April 24, 1934. M. HOKANSON 1,956,070

REFRIGERATOR

Filed Nov. 27, 1931 3 Sheets-Sheet 1

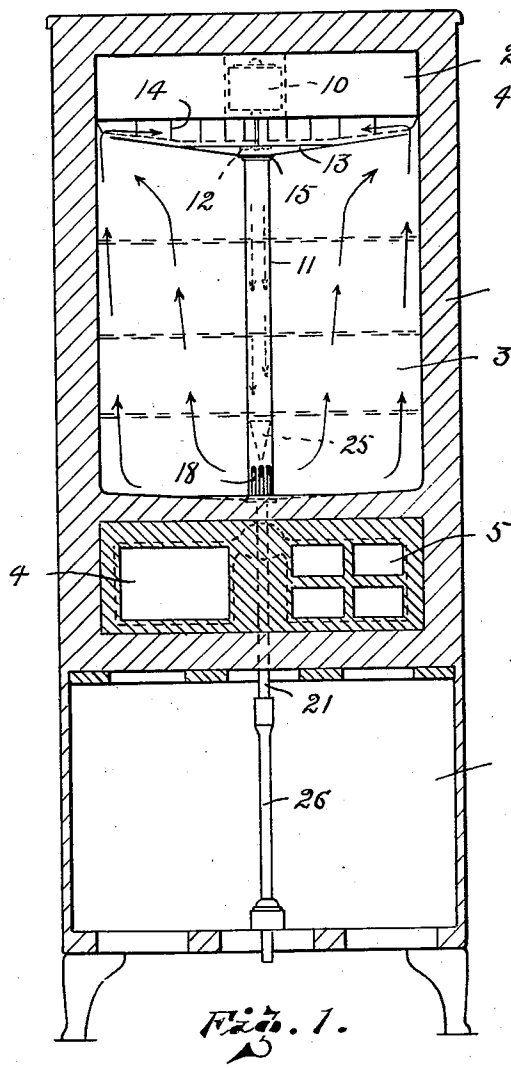


Fig. 1.

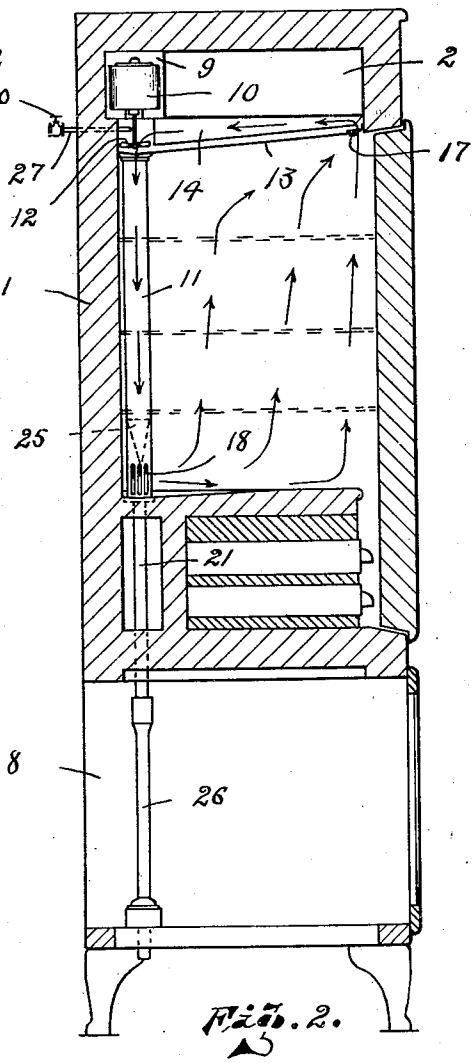


Fig. 2.

