Oct. 25, 1949. C. W. KUHN 2,485,894

HUMIDITY CONTROL SYSTEM

Filed Aug. 16, 1947 2 Sheets-Sheet 1

Fig. 1

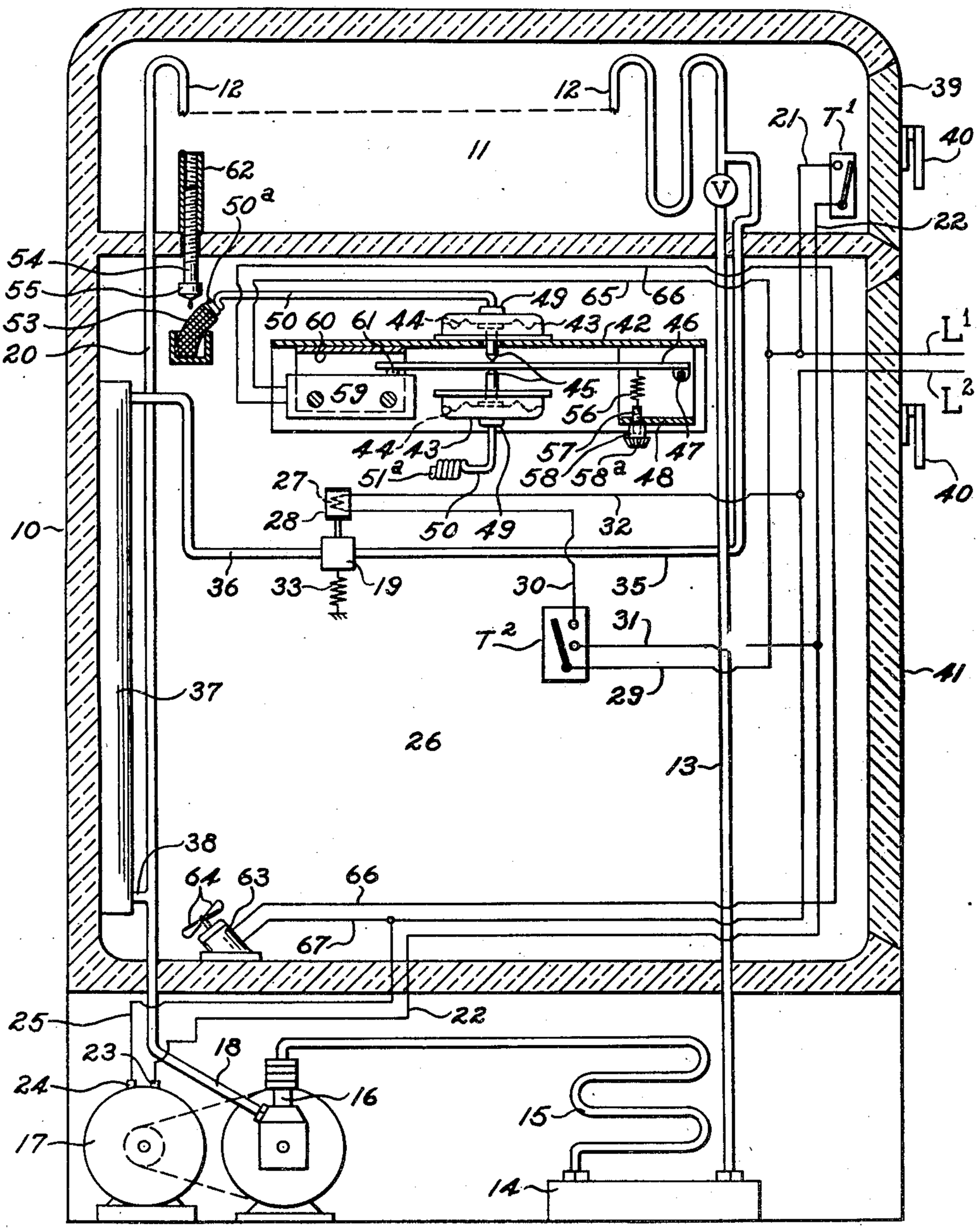

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Fig. 2

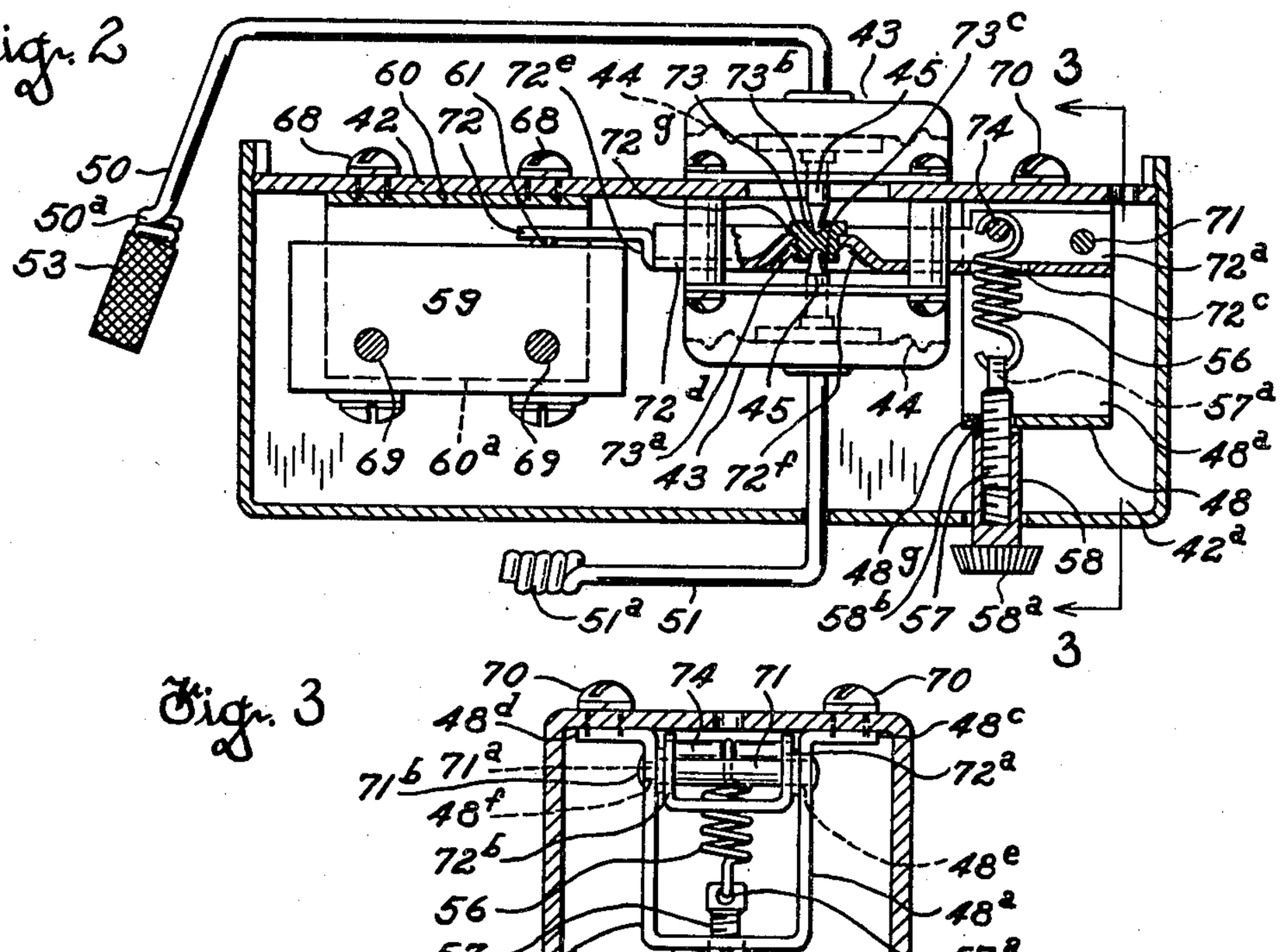
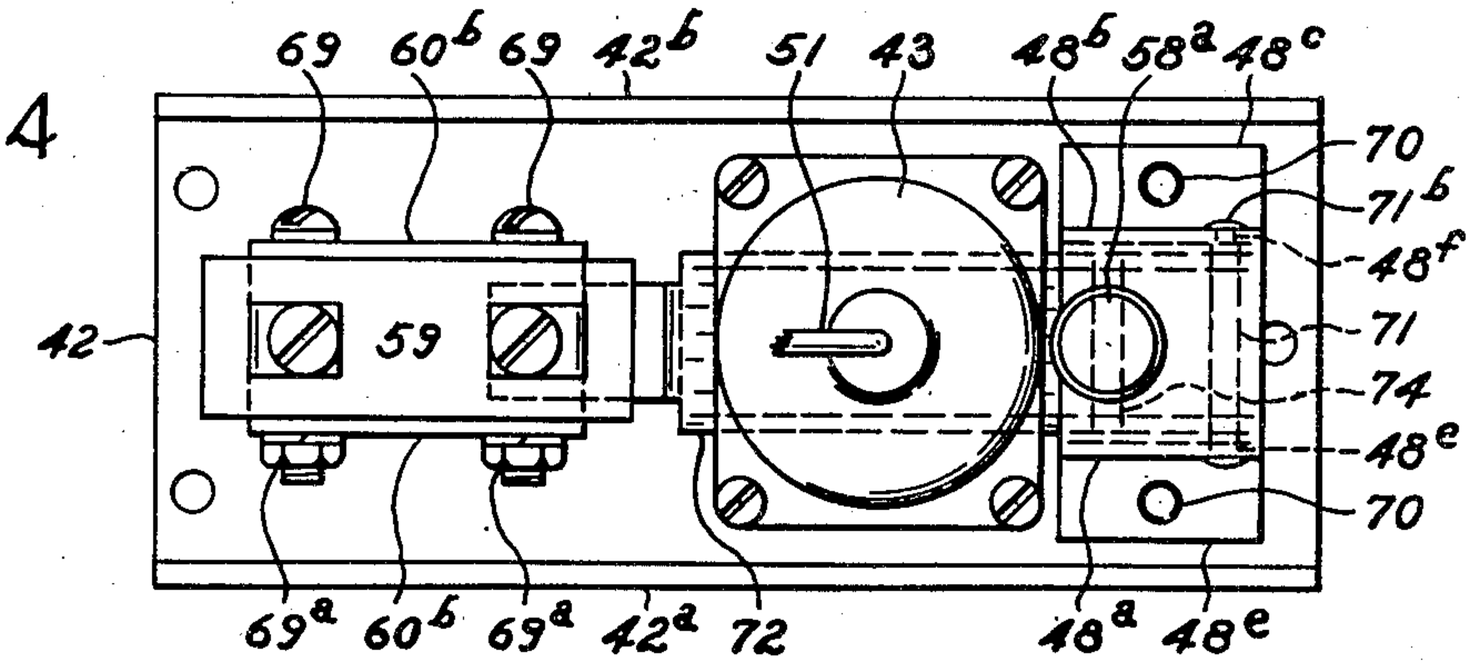


Fig. 3

Fig. 4



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HUMIDITY CONTROL SYSTEM

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Application August 16, 1947, Serial No. 768,995

11 Claims. (Cl. 236—44)

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This invention relates to improvements in humidity control systems. The invention relates more particularly to a novel and simple form of humidostat which is operable automatically to maintain at a substantially constant predetermined value the degree of humidity within a given space; for example, within the main food storage space of a household refrigerator.

