

June 13, 1950

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2,511,126

REFRIGERATING APPARATUS HAVING ADJUSTABLE PARTITIONS

Filed Sept. 22, 1947

3 Sheets-Sheet 1

Fig-1

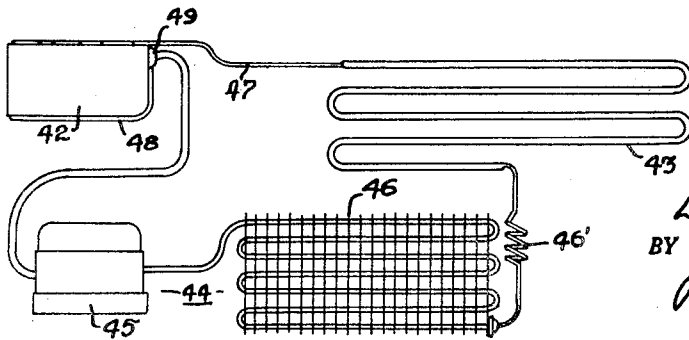
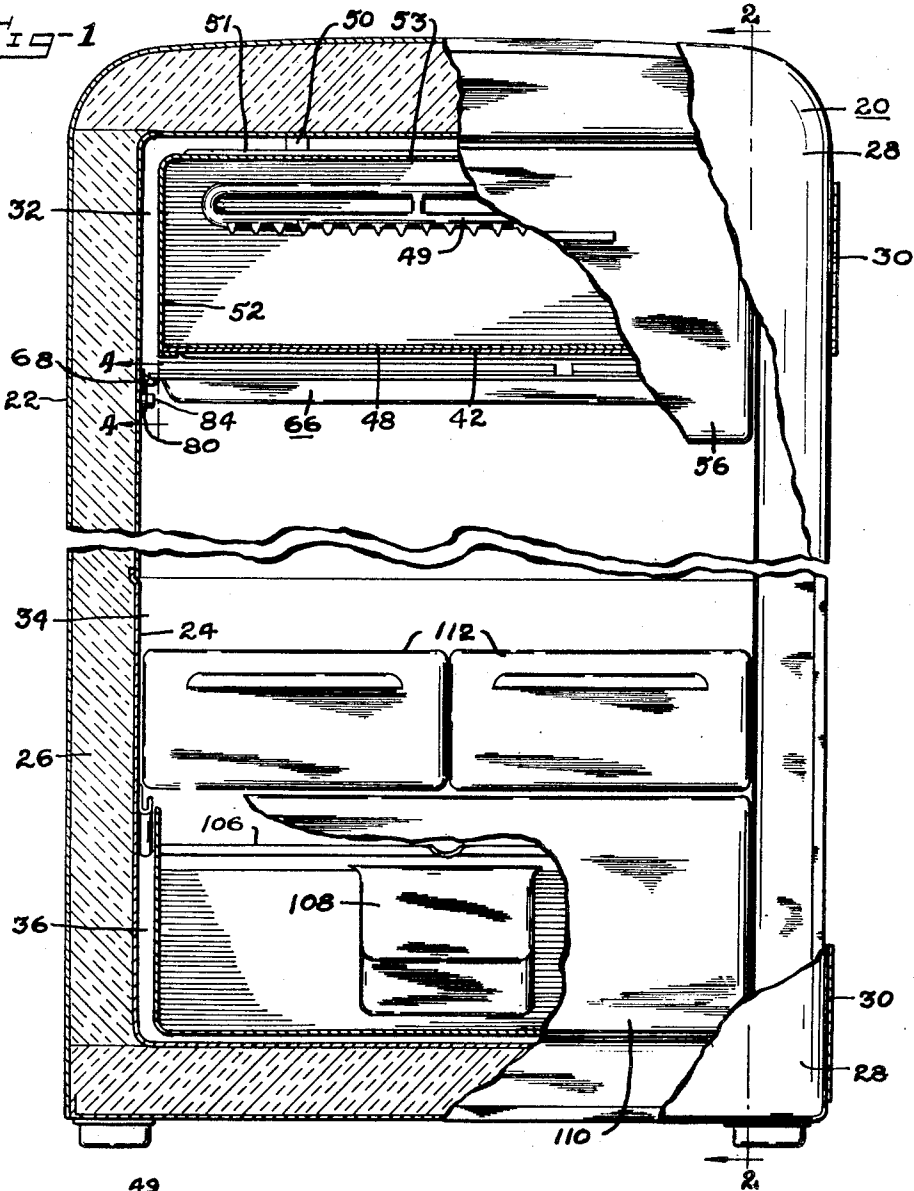