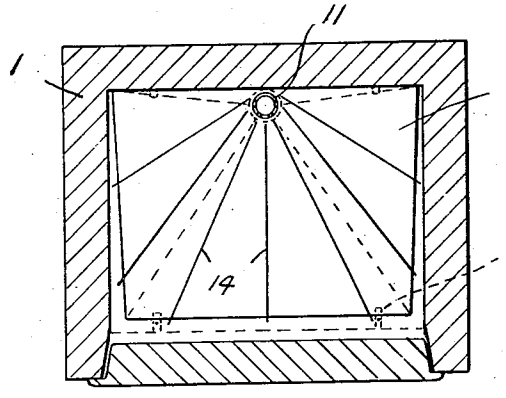


Fig. 3.

Inventor

Martin Hokanson.

By Geo. Stevens.

Attorney

April 24, 1934. M. HOKANSON 1,956,070

REFRIGERATOR

Filed Nov. 27, 1931 3 Sheets-Sheet 2

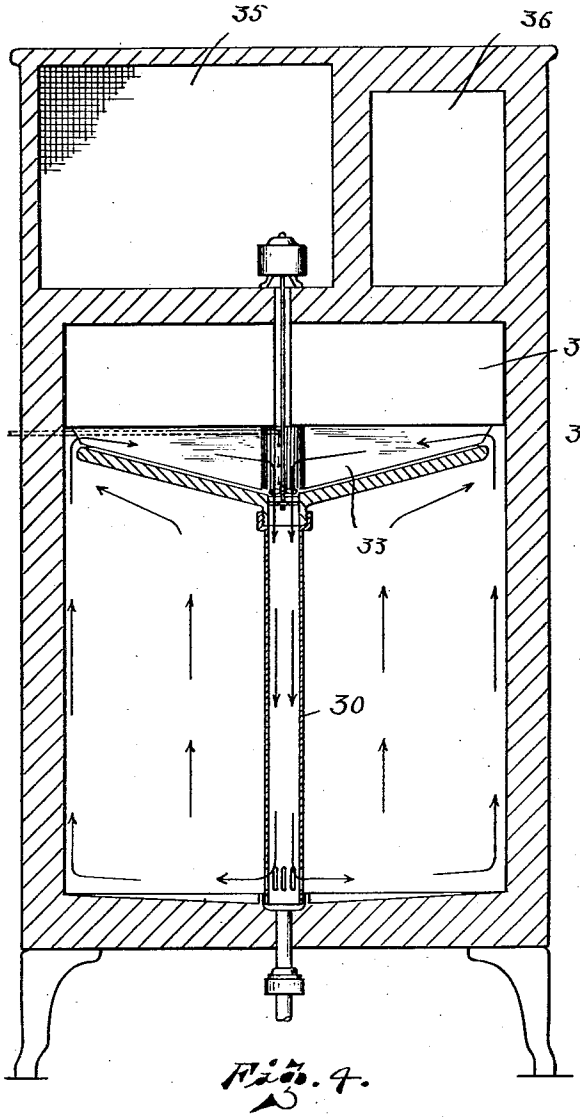


Fig. 4.

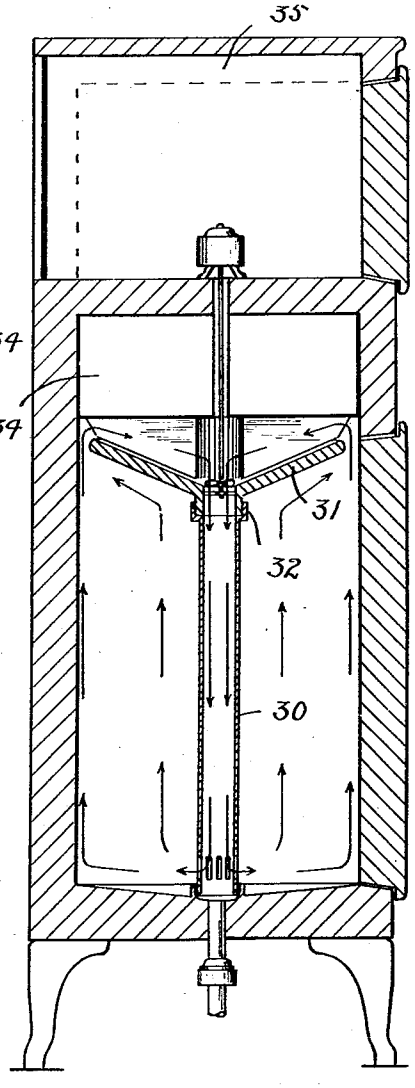


Fig. 5.