A primary object of the invention is to provide a humidostat which may be readily and inexpensively constructed from parts or elements which are commercially available.

Another object is to provide a humidity control system which is adapted to utilize any desired or required portion of the moisture normally present within the area or chamber whose humidity is to be controlled.

Another object is to provide such a humidostat which is operable on the wet- and dry-bulb principle.

Another object is to provide novel means for supplying moisture (water) to the wet bulb of the humidostat.

Another object is to provide means of the character just mentioned which is manually adjustable in a manner to insure attainment of the results desired.

Another and more specific object is to provide means associated with the cold evaporator of a refrigerator or the like to enable condensation and collection of moisture from the refrigerator compartment and automatic discharge thereof onto a wick associated with the wet-bulb of the humidostat.

Another object is to provide for automatic removal of at least a portion of the condensed humidity or frost from the cooling element of said refrigerator compartment as an incident to the aforementioned humidification of said compartment.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrate an embodiment of the invention which will now be described; it being understood that the embodiment illustrated is susceptible of modification in respect of certain structural details thereof without departing from the scope of the appended claims.

In the drawings,

Figure 1 is a schematic and diagrammatic illustration of one form of refrigerator having my improved humidity control means applied thereto.

Fig. 2 is a view, partly in section and partly in elevation, of the elements of a wet- and dry-bulb humidostat as constructed in accordance with my invention.

Fig. 3 is a sectional view, on the line 3—3 of Fig. 2, with certain elements of the device omitted, for clarity of illustration.

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Fig. 4 is a bottom plan view of the assembled device, with the cover member removed.

Referring first to Fig. 1, the numeral 10 designates in general a known type of domestic or household refrigerator, the various parts of which are shown more or less schematically and diagrammatically. Thus the same is shown as provided at its upper end with a freezing compartment 11, within which foods or liquids are to be frozen and/or maintained in a frozen condition. Fragments of the evaporating coil located within compartment 11 are shown diagrammatically at 12, 12. A thermostat T^1 is located within compartment 11; said thermostat being shown diagrammatically, and the same being adjustable manually to preselect any desired relatively low temperature (as for example, 0° F.) to be maintained within compartment 11, through the medium of a suitable switch, as shown, controlled thereby.

The refrigerant is supplied to the cooling coil 12 through an expansion valve V, by a conduit 13, the lower end of which leads from a receiver 14 into which the liquid refrigerant is discharged from a condenser 15. The refrigerant is supplied to condenser 15 from a compressor 16, which is preferably driven by an electric motor 17, under the control of the aforementioned thermostat T^1. The vaporized or partially vaporized refrigerant is drawn into compressor 16 through conduits 20 and 18 from the left-hand end of the refrigerating coil 12, 12. Thus upon closure of the switch contacts controlled by thermostat T^1 a circuit is completed for motor 17; which circuit extends from supply line L^1 by conductor 21 through the switch contacts of thermostat T^1, by conductor 22 to one terminal 23 of motor 17, and from the other terminal 24 of said motor by conductor 25 to line L^2. The aforedescribed circuit of motor 17 will be maintained by thermostat T^1 pending restoration of the predetermined desired low temperature within compartment 11.

The main food compartment 26 of refrigerator 10 is provided with a thermostat T^2, which is preferably manually adjustable to preselect the desired range of temperature to be maintained therein. For example, thermostat T^2 may be so adjusted as to provide for closure of the switch contacts, as shown, controlled thereby, when the temperature within compartment 25 rises to 42 degrees F. or above, and to provide for return of the switch contacts to their open position when the temperature within compartment 26 is reduced to about 36 degrees F. Upon closure of the contacts controlled by thermostat T^2 a circuit is completed for effecting operation of motor 17 (if said motor is not already in operation by closure of the aforementioned contacts controlled by thermostat T^1) and an energizing circuit is simultaneously completed for the operating winding 27 of a solenoid 28.

Said motor circuit may be traced from line L^1, by conductor **29** through the movable contact of thermostat T^2 to the lower stationary contact of the latter, by conductors **31** and **22** to motor terminal **23**, and from motor terminal **24** by conductor **25** to line L^2. The energizing circuit for said winding **27** may be traced from line L^1, by conductor **29** through the movable contact of thermostat T^2 to the upper stationary contact of the latter, by conductor **30** through winding **27**, and by conductor **32** to line L^2. The winding **27** when energized is adapted to effect movement of a valve, shown diagrammatically at **19**, to open position; valve **19** being normally biased to closed position in any suitable manner, as by means of the coiled tension spring **33**. Valve **19** when thus opened affords communication, through conduits **35** and **36**, from the right-hand end of coil **12**, **12** to the inlet end of the coil or zigzag path afforded for circulation of the refrigerant through the so-called "cold-wall" **37** of the compartment **26**. Although I have shown the cold-wall cooling or refrigerating element **37** at the rear wall of compartment **26**, it is to be understood that the same may be located in another or additional walls of said compartment. After circulation through the coil provided in the cold wall **37** the refrigerant discharges through conduit **38** to conduit **18** and is drawn into the compressor **16** in the manner aforedescribed to complete the circuit of flow of the refrigerant.