Fig-9

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3 Sheets-Sheet 2

Fig-2

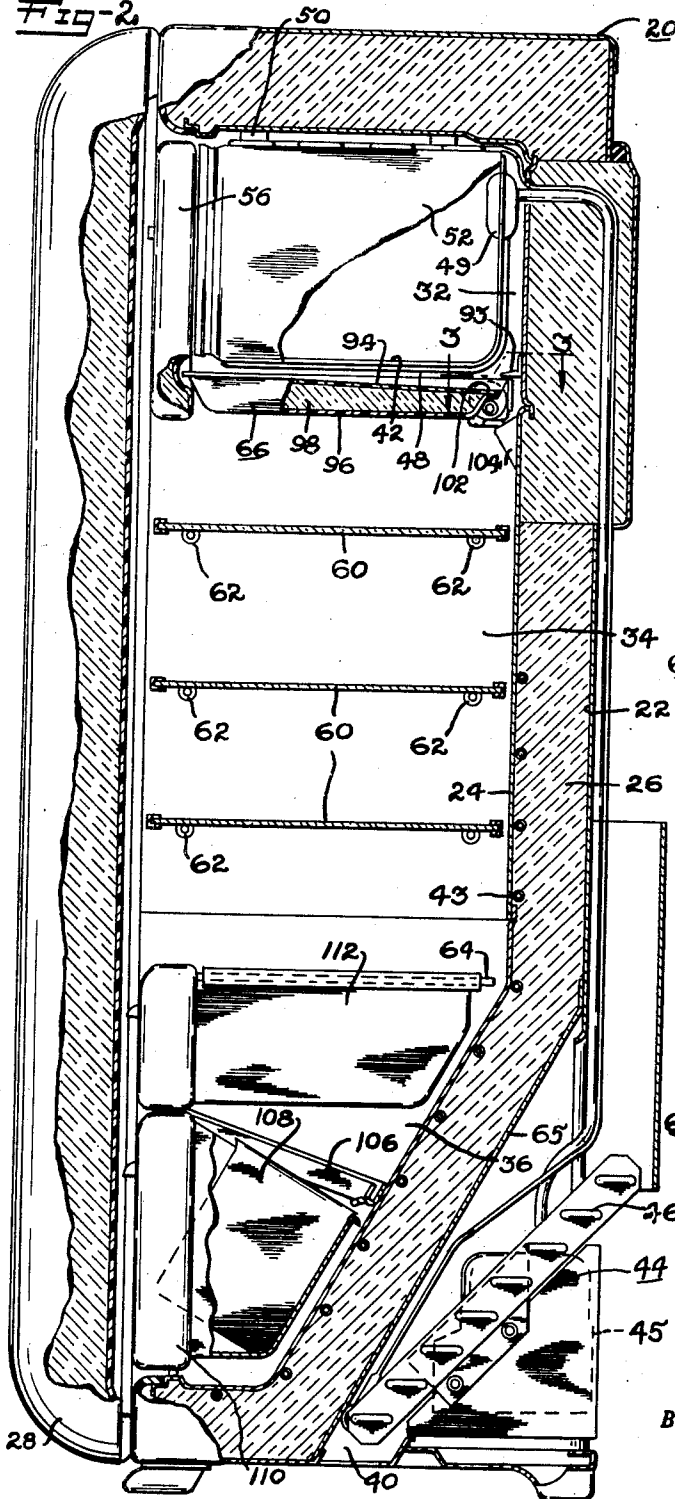
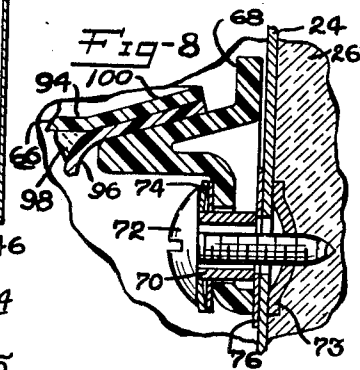
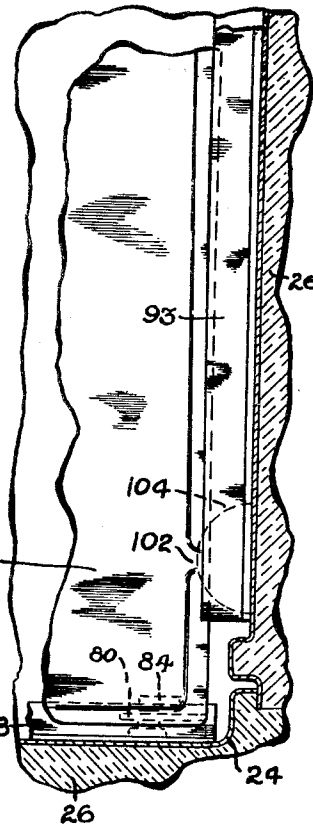


