May 25, 1948. J. J. BAUMAN 2,442,188

CONTROLLED HUMIDITY REFRIGERATOR

Filed Nov. 28, 1944 2 Sheets-Sheet 1

FIG. 1.

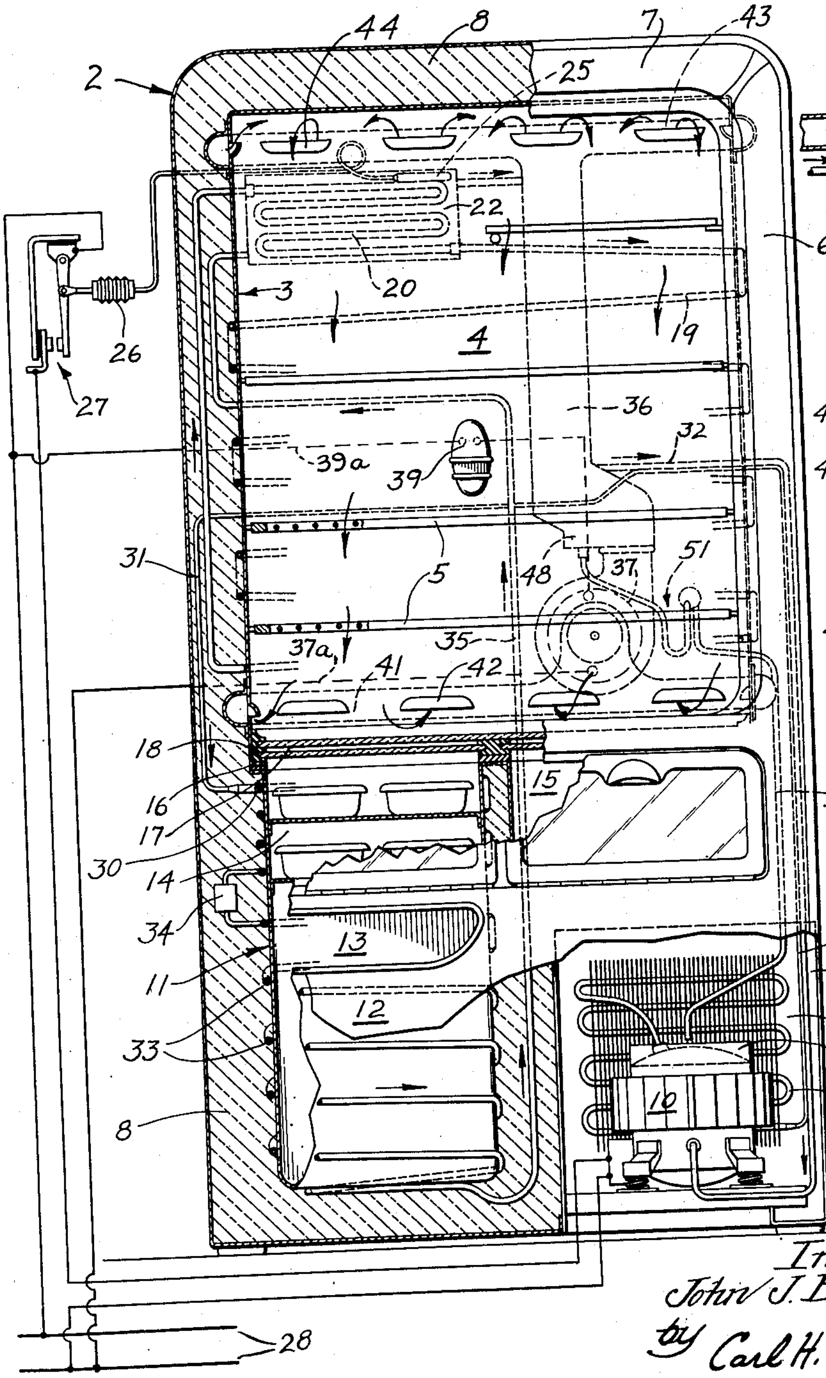

FIG. 2.

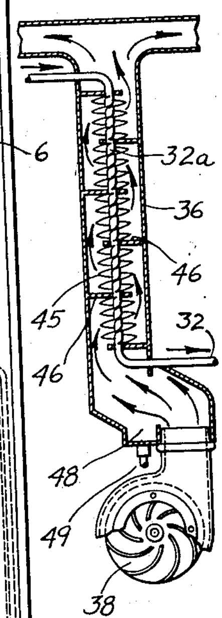

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FIG. 3.