Valve **19** will be maintained in open position pending a drop in the temperature in compartment **26** to the desired value, say, 36 degrees F. When said temperature has been reached thermostat T^2 will act automatically to interrupt the energizing circuit of winding **27** of solenoid **28** to permit valve **19** to be returned under the bias of spring **33** to its normally closed position. The contacts of thermostat T^2 when opened will also interrupt the last mentioned energizing circuit of motor **17**; and the latter may or may not continue in operation, depending upon whether or not the contacts of thermostat T^1 are then in closed position.

The compartment **11** is shown as having a door **39** which may be opened by operation of an unlatching handle **40**; whereas compartment **26** is provided with a correspondingly larger door **41** which may likewise be opened by operation of a second unlatching handle **40**.

As is well understood, there will normally be a quantity of moisture within the food compartment **26** which is more than enough to afford the desired degree of humidity therewithin, if such moisture were diffused in the compartment atmosphere. However, by reason of the cooling effect produced by the "cold-wall" element **37** the moisture will be gradually condensed upon element **37** and thus withdrawn from the compartment atmosphere. For example, if the thermostat T^2 is so adjusted as to provide for maintenance within compartment **26** of a temperature ranging from 36 degrees F. to 42 degrees F., it will likewise be desirable to maintain a relatively high and substantially constant degree of humidity of the compartment atmosphere; as, for instance, a humidity of ninety per cent, to prevent any substantial degree of dehydration of the articles of food, and to minimize other types of deterioration or spoilage thereof.

I have accordingly provided means which is operable automatically to maintain the degree of humidity of the atmosphere of compartment **26** at a substantially constant desired value; said means including manually adjustable means to enable definite preselection or variation of the degree of humidity to be maintained.

As aforestated, my humidity control means is adapted to utilize the well known differential value of the pressures afforded by thermally responsive elements subjected to the temperature of an ambient medium common thereto, when one of said elements is provided with a so-called dry-bulb and the other element is provided with a wet-bulb. A suitable switch (such as a snap switch of the "Micro" type) is subject to control in accordance with predetermined variations in said differential value to provide for maintenance of a substantially constant preselected degree of humidity within the food compartment **26**.

As shown somewhat schematically in Fig. 1, and in greater detail in Figs. 2, 3 and 4, the means for control of the degree of humidity within compartment **26** comprises essentially a support member **42**, which is attached in any suitable manner (not shown) to a wall of the compartment **26**. Attached to support **42** in a predetermined spaced relationship to each other are a pair of like, or substantially similar, power elements each comprising a housing or casing **43**, a flexible member or diaphragm being positioned therewithin and sealed thereto in a well known manner, as indicated in dotted lines at **44** in Fig. 1; and each diaphragm having rigidly attached thereto a pin, the oppositely projecting pointed ends **45** of which pins are biased toward each other to simultaneously engage opposite surfaces of a lever **46** which is pivotally attached to and supported by an inverted U-shaped bracket **48** rigidly attached to support **42**. The housings **43**, **43** have nipples **49**, **49** sealed thereto, and suitable lengths of tubing **50** and **51** are in turn sealed to said nipples.

As shown, all portions of the tubes **50** and **51** are located within compartment **26**, and the same are preferably provided with bulbs or equivalent portions of well known character. By way of example, I have shown the tubes **50** and **51** as provided at the outer ends thereof with spirally wound or coiled portions 50^a and 51^a. The bulb 51^a is adapted to act as the dry-bulb of my humidity control system. The bulb 50^a has associated therewith a wick, which as shown at **53** may be in the form of a suitable length of woven fibrous material enveloping said bulb. As will be apparent, the bulb 50^a covered or substantially covered by wick **53** is adapted to act as the wet-bulb of the system.

In accordance with my invention means are provided for keeping the wick **53** saturated with moisture (water). Said means is shown as comprising a metal rod **54**, at least a portion of the upper end of which is subjected to the relatively low temperature prevailing in the compartment **11**. Such relatively low temperature is, at least in part, transmitted to the lower end portion of rod **54** located within compartment **26**; said rod preferably having an enlarged or head portion **55** at its lower end. Due to the relatively lower temperature of head **55**, as compared with the temperature normally maintained within compartment **26**, a portion of the moisture or humidity of the atmosphere within compartment **26** is condensed upon head **55** and drips in a drop-by-drop manner upon wick **53** to effect saturation of the latter.

The dry-bulb portion 51^a will inherently be subjected to a relatively higher temperature than the wet-bulb portion 50^a with which wick **53** is associated. Therefore the diaphragm of the low-

er thermally responsive device in Fig. 1 will cause a preponderance of pressure to be applied to the lower surface of lever 46, to bias the latter upwardly, or in a clockwise direction. Lever 46 has attached thereto the upper end of a coiled tension spring 56; the lower end of said spring being attached to a threaded bolt 57, with which a nut 58 is associated; nut 58 being manually rotatable with respect to bolt 57 and with respect to bracket 48 (the lower connecting portion of which abuts against the upper end of nut 58), as by means of the knob 58ª to adjust the degree of tension of spring 56. By this means the effect of the differential value of the downward and upward pressures of the respective upper and lower diaphragms 44, 44 upon lever 46 may be varied at will, to correspondingly vary the percentage value of humidity within compartment 26 at which the lower diaphragm will act, against the bias of upper diaphragm 44 and spring 56, to effect such a degree of upward movement of lever 46 as will effect circuit completing operation of a switch 59; which is attached to a bracket 60, in turn attached to support 42.