Fig-3



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Fig-4

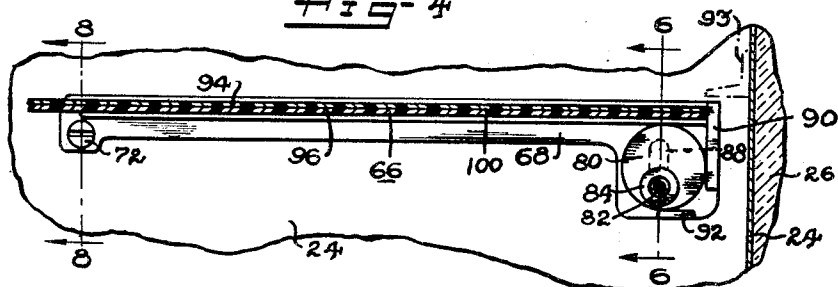


Fig-5

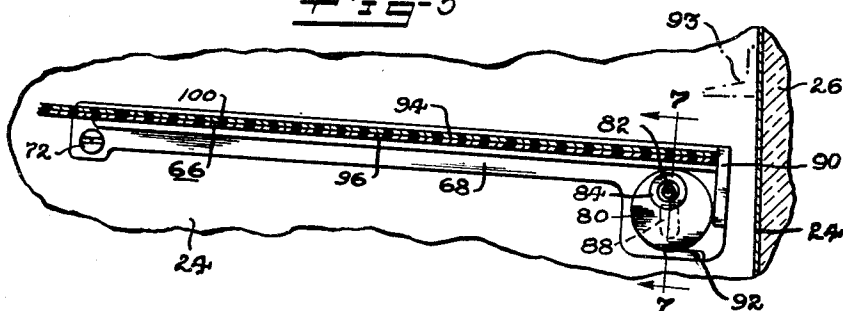
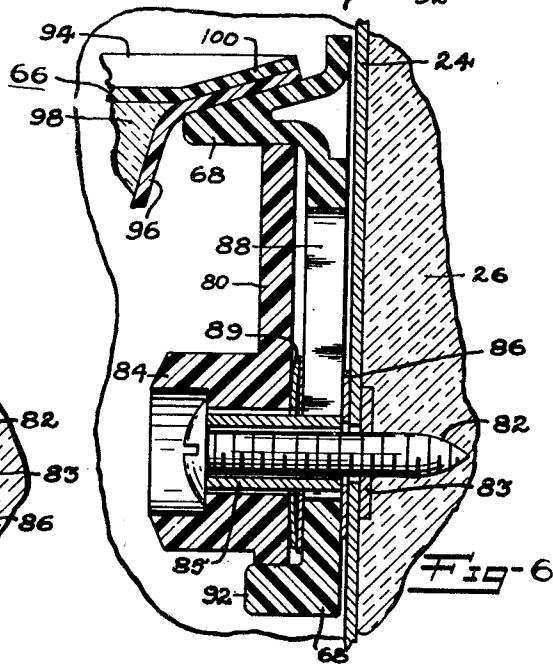
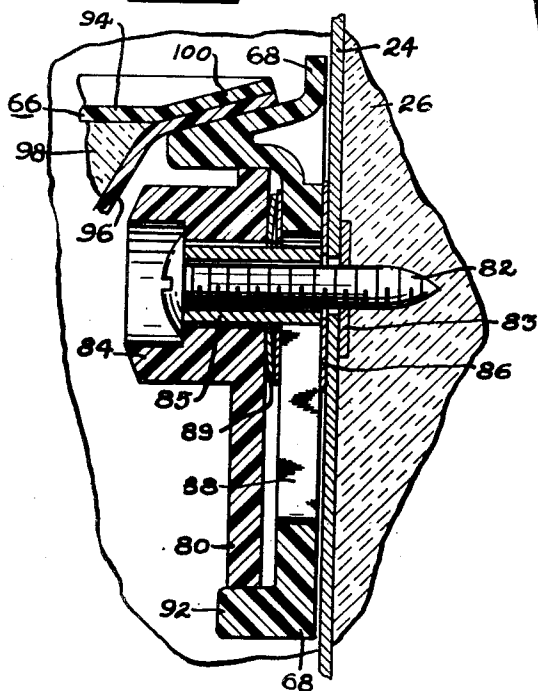