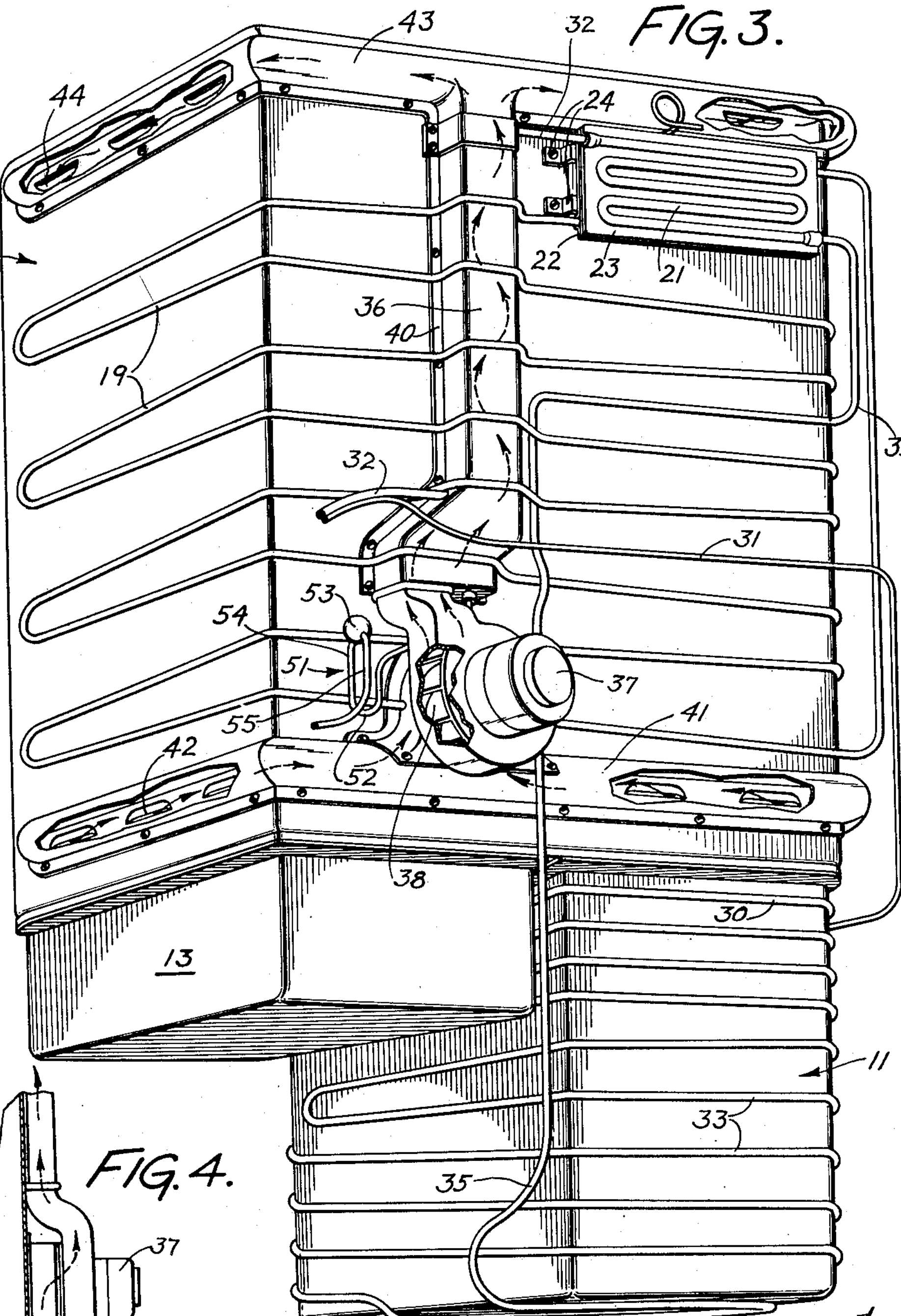
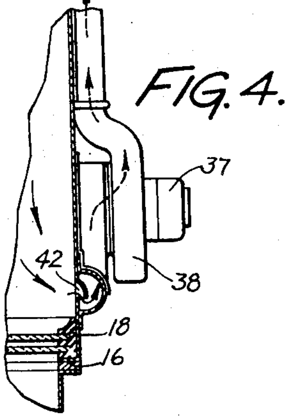


FIG. 4.