It is to be understood that switch 59 is preferably of the normally closed "Micro" type. That is to say, switch 59 in inherently biased toward its circuit completing position. Thus upon a predetermined relatively small degree of upward movement of lever 46 (to permit a corresponding degree of upward movement of plunger 61) the movable contact of switch 59 will snap into circuit completing engagement with its associated stationary contact. Any other suitable form of normally closed snap switch which requires only a relatively small amount of power for operation thereof may be employed. Also it is to be understood that so long as the percentage of humidity in the air in compartment 26 is within the range preselected therefor, the lever 46 will remain in the position thereof illustrated to restrain switch 59 against movement to its normally closed position.

As shown, I prefer that the metal rod 54 shall be adjustable manually so that more or less of the upper end portion thereof shall be subjected to the temperature prevailing in compartment 11, to correspondingly vary the temperature of the head 55 when the temperature within compartments 11 and 26 are of given values relatively to each other. For this purpose the rod 54 may be threaded externally for cooperation with a threaded member or recess 62 located within compartment 11. For example, the threaded recess may be formed in the evaporator casing or housing (not shown) located within compartment 11. Thus with a given percentage of humidity (say ninety per cent) of the air within compartment 26 at a given temperature therewithin (say 36 degrees F.) the head 55 of rod 54 will be rendered colder as the threaded shank thereof is screwed further up into the compartment 11. Such lowering of the temperature of head 55 will result in an acceleration of the rate of condensation of moisture thereon from the air within compartment 26.

As aforeindicated, the percentage of humidity in the air within compartment 26 will be gradually decreased by reason of the condensation of moisture upon the aforementioned "cold-wall" 37. By reason of the increase in the rate of evaporation of moisture from the latter (because of the lower percentage of humidity in the air in compartment 26, as aforementioned), the temperature of the thermally expansible fluid in the wet-

bulb device will be substantially reduced, with a corresponding reduction in the value of the fluid pressure directed downwardly against the upper diaphragm 44; so that the upward force applied to lever 46 by the lower diaphragm 44 (dry-bulb device) will eventually predominate over the downward forces applied jointly by the wet-bulb device and spring 56 to lever 46; whereupon the lever 46 moves upwardly to an extent sufficient to permit movement of switch 59 to circuit completing position under its own inherent bias.

Upon closure of switch 59 a circuit is completed for effecting operation of an electric motor 63 which drives the fan blades 64. Said circuit may be traced from line L^1 by conductor 65 through the contacts of switch 59 (when closed), by conductor 66 through the winding of motor 63, and by conductor 67 to line L^2. Motor 63 may be mounted at a suitable angle, as shown, so that the flow of air from the fan blades 64 is directed upwardly against and along the surface of the cold-wall 37 to effect evaporation and removal of at least a portion of the moisture condensed thereon, and to effect diffusion of such moisture throughout the body of air within compartment 26. Such evaporation of the moisture condensed upon the cold-wall 37 will be effected whether such moisture is in the form of water droplets or in the form of frost.

The resulting increase in the percentage of humidity in the air in compartment 26 will be reflected by a corresponding decrease in the rate of evaporation of moisture from the wick 53, and as a consequence of said decrease in rate of evaporation the downward pressure of the upper diaphragm 44 (of the wet-bulb device) upon lever 46 will be increased without a corresponding decrease of the upward pressure of the lower diaphragm 44 (of the dry-bulb device) upon said lever; so that the bias afforded jointly by the upper (wet-bulb) diaphragm 44 and spring 56 will eventually predominate over the bias of the lower (dry-bulb) diaphragm 44 to increase the degree of pressure applied by lever 46 to plunger 61, until a given point is reached at which switch 59 will be snapped to its circuit-interrupting position, against the normal or inherent bias thereof, thus discontinuing the operation of motor 63.

As will be apparent to those skilled in the art, the humidity control means for the compartment 26 is adapted to function in the manner desired and preselected by the adjustment of nut 58 regardless of the particular settings of the thermostate T^1 and T^2; although, of course, it is to be understood that thermostat T^1 will always be set to afford a lower temperature within compartment 11 than it is desired to maintain within compartment 26 by the setting of thermostat T^2.

Although I have herein illustrated my humidity control device as combined with a known form of refrigeration control system including a freezing compartment and an ordinary refrigerating compartment, it is to be understood that the main features of my humidity control system are likewise applicable to other forms of refrigeration control, including various types of air conditioning equipment now on the market.