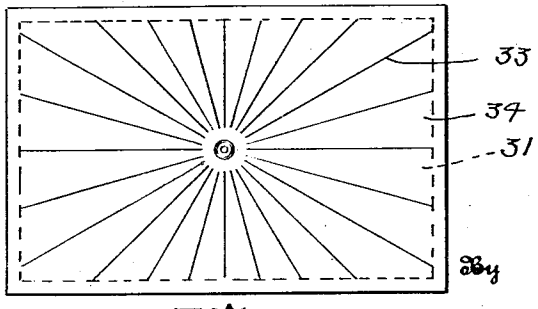


Fig. 6.

Inventor

Martin Hokanson.

Geo. Stevens.

Attorney

April 24, 1934. M. HOKANSON 1,956,070

REFRIGERATOR

Filed Nov. 27, 1931 3 Sheets-Sheet 3

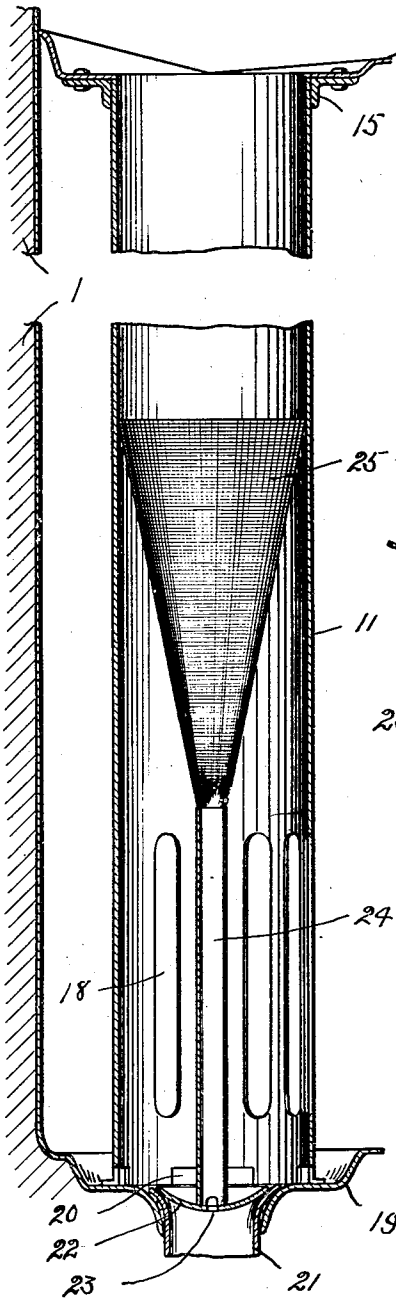


Fig. 7.

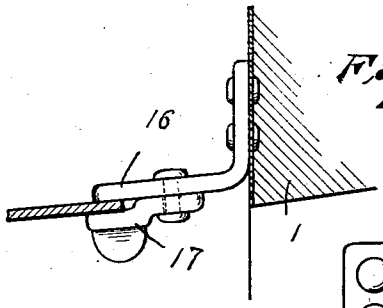


Fig. 9.

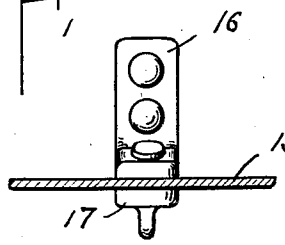


Fig. 10.