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2,442,188

CONTROLLED HUMIDITY REFRIGERATOR

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Application November 28, 1944, Serial No. 565,435

18 Claims. (Cl. 62—102)

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This invention relates to refrigeration apparatus, and is particularly concerned with refrigerators which include a high humidity compartment especially adapted to preserve foodstuffs without dehydration thereof. The invention has especial reference to such refrigerators, in which the moisture content of the compartment air may be controlled by circulating the air through a zone in heat exchange relation with a relatively low temperature element, to effect condensation of excess moisture.

More specifically, the present invention, while not limited thereto, has especial reference and adaptability to refrigerators of the multiple compartment type, in which the temperature of the air in one compartment is maintained above that existing in other portions of the box, and the relative humidity in said compartment is kept at a high value.

In refrigerators incorporating high humidity compartments, it has proven difficult to insure the desired degree of humidity throughout all seasons of the year, while still preventing the humidity from reaching undesirably high values at certain times, and particularly in damper climates.

As set forth in the copending application of Malcolm G. Shoemaker, Ser. No. 528,581, filed March 29, 1944, now Patent No. 2,416,354, granted February 25, 1947, and assigned to the assignee of the instant invention, excessively high humidity results in undesirable condensation of moisture upon the walls and other surfaces exposed within the so-called moist-cold space. The reason for this will be apparent when it is understood that such walls and surfaces are apt to assume temperature values well below the dew-point temperature of the compartment air, at the undesirably high relative humidity conditions frequently encountered in said compartments.

In the structure illustrated in the above-mentioned copending application, humidity-responsive means is provided which removes undesired moisture from the compartment air, as and when required, by passing said air in heat exchange relation with an evaporator maintained at relatively low temperature, which evaporator is also utilized for the production of ice cubes as well as for low-temperature storage purposes. While the construction of the above-mentioned application is highly advantageous, in that it provides the desired control of the moisture content of the compartment air, it inherently places certain restrictions on the flexibility and adaptability of the design, as will now be apparent.

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In refrigerators having provision for air circulation past a relatively low temperature element, the moisture condensed in that zone or passage which is in heat exchange relation with said cold element must be prevented from accumulating in the form of frost, as accumulation of frost therein restricts the passage area and reduces the necessary heat exchange.

Hence, if the zone or passage utilized to effect the moisture removal is normally operated below 32° F., it must be brought above the freezing temperature during at least a portion of the refrigerating cycle, but, on the other hand, it will be evident that the condensation of moisture will be facilitated by the maintenance of a relatively low temperature in said zone. Therefore, it would be highly desirable to maintain the moisture condensing zone at temperatures well below freezing, so long as it is possible to periodically raise the temperature of said zone for intervals of sufficient duration to insure melting of any frost which has accumulated. While provision has been made to prevent the accumulation of such frost in the prior type of apparatus, the inherent uniformity and the relatively low value of the temperature maintained in the evaporator past which the air is circulated, makes it difficult to operate said zone, in the system of said copending application, at as low a temperature as would otherwise be desired, while still insuring that the zone will periodically pass above the freezing point. This difficulty results from the fact that the temperature of the evaporator with which the zone is associated cannot normally be permitted to fluctuate substantially, because of the other requirements and functions of said evaporator, mentioned above. Therefore, means must be provided to keep the zone itself at or near 32° F., to insure that it will pass above the freezing point, during at least a part of the refrigerating cycle of said associated evaporator. This relatively high zone temperature, in turn, requires that said zone be of substantial area, in order to provide heat exchange of magnitude sufficient to accomplish the desired condensation.

By the present invention, these difficulties and design disadvantages previously encountered are eliminated and, to this end, it is a primary object of this invention to provide a refrigerator having a condensing zone which will not only operate at temperatures well below 32° F., but will also automatically attain a temperature, periodically, which is high enough to completely eliminate the possibility of frost accumulation in said zone.

More particularly, it is an object of the present invention to provide a refrigerator having dehumidifying means of the above character, which will become defrosted with each cycle of the refrigerator motor-compressor.

In another aspect, the invention contemplates provision for the removal of the condensed moisture, while still preventing ingress of additional moisture-laden air into the refrigerator, through the removal passages.

The foregoing and other objects and advantages of the invention may be clearly understood by reference to the following description, taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an elevational view of a refrigerator embodying the invention, portions thereof being broken away to facilitate illustration;

Fig. 2 is a sectional view taken through the longitudinal vertical mid-plane of the condensing zone or passage, included in the apparatus illustrated in Fig. 1;

Fig. 3 is an enlarged view in perspective of the rear of the refrigerator inner liner and associated structures, fragmentary portions being broken away; and,

Fig. 4 is a fragmentary illustration of a detail of the construction.