In Figs. 2, 3 and 4 I have illustrated certain structural details of certain elements of a humidity control system constructed in accordance with my invention. More particularly, the support is preferably formed of a single punched sheet of metal bent to provide a flat top wall portion 42. Said top wall 42 of the support has a pair of parallel side wall portions 42ª and 42ᵇ formed in-

tegrally therewith; the upper edges of portions 42a and 42b being preferably located in a common plane, as best illustrated in Fig. 3. Attached to the top wall portion 42 (Fig. 2) is a relatively smaller U-shaped sheet metal member 60, the downwardly extending parallel arms of which are designated by numerals 60a and 60b. The top wall portion 42 is provided with clearance openings and the top portion of member 60 is provided with tapped openings (Fig. 2) to accommodate the shanks of a pair of screws 68, 68 whereby member 60 is rigidly attached to portion 42. The arms 60a and 60b of member 60 are provided with alined pairs of openings to accommodate a pair of bolts 69, 69, the shanks of which penetrate suitable openings or passages extending transversely through the insulating housing or base portion of the aforementioned switch 59. As will be understood, said insulating housing of switch 59 is usually of two-part construction; but the specific construction thereof forms no part of the present invention. Nuts 69a are associated with bolts 69 (as shown in Fig. 4) to rigidly attach and position switch 59 with respect to member 60 and the top wall 42 of the support. The operating plunger 61 of switch 59 is shown depressed in Fig. 2, to provide for disengagement of its contacts.

The aforementioned sheet metal member 48 of channel-shape has its upwardly extending parallel arms 48a and 48b bent to form horizontal flange portions 48c and 48d; said flange portions having tapped openings formed therein to accommodate the shanks of a second pair of screws 70, which may be of the same form and size as screws 68, 68 aforementioned. Arms 48a and 48b are provided with a pair of alined openings 48e and 48f; the former being adapted to accommodate the full diameter (Fig. 3) of a pivot pin 71 and the latter being of smaller size to accommodate the reduced end portion 71a of said pin; said reduced end portion 71a being upset over the outer surface of arm 48b to rigidly and permanently secure pin 71 in position, as indicated at 71b in Figs. 3 and 4.

Also as shown the pivot pin 71 extends through bearing openings provided in the upwardly projecting arm portions 72a and 72b of a sheet metal member 72, whereby the latter is pivotally supported by pin 71 relatively to member 48 and the top wall portion 42 of the support member. A pin 74 (Figs. 2 and 3) is attached to and extends between the aforementioned arm portions 72a and 72b at a point to the right of, and preferably below, the plane of support of pivot pin 71 (Fig. 2). Pin 74 is adapted to be engaged by the hooked upper end of a coiled tension spring 56, the hooked lower end of which engages an eye or opening 57a formed in the upper end of a threaded stud or bolt 57, the lower end of which has clearance through an opening 48g (Fig. 2) formed in the lower or connecting portion of member 48. A specially formed nut 58 is internally threaded for cooperation with the thread on stud 57; said nut 58 being adapted to seat against the lower surface of the connecting portion of member 48, so that upon rotation of the nut in one direction or the other the stud 57 will be lowered or raised to increase or decrease the degree of tension of spring 56. Nut 58 is provided with a knob or enlargement 58a to facilitate manual adjustment thereof. Said connecting portion of member 48 is provided on diametrically opposite sides of opening 48g with at least one pair of extruded or downwardly bent portions 48h and 48i of triangular or knife-edge form in transverse cross section, and the upper end of

nut 58 is provided with four notches or slots spaced ninety degrees from each other; one of said notches being shown at 58b in Fig. 2 and another notch being shown at 58c in Fig. 3.

As will be understood, each diametrically opposed pair of notches is adapted for movement into alinement and engagement with the extruded portions 48h and 48i to prevent accidental rotation of nut 58. More particularly, the arrangement is such that nut 58 may be moved in either direction and retained in any one of four rotary positions for each complete turn of nut 58 during adjustment of the tension of spring 56. Member 72 is provided in the lower wall of its channel with an opening 72c (Fig. 2) to provide clearance for spring 56.

The channel-shaped portion of member 72 is preferably made shallower for a part of its length, as indicated by one of the two side walls shown at 72d in Fig. 2. The straight left-hand end portion of member 72 is preferably offset upwardly from the lower end wall of its channel-shaped portion, as indicated at 72e in Fig. 2, so that said right-hand end portion is normally located in a substantially horizontal plane, when plunger 61 is depressed to effect circuit interruption by switch 59, as illustrated. Also, as shown in Fig. 2, the lower end wall of the channel-shaped portion of member 72 is circularly cupped or offset upwardly, as indicated at 72f; the flat upper end wall of said offset having an opening 72g formed therein to accommodate the reduced lower end portion of a hardened steel plug member 73; said reduced portion being peripherally upset or ring-staked, as indicated at 73a, to rigidly and permanently attach member 73 to member 72. Member 73 is provided in its upper and lower ends with recesses 73b and 73c (preferably of conical form) which serve as abutments for the conical ends of pins 45, 45 respectively attached to the upper and lower diaphragms of the thermally responsive members 43.

With the parts assembled as shown in Fig. 2, and with the bulbs 50a and 51a subjected to like temperature conditions (but with wick 53 completely saturated with moisture, to provide the wet-bulb effect of the upper power element 43), the nut 58 may be manually adjusted so that the left-hand end portion of member 72 just touches the outer end of plunger 61, as illustrated. With the degree of tension of spring 56 adjusted in the manner just described the same is adapted to apply a predetermined degree of force tending to move lever 72 downwardly, to counteract the corresponding upward force applied to lever 72 by the pin 45 of the lower power element 43 (as an incident to the pressure of the liquid within the latter at a given temperature). For reasons aforedescribed, when the percentage of humidity in the air in the aforementioned compartment 26 decreases the downward presure applied by the pin 45 of the upper power element 43 will correspondingly decrease, and the pressure of the dry-bulb diaphragm will act to gradually effect upward movement of lever 72 to a degree sufficient to permit circuit-completing operation of switch 59, for the purpose aforedescribed.