Fig-7



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REFRIGERATING APPARATUS HAVING
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6 Claims. (Cl. 62-89)

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This invention relates generally to refrigerating apparatus and more particularly to household refrigerators.

It is an object of the present invention to provide a refrigerator having an improved arrangement to control air circulation between cabinet compartments of different temperatures.

Another object of the invention is to provide an improved arrangement for controlling humidity in a refrigerator cabinet to avoid condensation on the inner storage compartment surfaces of the cabinet.

Another object of the invention is to provide in a refrigerator having a freezing compartment and a food storage compartment, an improved arrangement for controlling rate of freezing out, in the freezing compartment, of moisture in the air of the storage compartment so as to control the humidity of the latter.

Another object of the invention is to provide an improved refrigerator of the above mentioned character which is inexpensive to manufacture.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front view, partly broken away and in section, of a refrigerator cabinet embodying features of the present invention;

Fig. 2 is a vertical, sectional view of the refrigerator, taken along the line 2-2 of Fig. 1;

Fig. 3 is a horizontal, sectional view of the refrigerator, taken along the line 3-3 of Fig. 2;

Fig. 4 is a fragmentary, sectional view of the refrigerator taken along the line 4-4 of Fig. 1;

Fig. 5 is a view similar to Fig. 4 showing parts thereof in different adjusted positions which they may assume;

Fig. 6 is an enlarged, fragmentary sectional view of the refrigerator and a humidity control adjustment device therefor;

Fig. 7 is a view similar to Fig. 6 with parts shown in different adjusted positions;

Fig. 8 is an enlarged, fragmentary sectional view of the refrigerator, taken along the line 8-8 of Fig. 4; and

Fig. 9 is a diagrammatical view of a refrigerating system of the present refrigerator.

In the drawings, there is shown a refrigerator of the household type having a cabinet, designated generally by the numeral 20. The cabinet 20 comprises, in general, a casing 22 and a liner 24. The casing 22 and the liner 24 may be made

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of sheet material which may be steel or any other suitable material. Insulation 26 is preferably provided between the casing 22 and the liner 24 to decrease the rate of heat leakage through the walls of the cabinet into the interior thereof. A single door 28 may be provided to close the front of the cabinet and, as shown, may extend substantially from the top to the bottom of the cabinet. This door 28 may be hung on the cabinet by hinges 30 which may be secured to one of the sides of the cabinet.