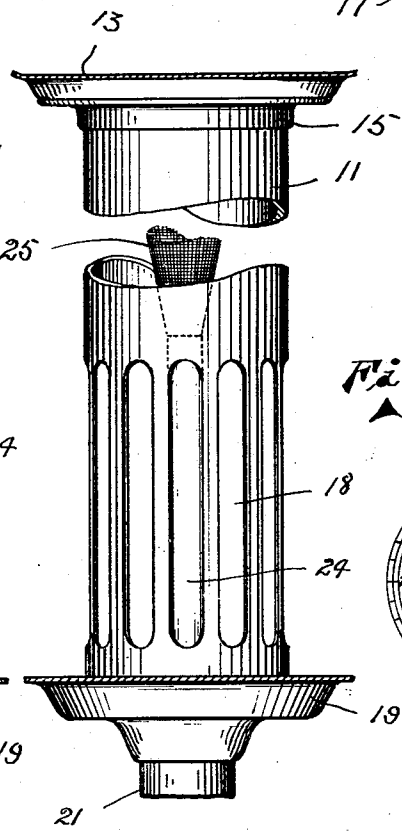


Fig. 8.

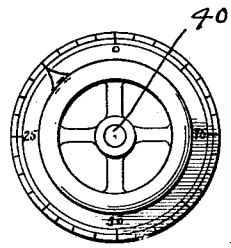


Fig. 11.

Inventor

Martin Hokanson.

By Geo. Stevens

Attorney

Patented Apr. 24, 1934 1,956,070

UNITED STATES PATENT OFFICE

1,956,070

REFRIGERATOR

Martin Hokanson, Duluth, Minn.

Application November 27, 1931, Serial No. 577,587

9 Claims. (Cl. 62—102)

This invention relates to improvements in refrigerators and is particularly adapted for use in connection with small individual mechanical units such as used for household purposes, or the like, the principal object being to produce a more efficient and economical device of this character than heretofore known.

Another object is to provide such a device wherein the proper humidity may be maintained and the air within the refrigerating chamber adequately purified, together with uniform temperature throughout the chamber.

Still other objects and advantages of the invention will appear in the following description thereof.

Referring now to the accompanying drawings, forming part of this application, and wherein like reference characters indicate like parts:

Figure 1 is a vertical central sectional view through the preferred form of domestic refrigerator, embodying the invention;

Figure 2 is a similar view taken at right angles to Figure 1;

Figure 3 is a transverse section, showing a plan of the drip pan and arrangement of fins thereabove;

Figure 4 is a view similar to Figure 1 of a modified form of refrigerator embodying like novel features to that shown in the preferred form;

Figure 5 is a vertical sectional view of Figure 4 taken at right angles thereto;

Figure 6 is a plan of the under side of the refrigerant tank;

Figure 7 is a vertical sectional detail of the preferred form of conductor pipe construction;

Figure 8 is a broken side elevation of Figure 7;

Figure 9 is an elevation of one of the drip pan supporting brackets; and

Figure 10 is an elevation of Figure 9, taken at right angles thereto.

Figure 11 is an enlarged elevation of the water supply valve.

The preferred unit here illustrated comprises the suitably insulated upright structure 1 having the refrigerant tank 2 in the upper portion thereof, beneath which is the food compartment 3, equipped with any desired arrangement of shelving, or the like.

Beneath this compartment is one embodying the two compartments 4 and 5, one of which is used as a freezing compartment in which slidable trays or the like common to such structures are used, and the other provided, for convenience, with pull drawers in which a comparatively low temperature, say approximately 30° is maintained. Beneath this principal insulated portion of the refrigerator is the compartment 8 for the reception of the mechanical mechanism of the refrigerator; the whole being mounted upon suitable legs as desired.