Making particular reference to Figs. 1 and 3 of the drawings, there is illustrated a domestic refrigerator of the mechanical type which includes an outer shell 2, which may be of any well-known type and construction, and an inner metal shell or liner member 3 providing the main food storage space, indicated generally at 4. This space 4 is fitted with a plurality of shelves 5, of any desired type. Vertical and horizontal breaker strips 6 and 7, respectively, of low thermal conductivity, are fitted around the forward marginal edge of the cabinet opening, while thermal insulation, portions of which are indicated at 8, completely surrounds the inner liner member 3 as well as the outside surfaces of the cooling means presently to be described. The cabinet would, of course, be provided with a door (not shown) said door being adapted to seat thereagainst in the plane of the breaker strips 6 and 7.

A machinery compartment 9 is located in the lower portion of the cabinet structure, this compartment housing the motor-compressor unit indicated generally at 10. The main food storage and ice freezing evaporator is shown at 11 and includes, generally, a relatively large well-type frozen food storage area 12, to which access may be had through an opening 13, and a smaller ice freezing space indicated at 14. A storage area 15 is located to the right of the ice freezing section as viewed in Fig. 1 and is particularly adapted for the preservation of meats, and the like. This evaporator may be supported within the refrigerator in any convenient manner, as for example, by securing its outer, vertical walls to an inturned flange 16 formed about the lower edges of the inner liner 3. Certain features of the particular evaporator illustrated are disclosed and claimed in the copending application of Donald E. Dailey, Serial No. 515,950, filed December 28, 1943, now Reissue Patent No. 22,976, granted February 24, 1948, and as such features, per se, form no part of the present invention, detailed description of such features is not deemed necessary herein.

In the embodiment illustrated, and as clearly appears in Fig. 1, a double-thickness insulating partition 17 provides the floor for the main storage compartment 4, this partition being interposed between the sections of the main evaporator and said food storage compartment, in order to make it possible to operate the compartment 4 at relatively high temperatures as compared with the temperature of the storage and freezing sections 12, 14 and 15, and to prevent the undesired frosting-out of moisture present in said compartment 4. As clearly appears in the drawing, a gasket member 18 surrounds the partition 17, said gasket being interposed between the partition members and the adjacent wall portion of the inner liner 3.

The main food storage section 4 is cooled by means of refrigerant tubing 19 secured in convoluted arrangement about the exterior surface of the inner liner, and constituting the evaporator portion of a secondary refrigerant circuit of known type. Condensation of the secondary liquid is effected by means of heat exchange association between a condensing portion 20 of the secondary tubing and a small evaporator 21 (see Fig. 3) which constitutes a series-connected portion of the main primary circuit utilized to effect refrigeration of the evaporator sections 12 and 14. As best appears in Fig. 3, the condensing tubing 20 and the small primary evaporator 21 are each carried by a metallic plate 22 and 23, respectively, said plates being arranged in high heat conducting relation and secured to the rear portion of the inner liner by any convenient means, as for example, by the brackets illustrated at 24. While the refrigerant flow circuits will be pointed out more fully just below, a detailed description of the relationship and functioning of the primary-secondary circuits is not necessary herein, since the invention is not concerned therewith.

For a purpose which will appear hereinafter, the operation of the motor-compressor 10 is controlled in response to the temperature of the associated plates 22 and 23 and, for that purpose, a suitable feeler tube 25 (see Fig. 1) is mounted against the face of plate 22. This feeler tube is connected to the expansible bellows 26 of a thermostatic switch 27 of well-known type. Closure of the switch 27 will initiate operation of the motor-compressor 10 by connecting it across the line 28, as is evident from the drawing. Although the control switch 27 has been illustrated conventionally, it will be understood that a control is contemplated which is of the usual type providing a temperature difference of several degrees, between open and closed positions. That is, after opening of the switch contacts, reclosure thereof will not occur until the temperature of bulb 25 has risen several degrees.