The cabinet 20 has a freezing compartment 32, a food storage compartment 34 and a fresh vegetable compartment 36. In the present arrangement of the compartments, the freezing compartment 32 and the fresh vegetable compartment 36 are located respectively at the top and bottom of the cabinet and the food storage compartment 34 is located therebetween. The cabinet 20 also preferably has a machinery compartment 40, located immediately behind the high humidity compartment 36 at the back of the cabinet.

Any suitable refrigerating system may be used to effect desired temperatures in the compartments 32, 34 and 36. The system shown includes a relatively low temperature cooling element or refrigerant evaporator 42, a relatively high temperature cooling element or evaporator 43 and a refrigerant condensing element 44. The relatively low temperature evaporator 42 is arranged to absorb heat principally from the freezing compartment 32 and the relatively high temperature refrigerant evaporator 43 is arranged to absorb heat principally from the storage compartment 34 and from the fresh vegetable compartment 36. The temperature differential between these evaporators 42, 43, will, of course, induce gravity circulation of air between the compartments; the air flowing down the back wall of the liner 24; up the front of the cabinet, adjacent the door 28 and over and around the relatively low temperature or freezing evaporator 42. The evaporators 42 and 43 as shown, are connected together in series, but if desired, primary and secondary systems may be employed. The condensing element 44 includes a motor-compressor unit 45 and a condenser 46. Refrigerant is supplied from the condenser 46 through a flow control or capillary tube 46' to the relatively high temperature evaporator 43 from which the refrigerant flows into the relatively low temperature evaporator 42 through a flow restricting or capillary tube 47 which maintains a desired pressure differential and therefore temperature differential between the evaporators. Gaseous refrigerant is with-

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drawn from the evaporator 42 by the motor-compressor unit 45 to be compressed and returned to the condenser 46.

The freezing compartment evaporator 42 may be of the so-called L-shaped type of sheet metal construction, formed to provide refrigerant passages 48 and a refrigerant accumulator 49. The evaporator 42 may be suspended from the cabinet top wall by brackets 50 or by any other suitable means. As shown, the L-shaped evaporator 40 forms the bottom and rear walls of a box-like frozen food and ice tray container which preferably includes a sheet metal top 51 and sheet metal sides 52. On the sheet metal top 51, a length of refrigerant evaporator coil in sinuous form may be used to absorb heat; the coil being connected to the outlet of the flow restricting tube 47 and to the inlet of evaporator 42. The size of the frozen food and ice tray container is made such that it occupies substantially the entire freezing compartment 32; a space being provided between the opposed corresponding top, side and rear wall surfaces of the container and of the cabinet liner 24 for restricted circulation of air over and around the container. An inner door 56 is provided to close the front of the frozen food and ice container to prevent room air from freely entering the container when the outer cabinet door 28 is opened.

In the food storage compartment 34, a number of vertically spaced shelves 60 is provided. The shelves 60 are made of an impervious material, preferably glass, to baffle air circulation and are arranged with their front and rear edges in spaced relation respectively to the cabinet door and to the cabinet rear wall inner surface to allow for restricted air circulation between compartments. Supports 62 of any suitable character may be attached to the cabinet opposite side walls to support the shelves 60. Spaced below the lowermost shelf 60 is a horizontal partition-shelf 64, common to the food storage compartment 34 and to the fresh vegetable compartment 36.

The relatively high temperature evaporator 43, preferably in the form of a sinuous coil, may be attached to the outer surface of the liner 24, extending along the rear wall of the food storage compartment 34 and of the fresh vegetable compartment 36. This evaporator coil 43 extends along a lower partition 65 of the rear cabinet wall which is common to or separates the fresh vegetable compartment 36 from the machinery compartment 40. The partition 65 may be inclined, extending from the cabinet rear wall forwardly and downwardly to the cabinet bottom wall, as shown.