Centrally of and at the back of the refrigerant compartment 2 is a relatively small space 9 provided for the motor 10, the latter being mounted with its armature shaft in vertical position and extending downwardly slightly below the bottom of the refrigerant tank and directly over the vertical circulating pipe or tube 11. Upon the extreme lower end of the armature shaft is carried the circulating fan 12 so that rotative motion of the latter will produce a forced downward draft in the pipe 11.

From the top of the pipe 11 and extending in all directions therefrom is the inclined drip pan 13 which may or may not be insulated, though preferably not, as there is little difference in the temperatures of the air on opposite sides thereof. This drip pan is given the proper inclination to insure adequate drainage, and is spaced from the bottom of the refrigerant tank, providing room for the radially disposed thin metal fins 14 which are permanently fixed to the bottom of the tank, and serve not only as additional cooling surface but tend to positively direct the flow of air uniformly throughout the space intermediate of the drip pan and the bottom of the refrigerant tank.

A socket or shallow nipple 15 is attached to the under side of the lowermost point in the drip pan for the reception of the circulating pipe 11 so that this pipe may be readily applied to or removed from the pan as sanitary conditions may require. The edges of the pan are supported from the interior walls of the compartment 3 preferably by suitable supporting brackets as illustrated in Figures 9 and 10, they each comprising an angular body portion 16 fixed to the inner wall of the compartment and pivotally carrying upon its laterally extending portion the winged button or clip 17 which may be swung about for convenience in removal or installation of the pan as clearly illustrated.

The lower end of the pipe 11 is provided with suitable elongated discharge ports 18 about the circumferential surface thereof with the exception of possibly the back of the pipe where such would discharge only against the back of the compartment in close proximity thereto, and the lowermost end of the pipe 11 is provided with an annular flange for convenience in normally centering same in the downwardly stepped socket 19 in the floor of the compartment, the lower end of

the pipe being provided with suitable limber holes 20 therein. As a further novel feature of the invention I contemplate the installation of the drain pipe 21 in the socket 19 as by the upper end of the drain pipe being flared to fit within the conical depending portion of the socket 19, and closed as by the concaved thimble 22 except that the thimble is provided with a central hole 23 about which rests the drip pipe 24 of the cone shaped screen 25 which is removably installed within the lower end of the conductor pipe 11 above the ports 18.

This cone shaped screen is provided for a more thorough impregnation of the air passing through the pipe with the moisture therein and to insure the concentration of any scavengering moisture passing downwardly through the drip pipe. Any desired arrangement for the further extension of the drain pipe through the machinery compartment and bottom of the refrigerator may be employed as for example that illustrated at 26.

As a water supply for the cleansing of the air in the refrigerator, as well as providing the desired humidity content of same, I have illustrated the water supply pipe 27 extending through the back of the refrigerator just beneath the bottom of the refrigerant tank and controlled by the valve 40 which may be located in any convenient position with, if desired, an indicator as indicated in Figure 11; said pipe terminating above the fan 12 so that the water may fall upon the fan and be thoroughly admixed with the air being circulated.

In the modified form the circulating pipe 30 is disposed centrally of the food compartment and the drip pan 31 in this instance is shown as being insulated, inclined downwardly from all sides towards same, and separably mounted thereupon as at 32 for convenience in removing or installing as is obvious.

I have also here shown the fins 33 depending from the bottom of the refrigerant tank 34 as being deeper and extending equally radially in all directions from the center and in this instance the motor is in a compartment 35 for the refrigerating unit above the refrigerant tank. There is also shown a compartment 36 for freezing trays or the like to one side of the compartment 35.

In this assembly a slightly more uniform circulation of air may be accomplished within the food compartment but the central down spout or circulating pipe may be of some inconvenience, and the embodiment illustrated in Figures 1 and 2 preferred.

The termperature in the tank 2 may be conveniently controlled and held to slightly above freezing so as to avoid the formation of ice or heavy frost which might interfere with the proper functioning of the device.