Although any convenient form of primary refrigerant circuit may be employed, there is illustrated an arrangement in which (see Figs. 1 and 3) the liquid refrigerant in the condenser 29 is delivered to tubing 30 surrounding the ice freezing section 14, said delivery being effected through a capillary tube 31, a portion of which is arranged in heat exchange relation with the lower portion of a suction line 32. From the entry tubing 30 the volatile refrigerant passes through refrigerant flow passages 33 arranged about the evaporator storage section 12, a suitable restrictor 34 being interposed between the courses of tubing 30 and the convolutions 33, in order to maintain the low temperature desired for the proper preservation of frozen foodstuffs. From the tubing 33 surrounding the storage compartment 12, the refrigerant is delivered to the small auxiliary evaporator 21, by means of an upwardly extending conduit 35. After being passed in heat exchange relation with the refrigerant contained in the secondary condensing tubing 20, as above described, the primary refrigerant is returned to the compressor unit through the downwardly extending suction conduit 32. It should be observed that the primary refrigerant leaving the evaporator 21 is first delivered to an upper portion 32a of said suction line, which portion, as clearly appears in Fig. 2, extends downwardly through an airflow passage 36 secured to the rear face of the inner liner member 3. This portion of the construction is of particular importance in connection with the instant invention and will be described in greater detail hereinafter.

It should be borne in mind that, in common with the aforementioned Shoemaker application, the invention is concerned with an arrangement in which undesired humidity in the main food storage compartment is eliminated by effecting periodic circulation of the compartment air through certain ducts associated with said compartment, and thence into a passage or zone arranged in heat exchange relation with a normally cold element. In such a system, there is a transfer of latent heat from the moisture-laden air to the cold element referred to and, consequently, some of the moisture is condensed upon surfaces of this dehumidifying zone. Following this, the air whose absolute humidity has now been substantially decreased is re-injected into the food storage compartment and, combining with the air in said compartment, acts to lower the overall relative humidity therein.

In the apparatus of the present invention this circulation is effected, as and when required, by means of a motor 37 and associated blower 38, operable periodically in response to the humidity conditions existing in the compartment 4.

This controlled circulation may conveniently be initiated by means of a humidostat 39 which, while it may be of any desired type, is illustrated as being of the type disclosed and claimed in my copending application, Ser. No. 537,701 filed May 27, 1944. Description of the humidostat is unnecessary herein, beyond mentioning that the humidostat is adapted to initiate operation of the motor 37 when the relative humidity in the compartment 4 has risen just above a predetermined value. This is accomplished through conductors 39a and 37a which, in response to operation of the humidostat, serve to connect the motor across the line 28 through the motor-control contacts of the humidostat, as fully set forth in my copending application identified above. Further, it will be evident that while humidostat control is preferable, it would be possible to effect periodic actuation of the air circulation blower by other means. For example, the motor 37 could be energized at periodic, timed intervals, in accordance with the average humidity conditions encountered in practice in any particular locality. Further, in the broad aspect, certain advantages of the present invention could be realized by a slow, continuous circulation of the compartment air by means of the blower 38.

Referring now with more particularity to the construction and operation of the dehumidifying apparatus of the present invention, it will be seen that the air-flow passages, see for example the passage 36, preferably comprise duct work taking the form of substantially half-round tubing secured to the face of the inner liner 3 by means of flanges 40, which may be bonded to the exterior wall of the liner in any convenient manner. A generally C-shaped air withdrawal duct 41 extends about the side and rear walls of the liner 3 in the lower portion thereof and, as shown at 42, apertures are provided in the liner wall in registry with this duct portion 41. A similar air injection duct 43 extends about the upper portion of the liner member, the liner wall again being apertured as at 44 to permit passage of air from said duct 43 into the food compartment 4.

The duct 36 extends between the upper and lower air passages 41 and 43 and, as designated by arrows appearing in the drawings, it will be apparent that the air is withdrawn from the compartment through duct 41, passes upwardly (see Figs. 3 and 4) into the inflow portion of the blower unit 38 and thence upwardly through passage 36 in heat exchange relation with portion 32a of the suction line, the circuit being completed by re-injection of air into the box through apertures 44 communicating with the upper passage 43.

The portion 32a of the suction line is provided with spiral fins 45 to increase the active heat exchange surface, and it is here that the aforementioned transfer of latent heat occurs, and the condensation of excess moisture takes place. It will be noted that the duct 36 carries opposed baffles 46 providing a circuitous path for the air, and thereby further insuring sufficient heat exchange between said air and the suction line 32a, whereby to effect the desired moisture-condensation.