As will be apparent to those skilled in the art, it may be found desirable in a given installation to either increase or decrease the degree of tension of spring 56, to correspondingly vary the humidity percentage point at which the circuit-closing operation of switch 59 is effected. Al-

though I have disclosed the use of an adjustable tension spring 56 to provide the desired initial downward bias of lever 72, it is to be understood that an adjustable coiled compression spring may be substituted therefor; such a compression spring, when employed, being interposed between the upper surface of lever 72 and an underlying portion of the aforementioned top wall portion 42 of the support member.

Although as herein illustrated I prefer to employ a pair of thermally-responsive power elements 43, 43 of substantially equal value, it may be found desirable in certain installations to employ elements of unequal power, but arranged in the manner herein illustrated.

Other changes in the structural form and arrangement of the elements of my humidity control system will at once suggest themselves to those skilled in the art.

I claim:

1. In combination, a humidostat comprising a pair of like power members each comprising a bulb, a diaphragm and a filling of thermally expansible fluid, means for fixedly supporting said members with the diaphragms thereof in opposed relationship to each other, one of said members being of the dry-bulb type and the other member being of the wet-bulb type, a pivoted lever interposed between said diaphragms, manually adjustable spring means associated with said lever to afford a preselected degree of force in opposition to the force applied to said lever by the diaphragm of said dry-bulb member, a plunger type snap switch mechanism inherently biased to its closed position and normally held by said lever in open position, said lever being so arranged in operative relationship to the normally projecting operating plunger of said switch as to effect release of said plunger to complete an electric circuit when the percentage of humidity in the air to which said humidostat is subjected falls below a value preselected by the adjustment of said spring means, a source of moisture, an electric fan the motor of which is adapted to be operated upon completion of said circuit, and said fan when operated being adapted to produce a flow of air coacting with said source of moisture to effect an increase in the percentage of humidity in said air pending attainment of a value thereof so preselected by the adjustment of said spring means.

2. In combination, a humidostat comprising a pair of like power members each comprising a bulb, a diaphragm and a filling of thermally expansible fluid, means for fixedly supporting said members with the diaphragms thereof in opposed relationship to each other, one of said members being of the dry-bulb type and the other member being of the wet-bulb type, a pivoted lever interposed between said diaphragms, manually adjustable spring means associated with said lever to afford a preselected degree of force in opposition to the force applied to said lever by the diaphragm of said dry-bulb member, a plunger type snap switch mechanism inherently biased to its closed position and normally held by said lever in open position, said lever being so arranged in operative relationship to the normally projecting operating plunger of said switch as to effect release of said plunger to complete an electric circuit when the percentage of humidity in the air to which said humidostat is subjected falls below a value preselected by the adjustment of said spring means, a source of moisture, an electric fan the motor of which is adapted to be operated upon completion of said circuit, said fan when operated being adapted to produce a flow of air coacting with said source of moisture to effect an increase in the percentage of humidity in said air pending attainment of a value thereof so preselected by the adjustment of said spring means, said wet-bulb having a wick associated therewith, and associated means operable automatically to substantially continuously supply moisture to said wick at a rate directly proportional to the instantaneous percentage of humidity in said air.

3. In combination, a humidostat comprising a pair of like power members each comprising a bulb, a diaphragm and a filling of thermally expansible fluid, means for fixedly supporting said members with the diaphragms thereof in opposed relationship to each other, one of said members being of the dry-bulb type and the other member being of the wet-bulb type, a pivoted lever interposed between said diaphragms, manually adjustable spring means associated with said lever to afford a preselected degree of force in opposition to the force applied to said lever by the diaphragm of said dry-bulb member, a plunger type snap switch mechanism inherently biased to its closed position and normally held by said lever in open position, said lever being so arranged in operative relationship to the normally projecting operating plunger of said switch as to effect release of said plunger to complete an electric circuit when the percentage of humidity in the air to which said humidostat is subjected falls below a value preselected by the adjustment of said spring means, a source of moisture, an electric fan the motor of which is adapted to be operated upon completion of said circuit, said fan when operated being adapted to produce a flow of air coacting with said source of moisture to effect an increase in the percentage of humidity in said air pending attainment of a value thereof so preselected by the adjustmnt of said spring means, said wet-bulb having a wick associated therewith, associated means operable automatically to substantially continuously supply moisture to said wick at a rate directly proportional to the instantaneous percentage of humidity in said air, said last mentioned means comprising a metal member overlying said wick, and means for maintaining said metal member at a temperature at all times substantially lower than the temperature of said air, to thereby condense a portion of the moisture in the latter and discharge the same upon said wick.

4. In combination, a humidostat comprising a pair of like power members each comprising a bulb, a diaphragm and a filling of thermally expansible fluid, means for fixedly supporting said members with the diaphragms thereof in opposed relationship to each other, one of said members being of the dry-bulb type and the other member being of the wet-bulb type, a pivoted lever interposed between said diaphragms, manually adjustable spring means associated with said lever to afford a preselected degree of force in opposition to the force applied to said lever by the diaphragm of said dry-bulb member, a plunger type snap switch mechanism inherently biased to its closed position and normally held by said lever in open position, said lever being so arranged in operative relationship to the normally projecting operating plunger of said switch as to effect release of said plunger to complete an elec-

tric circuit when the percentage of humidity in the air to which said humidostat is subjected falls below a value preselected by the adjustment of said spring means, a source of moisture, an electric fan the motor of which is adapted to be operated upon completion of said circuit, said fan when operated being adapted to produce a flow of air coacting with said source of moisture to effect an increase in the percentage of humidity in said air pending attainment of a value thereof so preselected by the adjustment of said spring means, said wet-bulb having a wick associated therewith, associated means operable automatically to substantially continuously supply moisture to said wick at a rate directly proportional to the instantaneous percentage of humidity in said air, said last mentioned means comprising a metal member having a threaded end portion adjustably insertable into an associated freezing compartment whereby said metal member may attain a temperature substantially lower than the temperature of said air, to thereby effect condensation of a portion of the moisture in the latter and discharge thereof onto said wick.