From the foregoing it is evident that I have provided simple, practical and efficient means for forcibly circulating the air within the food compartment of a refrigerator simultaneously with a thorough cleansing, humidifying and cooling process, and that while I have shown the invention as applied to a single door domestic box, it is obvious that the same may be of different dimension and larger double door construction employed with equally good results; also that by the novel arrangement of instrumentalities within the food compartment the same may be most conveniently removed at any time for sanitary purposes, such as washing, renewing, or the like.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A refrigerator unit comprising in combination a food chamber, an air cooling chamber above the food chamber and substantially non-communicative therewith, mechanical means above the cooling chamber for providing the refrigerant, a fan, and moisture supplying means cooperative with said fan for circulating and cleansing the air in the food chamber.

2. The combination with a refrigerator having a refrigerant chamber a cooling chamber and a substantially non-communicating food chamber, of fin-like metal baffles depending from the refrigerant chamber and within the cooling chamber and converging towards the center thereof, and means for circulating the air within the food chamber and intermediate of the baffles.

3. The combination with a refrigerator having a refrigerant chamber a cooling chamber and a food chamber beneath the cooling chamber and separated therefrom by the bottom only of the latter, of radially disposed longitudinally and laterally spaced metal fins depending from the refrigerant chamber, and within the cooling chamber, said fins being deepest at their spaced adjacent ends, a vertically disposed conductor pipe centrally of the food chamber, a hopper-like pan carried on the upper end of said pipe adjacent the lower edges of the baffles and means for circulating air downwardly through said pipe, upwardly in the food chamber, and horizontally and downwardly intermediate of the baffles.

4. In a mechanical refrigerator, the combination of a refrigerant tank at the top of the refrigerator, a food chamber, a vertical air circulating and humidifying pipe passing ing through said food chamber, a plurality of depending fins fixed to the bottom of said tank and converging toward the upper end of said pipe, means for supplying moisture to the upper end of said pipe, and means for causing said moisture and the air in the food compartment to circulate through said pipe.

5. In a mechanical refrigerator, the combination of a refrigerant tank, a food chamber, an air circulating and humidifying pipe passing through said food chamber, means for supplying moisture to the upper end of said pipe, and a motor and fan for causing said moisture to be atomized and circulated with the air in the food compartment through said pipe.

6. A forced circulation refrigerator of the type described comprising in combination a refrigerated compartment, a refrigerant compartment, a down forced draft pipe within the refrigerated compartment, a motor and fan for forcing said draft, air discharge openings through the sides of the lower end of the pipe, and means whereby air supply to the upper end of the tube is accomplished from adjacent the outer walls of the upper end of the refrigerated compartment.

7. In combination, a refrigerated compartment, a refrigerant compartment above same, means for forcibly circulating air thoughout the refrigerated compartment and against the bottom of the refrigerant compartment, said means comprising a conductor pipe having forced draft therethrough, a pan extending upwardly and outwardly from the upper end of the pipe, a water supply above the upper end of the pipe and fins fixed to and depending from the bottom of the refrigerant compartment, said fins converging towards said pipe, whereby uniform distribution

of air against the bottom of the refrigerant compartment is accomplished.

8. A refrigerator unit comprising in combination a food chamber, an air cooling chamber above the food chamber and substantially non-communicative therewith, mechanical means above the cooling chamber for providing the refrigerant, a fan, moisture supplying means co-operative with said fan for circulating and cleansing the air in the food chamber, and radially disposed heat absorbing fins depending from the mechanical means and within the cooling chamber.

9. A refrigerator unit comprising a food chamber, a cooling chamber, mechanical means above the cooling chamber for providing the refrigerant, combined mechanical and moisture supplying means for circulating and cleansing the air in the food chamber, and radially disposed heat absorbing fins depending from the mechanical means and within the cooling chamber and converging towards the center thereof.

MARTIN HOKANSON.