As is known in the refrigeration art, the refrigerant leaving an evaporator may, if desired, be in an active state, at least to some extent, and as a consequence, heat is taken up through the suction line which becomes, in effect, an extension of the evaporator. This action occurs when active refrigerant is being pumped through the system by the motor-compressor, and diminishes or disappears, while said motor-compressor is idle. As a result, during the "on" cycle of the motor-compressor, a sub-freezing zone commonly extends back the suction line toward the motor-compressor. The termination of this sub-freezing zone is known as the "frost" line and, as indicated above, the excursion of this frost line varies as between "on" and "off" portions of the motor-compressor cycle. The degree of such excursion can be very readily controlled by the amount of refrigerant charge in the system, and tests have established that such frost line excursion may be very closely held within predetermined limits.

While, in the apparatus of the present invention, the amount of refrigerant charge would necessarily vary with the specific design desired, the invention contemplates charging the system to a degree just sufficient to insure that frost line excursion will occur as follows. The system is so charged that, during "on" portions of the motor-compressor cycle, the frost line will extend down the suction line to a point just short of the region where said suction line extends out of the duct 36 and passes downwardly to the motor-compressor. During "off" periods of the motor-compressor cycle, on the other hand, the frost line recedes up the suction line 32a to a point preferably just outside of the upper portion of duct 36. Thus, it will be evident that, during each "off" period of the compressor 10, the suction line 32a and the associated fins and surfaces will defrost, while each recurrence of motor-compressor operation reduces the average temperature of that portion of suction line which is within the duct 36, to a value well below freezing. It should be understood that the thermal mass of the suction line and associated heat exchange surfaces is comparatively small and that, as a consequence, said line and surfaces will require a very short time to pass above the freezing point at the initiation of each "off" portion of the cycle, thereby insuring melting of any frozen moisture.

It will be apparent from inspection of Fig 2 that all of the moisture accumulated in duct 36 will be delivered to a sump portion 48 from whence it is passed downwardly through a conduit 49 into a receptacle 50 which is associated with the motor-compressor unit 10, in order that the condensate may be evaporated by the heat of said unit and provide cooling therefor. Special provision is made to prevent entrance of moist air through the conduit 49, as follows.

As will be evident from Fig. 3, a trap 51 is formed in conduit 49 through which the condensed moisture passes. A portion of the moisture will always be present in the trap and this operates to prevent warm humid air from being drawn into the box from the region of the motor-compressor, by virtue of the suction created by the blower. This trap includes double U-shaped portions, one of which appears in Fig. 3 at 52, and the other of which terminates in an enlarged spherical junction 53, to prevent any loss of trapped fluid due to a syphoning action. The plane of the U-portion 52 is substantially parallel to the rear surface of the liner, while the legs 54 and 55, which form the second trap portion, lie in a plane at right angles to the plane of the first trap. Before shipment of the refrigerator, this double trap structure can be filled with a liquid which will not freeze during shipping (thereby ensuring presence of a seal when the refrigerator is first operated) and it will be understood that the orientation of the two trap portions prevents loss of the sealing liquid, even if the refrigerator is placed on its back during shipment.

While the overall functioning of the apparatus will be clear from the foregoing, a brief summary will be made here, with emphasis on certain features. Existence of undesirably high humidity within the compartment 4 initiates operation of the blower 38, by means of the humidostat 39, thereby causing air to be withdrawn through duct 41, passed upwardly through duct 36 and thence reinjected into the food compartment. Moisture is given up in the duct 36, as has been described, and the blower operation continues until the relative humidity of the air in the compartment 4 has been reduced to the desired value. This action takes place, under the control of the humidostat or other periodic cycling means employed, without regard to whether or not the motor-compressor is in operation.

If the motor-compressor is functioning during operation of the blower 38, it will be evident that the portion of the suction line (32a) within the passage 36 will be at a cold temperature (the value of which is determined by the specific nature of the particular design) and the heat transferred here from the moving air to the suction line will be absorbed by the refrigerating capacity of the main or primary circuit.

On the other hand, if the relative humidity within the compartment 4 should become excessive during an "off" portion of the motor-com-

pressor cycle, the line 32a will be at a relatively high defrosting temperature, and its capacity to absorb further heat will be small. Under such conditions, only small amounts of moisture could be condensed in the dehumidifying zone. However, should this reduced heat exchange capacity be insufficient to restore the desired relative humidity condition within the food compartment, operation of the compressor will be reestablished automatically, as will now be seen.

As soon as the temperature of the suction line and the adjacent surfaces of the passage 36 rise substantially, heat flows back along said suction line to primary coil 21 and the plate 23. As pointed out above, the control tube 25 is so positioned that it will respond to this back flow of heat, thereby re-establishing operation of the compressor 10 and, as will now be understood, reducing the temperature of suction line portion 32a toward its cold value.