In order to prevent condensation occurring on the inner surface of the cabinet liner 24, I provide a movably adjustable partition or baffle-like damper 66 which I arrange to control or to regulate the rate of air circulation between the cabinet compartments 32, 34 and 36 and consequently regulate the rate of freezing out of air entrained moisture on the low temperature evaporator 42. The baffle 66 is common to or separates the freezing compartment 32 from the food storage compartment 34. As shown in Figs. 2 and 3, the baffle 66 is disposed immediately beneath and adjacent to the underside of the evaporator 42, but is spaced therefrom to allow restricted circulation of air around the low temperature evaporator 42. The baffle 66 is preferably supported on a pair of individually, tiltable rails 68 which extend between the door 28 and the cabinet rear wall, respectively along the opposite, inner wall sur-

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faces of the cabinet liner 24. Preferably, the baffle supporting rails 68 are made of a low heat conducting material, such as phenolic plastic. Adjacent their forward ends, the baffle supporting rails 68 are individually pivoted to the cabinet liner sides on pivot members 70 which are attached to the cabinet liner 24 preferably by self-threading, sheet metal screws 72. In the present construction, the rail pivot members 70 are tubular, open ended spacers through which the screws 72 extend to screwthread into apertured plates 73 which may be welded or be otherwise suitably secured to the outer surface of the sides of the baffle supporting rails 68. Spring lock washers 74 may be provided to aid in frictionally clamping the parts together. Between the inner surface of the cabinet liner 24 and the adjacent ends of the tubular pivot members 70, spacers 76 are preferably provided; the spacers 76 and the liner 24 having clearance apertures freely receiving the screws 72.

The free or rear ends of the baffle supporting rails 68 rest respectively on outer peripheral surfaces of individually operable adjustment members or eccentrics 80. These eccentrics 80 are respectively mounted on the opposite side walls of the liner 24, adjacent the rear wall thereof. Each of the eccentrics 80 may be mounted on the liner 24 by a sheet metal screw 82, and a threaded sheet metal plate 83. The plate 83 may be welded or may be otherwise suitably secured to the rear surface of the liner 24. Each of the eccentrics 80 may be provided with an integral operating knob 84 having a bore therethrough to receive an open ended, tubular spacer 85 which in turn receives the screw 82. Interposed between each of the baffle supporting rails 68 and the opposed, inner surfaces of the cabinet liner 24 is a spacer or washer 86 having an enlarged clearance aperture receiving the screws 82. An elongated aperture or slot 88 in each of the baffle supporting rails 68 respectively receives the screws 82, providing for tilting adjustment movement of the rails relative to the screws. Between the opposed faces of the eccentrics 80 and rails 68, lock or spring washers 89 may be provided to aid frictionally in holding the eccentrics 80 in desired tilted position. At the end of each of the rails 68, a lug 90 formed thereon may be provided to serve as a stop, limiting upward pivoted movement of the rails 68. A second lug 92 on each of the rails 68 below the eccentrics 80 is engaged thereby to tilt the rails downwardly when the eccentrics are rotated in one direction. Above the baffle 66, a fixed air baffle member 93 is provided which cooperates with the rear edge of the tiltable baffle 66 to control air circulation in the cabinet. The fixed baffle member 93 may be of angle cross section having one leg secured flat against and to the liner and having its other leg projecting horizontally from the liner toward the baffle 66. When the eccentrics 80 are against the stops 90, the baffle 66 will have been tilted by the eccentrics 80 to the position shown in Fig. 4 moving the rear edge of the baffle 66 closer to the fixed baffle member 93, thus decreasing air circulation between the freezing compartment 32 and compartments 34 and 36. By turning the eccentrics 80 counterclockwise, facing Fig. 4, the baffle 66 will be tilted downwardly, increasing the flow capacity between the rear edge of the baffle and the adjacent, fixed baffle member 93. This will increase the rate of air circulation in the cabinet with corresponding increase in the rate of freezing out of moisture on the relatively low tempera-

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ture evaporator 42 with the result that the humidity of the circulating air will be decreased.

