has been found in practice that the daily water consumption is about one pint. For an ordinary household refrigerator, a storage capacity of about three or four quarts will be sufficient to provide the necessary water for about one week. Water may be put in the reservoir through any suitable opening, and, as shown, a funnel 28 located outside of the refrigerator housing and having a tube 29 extending to the reservoir is provided. The funnel would, of course, be provided with a suitable closure device 30 to prevent foreign matter from entering. A sight glass 31 may be provided for observing the level in reservoir 25. A pipe 32 connects the lower portion of the reservoir 25 with the humidifier 7, and in this pipe is connected a pump 35, for instance, of the centrifugal type, for supplying the necessary pressure to enable the humidifier to break the water into the extremely fine mist or cloud. The pump is driven continuously by an electric motor 38. Also a filter 36 may be provided in this pipe line 32. The reservoir is advantageously located at a lower level than the humidifier 7 and a return drain for the overflow 37 or excess water extends from the humidifier back to the reservoir to return the excess water by gravity.

As is fully explained above and in my above-mentioned patents, the contaminated moisture precipitated by the cooling device is immediately removed from the refrigerator chamber and in order to dispose of this moisture according to the present invention, I provide an evaporator device 40 in the form of a plurality of horizontally extending bars 41 or baffles arranged one above another and the drain 8 from the refrigerator conducts the water to the uppermost of these bars or the like. The water may flow or drip from the upper to the lower bars, in the course of which it will be completely disposed of by evaporation. If desired, the evaporator device may be located in a position to be affected by the air stream induced by the cooling fan 18 of the refrigerator unit. Since only about one pint of water will be discharged from the drain in the course of a day, it is obvious that no difficulty will occur in completely evaporating it. However, in order to provide for the possibility of liquid being inadvertently spilled in the refrigerator and running out of drain 8, a collecting pan 60 may be removably located beneath the evaporator bars 41 to catch such liquid.

Alternatively, as shown in Fig. 6, the evaporator baffles may be omitted, and in this case the drain pipe 65 will terminate at the top and closely adjacent one side of the condenser coils 66 of the refrigerator unit. If the fan 67 blows the air through the condenser the drain pipe will terminate on the fan side of the condenser while if the fan draws air through the condenser the drain will discharge on the opposite side of the condenser from the fan. During operation of the fan the discharged water will be blown or drawn onto the pipes of the condenser or onto the fan blades and will be evaporated therefrom. Since the fan operates only part of the time, it is necessary to provide means for disposing of the water discharged during the inoperative periods. For this purpose a collecting pan 68 which has a large horizontal area is provided beneath the drain. Due to the large area of the pan a large part or all of the water will be evaporated or the pan may be emptied from time to time if the evaporation does not dispose of all the water.

It will be apparent that a refrigerator equipped in accordance with this invention may be installed in houses which are not provided with running water, or with drains, and without excessive inconvenience to the owner as the only regular service required is the filling of the reservoir at relatively infrequent intervals.

What I claim is:

In an air conditioning system for domestic refrigerators, a housing forming a refrigerator chamber, a reservoir for humidifying water under atmospheric pressure, means for withdrawing water from said reservoir and subjecting it to pressure, means for forming the water under pressure into an extremely fine jet, an atomizer housing, an impact element in said housing against which said jet impinges whereby the water is atomized into extremely fine particles, means for separating and collecting the larger particles, means for returning the collected water to the reservoir under atmospheric pressure, the atomizer housing having openings through which the finer particles pass into the refrigerator chamber, means for extracting and collecting contaminated moisture from the atmosphere in the refrigerator, means for leading the collected contaminated water out of the refrigerator chamber, and means for disposing of said contaminated water by evaporation into the outside atmosphere.

CARL G. VRETMAN.