It should, of course, be recognized that even under adverse climatic conditions, the time when the blower is in operation will not represent a very large proportion of the total operating time of the refrigerator, and there is always ample time for the defrosting of the heat exchange zone of the present invention. This is evident from the fact that quite high values of relative humidity (for example 80%) are desirable for the proper preservation of fresh foodstuffs, such as leafy vegetables and, therefore, a number of complete cycles of the compressor will normally take place before the humidostat would again respond to excessive humidity and institute operation of the air circulating blower.

From the above, it will be apparent that this invention provides a controlled-humidity refrigerator having a novel moisture-condensing arrangement which will not only operate at temperatures well below 32° F., but will also automatically attain a relatively high temperature, periodically. The importance of the resultant prevention of any possibility of frost accumulation in the moisture-condensing zone, will be appreciated.

Moreover, the advantages of the invention are realized by an arrangement which is well adapted for use with present day refrigerators, having a plurality of zones to be maintained at temperature and humidity conditions varying in accordance with the needs of different foods.

It will be evident that, in a broader aspect, the invention is not limited to the use of a suction conduit in which the temperature varies substantially during the cycle, since the conduit might be operated above freezing at all times, while still providing some of the advantages of the present invention. However, it will be understood that the invention is susceptible of such changes and modifications as may come within the terms of the appended claims.

I claim:

1. In a refrigerator having a high humidity storage compartment, a cyclically-operable refrigerant circulating system having a portion located exteriorly of said compartment out of contact with the moisture-laden air of said compartment during normal operation of the refrigerator and whose temperature varies during a cycle from a value substantially below the freezing point of water to a value in excess of freezing, and means for passing air from said compartment in heat exchange relation with said portion to condense moisture from the air.

2. In a refrigerator, a high humidity storage

compartment, an evaporator, compressing means, a suction conduit portion arranged between said evaporator and said compressing means and adapted to operate periodically at a temperature below that prevailing in said storage compartment, said portion being located exteriorly of said compartment and out of contact with the moisture-laden air thereof during normal operation of the refrigerator, and means for passing air from said compartment in heat exchange relation with said conduit portion to condense moisture from the air.

3. In a refrigerator, a high humidity storage compartment, an evaporator, cyclically-operable compressing means, a suction conduit arranged between said evaporator and said compressing means and at least a portion of which is adapted to operate at temperatures which vary during a cycle from a lower value below that prevailing in said storage compartment to a higher value in excess of the freezing point of water, said portion being located exteriorly of said compartment and out of contact with the moisture-laden air thereof during normal operation of the refrigerator, and means for passing air from said compartment in heat exchange relation with said suction conduit portion to condense moisture from the air.

4. In a refrigerator, a high humidity storage compartment, an evaporator, cyclically-operable compressing means, a suction conduit arranged between said evaporator and said compressing means and at least a portion of which is adapted to operate at temperatures which vary during a cycle from subfreezing to superfreezing values, said portion being located exteriorly of said compartment out of contact with the moisture-laden air thereof during normal operation of the refrigerator, and means for passing air from said compartment in heat exchange relation with said suction conduit portion to condense moisture from the air.

5. A construction in accordance with claim 1, wherein said last means includes an element responsive to an increase in relative humidity above a predetermined value to initiate action of the said last means and is further adapted to maintain the air movement until the relative humidity is reduced to said predetermined value.

6. In a refrigerator, a high humidity storage compartment, an evaporator, cyclically-operable compressing means, a suction conduit arranged between said evaporator and said compressing means and at least a portion of which is adapted to operate at temperatures which vary during a cycle from a lower value below that prevailing in said storage compartment to a higher value in excess of the freezing point of water, said portion being located exteriorly of said compartment and out of contact with the moisture-laden air thereof during normal operation of the refrigerator, and periodically operable means for passing air from said compartment in heat exchange relation with said suction conduit portion to condense moisture from the air.

7. A construction in accordance with claim 6, wherein said last means includes an element responsive to an increase in relative humidity above a predetermined value to initiate action of the said last means and is further adapted to maintain the air movement until the relative humidity is reduced to said predetermined value.

8. In a refrigerator, a high humidity storage compartment, an evaporator, compressing means, a suction conduit portion arranged between said evaporator and said compressing means and adapted to operate at least periodically at a temperature below that prevailing in said storage compartment, means defining an air-flow passage in heat exchange relation with said suction conduit portion, and means for passing air from said compartment through said passage and for thereafter returning the air to said compartment.