The adjustable baffle 66, disposed immediately below the evaporator 42 is made so as to serve also as a drip receiver, during periods of defrosting of the refrigerating system. This baffle 66 may comprise an upper pan 94 and a lower pan 96. These pans 94, 96 are spaced apart to receive heat insulation 98 to decrease heat transfer by conduction, between the freezing and food storage compartments. Outer marginal portions or flanges 100 of the baffle 66 may be cemented or be otherwise suitably secured together around the outer peripheries thereof. Adjacent the rear edge of the baffle upper pan 94, a depression 102 directs water to flow from the baffle down onto a projection 104 of the rear wall liner. The water runs down the liner 24 into a channel 106 secured thereto and into a drip receiver or pan 108 which is carried by a bin door 110 which closes a lower portion of the front of compartment 36. Above the bin in compartment 36, a pair of laterally spaced vegetable containers or drawers 112 may be provided and supported on rails adjacent the underside of the shelf-partition 64.

From the foregoing description, it will be noted that I have provided an improved arrangement within a refrigerator cabinet to control humidity of the air therein by controlling the rate of freezing out of air entrained moisture on a freezing temperature evaporator. In addition it will be noted that I have accomplished the above by utilizing and adapting a drip pan for the control member which may be readily tilted to regulate air circulation and correspondingly regulate humidity in the compartments of the refrigerator.

Although only a preferred form of the invention has been illustrated, and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. In a refrigerating apparatus, a cabinet, a partition extending substantially to the inner wall surface of said cabinet, said partition and inner wall cabinet surface forming a freezing compartment on one side of said partition and a relatively high humidity compartment on the other side of said partition, a cooling element within said cabinet on said one side of said partition inducing air circulation between said compartments and freezing moisture out of the air, said partition being tiltable to different positions to change the rate of air flow between said compartments, means supporting said partition and means for holding said partition in adjusted position.

2. In a refrigerating apparatus, a cabinet, a refrigerant evaporator in said cabinet, a drip pan within said cabinet below said refrigerant evaporator, a pair of rails supporting said drip pan and pivoted adjacent corresponding ends to said cabinet, a freezing compartment above said drip pan, a relatively high humidity compartment below said drip pan, said evaporator inducing gravity circulation of air between said compartments controlled by the position of said drip pan, and adjustment means holding said pivoted rails in adjusted position.

3. In a refrigerating apparatus, a cabinet liner,

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a partition within the space defined by said liner and being pivoted for adjustment about a substantially horizontal axis, said partition cooperating with said liner to form a freezing element chamber on one side of the partition and a food storage compartment on the other side of said partition, said partition also being arranged with an edge thereof spaced from the inner surface of said liner allowing circulation of air between said compartments, and adjustment means operable to pivot said partition to change the spacing of said partition edge from said liner and correspondingly change the rate of air circulation between said compartments.

4. In a refrigerating apparatus, a cabinet liner, a partition within the space defined by said liner and being pivoted for adjustment about a substantially horizontal axis, said partition cooperating with said liner to form a freezing element chamber on one side of the partition and a food storage compartment on the other side of said partition, said partition also being arranged with an edge thereof spaced from the inner surface of said liner allowing circulation of air between said compartments, and cam means adjustably supporting said pivoted partition operable to vary the spacing between said partition edge and said liner.

5. In a refrigerating apparatus, a refrigerator cabinet liner, a pair of oppositely disposed supporting rails pivoted respectively to opposite sides of said cabinet liner, a drip pan supported on said rails forming a common wall between a freezing compartment on one side thereof and a food storage compartment on the other side thereof, said drip pan being spaced from said cabinet liner for predetermined circulation of air between said compartment and being tiltable by said rails to vary the rate of air circulation between said compartments, and adjustment means mounted on the sides of said liner operable to pivot said supporting rails.

6. In a refrigerating apparatus, a refrigerator cabinet liner, a pair of heat insulating supporting rails pivoted to and disposed within the space defined by said liner, a removable drip pan unattachedly supported by said rails within the space defined by said liner, said drip pan forming the bottom and top walls respectively of an upper freezing compartment and a lower cooling compartment, means on said pan and on said rails restraining relative movement therebetween and positioning said pan so that an edge thereof is spaced from said liner to allow predetermined circulation of air between said compartments, and adjustment means operable to pivot said rails and change the spacing of said pan edge and said liner for correspondingly changing the rate of air circulation between said compartments.

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