9. In a refrigerator, an inner liner defining a high humidity storage compartment, a refrigerant system including a suction conduit portion adapted to operate at least periodically at a temperature below that prevailing in said storage compartment, and air flow passage means carried by said inner liner and through which air may be withdrawn from said compartment and returned thereto, a portion of said passage means being arranged in heat exchange relation with said suction conduit portion.

10. In a refrigerator, a high humidity storage compartment, a refrigerant circulating system including a suction conduit portion adapted to operate at least periodically at a temperature below that prevailing in said storage compartment, an air-flow passage in heat exchange relation with said conduit portion, and means for passing air from said compartment through said passage whereby to reduce the humidity of the air.

11. In a refrigerator, a high humidity storage compartment, an evaporator, compressing means, a suction conduit arranged between said evaporator and said compressing means and at least a portion of which is adapted to operate at least periodically at temperature below that prevailing in said storage compartment, an air-flow passage in heat exchange relation with said suction conduit portion, means for passing air from said compartment through said passage to condense moisture from the air, and means for controlling the operation of said compressing means, said last means normally being responsive to the temperature condition of said evaporator and further being adapted to initiate operation of said compressor in response to a predetermined temperature condition within said passage.

12. A refrigerator comprising a high humidity compartment, a low-temperature compartment, a cyclically-operable compressor, a secondary refrigerating system for cooling said high humidity compartment, an evaporator for cooling said low-temperature compartment, an auxiliary evaporator arranged in heat exchange relation with a portion of said secondary system, said evaporators being associated with said compressor to form a series flow refrigerant circuit including a suction conduit portion interconnecting said auxiliary evaporator and said compressor, said suction conduit portion being adapted to operate at temperatures which vary during a cycle from a lower value below that prevailing in said high humidity compartment to a higher value in excess of the freezing point of water, and means for passing air from said high humidity compartment in heat exchange relation with said suction conduit portion to condense moisture from the air.

13. In a refrigerator, a high humidity storage compartment, a refrigerant system including a suction conduit portion adapted to operate at least periodically at a temperature below that prevailing in said storage compartment, an air flow passage in heat exchange relation with said suction conduit portion, means for passing air from said compartment through said air flow passage

to condense moisture from the air, and a second passage for conveying condensed moisture out of said air flow passage, said second passage including means preventing ingress of moisture-laden air in a reverse direction therethrough.

14. In a refrigerator, a high humidity storage compartment, a refrigerant circulating system including a portion so disposed as to be out of contact with the moisture-laden air of said compartment during normal operation of the refrigerator and in which active liquid refrigerant is present intermittently, and means for passing air from said compartment in heat exchange relation with said portion to condense moisture from said air.

15. In a refrigerator, a high humidity storage compartment, a cyclically-operable refrigerant circulating system including a conduit so disposed as to be out of contact with the moisture-laden air of said compartment during normal operation of the refrigerator and in which active liquid refrigerant is present during only a portion of a complete cycle, and means for passing air from said compartment in heat exchange relation with said conduit to condense moisture from said air.

16. In a refrigerator, a high humidity storage compartment, intermittently-operable compressing means, a conduit portion arranged between said evaporator and said compressing means and in which active liquid refrigerant is present only during operating periods of said compressing means whereby said conduit portion is adapted to function as an evaporator during such operating periods, said portion further being so disposed as to be out of contact with the moisture-laden air of said compartment during normal operation of the refrigerator, and means for periodically effecting heat exchange between the storage compartment air and said conduit portion.

17. In a refrigerator, a high humidity storage compartment, a refrigerant circulating system including a suction conduit portion adapted to operate at least periodically at a temperature below that prevailing in said storage compartment, means defining a substantially enclosed area disposed out of contact with the moisture-laden air of said compartment during normal operation of the refrigerator and in high heat exchange relation with said suction conduit portion, and means providing for introduction of compartment air into said area to condense moisture from said air.

18. In a refrigerator, a high humidity storage compartment, a refrigerant circulating system including a suction conduit portion adapted to operate at least periodically at a temperature below that prevailing in said storage compartment and disposed out of contact with the moisture-laden air of the compartment during normal operation of the refrigerator, and means responsive to the humidity condition of the air within said compartment and effective to establish a high heat exchange association of said air with said suction conduit portion in response to an increase in humidity above a predetermined value.

JOHN J. BAUMAN.

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