5. In a combined temperature and humidity control system, in combination, a compartment, means operable automatically to maintain at a substantially constant preselected value the temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect an increase in the percentage of humidity to said predetermined value, said last mentioned means comprising a pair of thermally responsive power units positioned in differential relationship to each other, one of said units being of the dry-bulb type and the other being of the wet-bulb type, an electric motor, a fan to be driven thereby, said fan when operating acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value, a switch adapted when closed to effect operation of said motor, operating means for said switch subject to control in accordance with the differential action of said power units, and means associated with said wet-bulb unit to modify the temperature effect upon the latter to a degree proportional to the degree of such humidity.

6. In a combined temperature and humidity control system, in combination, a compartment, means operable automatically to maintain at a substantially constant preselected value the temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect an increase in the percentage of humidity to said predetermined value, said last mentioned means comprising a pair of thermally responsive power units positioned in differential relationship to each other, one of said units being of the dry-bulb type and the other being of the wet-bulb type, an electric motor, a fan to be driven thereby, said fan when operating acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value, a switch adapted when closed to effect operation of said motor, operating means for said switch subject to control in accordance with the differential action of said power units, means associated with said wet-bulb unit to modify the temperature effect upon the latter to a degree proportional to the degree of such humidity, and manually adjustable spring means associated with said switch operating means to provide for preselection of any desired percentage of humidity within a given range to be maintained within said compartment.

7. In a combined temperature and humidity control system, in combination, a compartment, means operable automatically to maintain at a substantially constant preselected value the temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect an increase in the percentage of humidity to said predetermined value, said last mentioned means comprising a pair of thermally responsive power units positioned in differential relationship to each other, one of said units being of the dry-bulb type and the other being of the wet-bulb type, an electric motor, a fan to be driven thereby, said fan when operating acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value, a switch adapted when closed to effect operation of said motor, operating means for said switch subject to control in accordance with the differential action of said power units, means associated with said wet-bulb unit to modify the temperature effect upon the latter to a degree proportional to the degree of such humidity, and manually adjustable spring means associated with said switch operating means to provide for preselection of any desired percentage of humidity within a given range to be maintained within said compartment, said means associated with said wet-bulb unit comprising an element located within said compartment and having a temperature continuously lower than the temperature within the latter, whereby moisture is condensed from the air in said compartment and deposited upon the wet-bulb at a rate directly proportional to the percentage of humidity in the air.

8. In a combined temperature and humidity control system, in combination, a compartment, means operable automatically to maintain at a substantially constant preselected value the temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect an increase in the percentage of humidity to said predetermined value, said last mentioned means comprising a pair of thermally responsive power units positioned in differential relationship to each other, one of said units being of the dry-bulb type and the other being of the wet-bulb type, an electric motor, a fan to be driven thereby, said fan when operating acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value, a switch adapted when closed to effect operation of said motor, operating means

for said switch subject to control in accordance with the differential action of said power units, means associated with said wet-bulb unit to modify the temperature effect upon the latter to a degree proportional to the degree of such humidity, manually adjustable spring means associated with said switch operating means to provide for preselection of any desired percentage of humidity within a given range to be maintained within said compartment, said means associated with said wet-bulb unit comprising an element located within said compartment and having a temperature continuously lower than the temperature within the latter, whereby moisture is condensed from the air in said compartment and deposited upon the wet-bulb at a rate directly proportional to the percentage of humidity in the air, and means providing for adjustment of the position of said element within said compartment to correspondingly vary the temperature of said element.

9. In combination, a refrigerating compartment, means operable automatically to maintain at a substantially constant preselected value the refrigerating temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect a predetermined increase in said percentage of humidity, said last mentioned means comprising a pair of opposed thermally responsive power elements one of which is of the dry-bulb type and the other of which is of the wet-bulb type, a pivoted lever interposed between said power elements and normally operable in accordance with the differential value of the forces applied by the latter, spring means associated with said lever to counteract the major portion of said differential value, a normally closed switch mechanism normally held open by said lever and releasable by the latter for movement to closed position upon a predetermined decrease in said differential value as an incident to a corresponding decrease in said percentage of humidity, an electric fan having a motor the circuit of which is completed upon closure of said switch, and said fan when operated acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value in accordance with the counteracting force applied by said spring means.

10. In combination, a refrigerating compartment, means operable automatically to maintain at a substantially constant preselected value the refrigerating temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect a predetermined increase in said percentage of humidity, said last mentioned means comprising a pair of opposed thermally responsive power elements one of which is of the dry-bulb type and the other of which is of the wet-bulb type, a pivoted lever interposed between said power elements and normally operable in accordance with the differential value of the forces applied by the latter, adjustable spring means associated with said lever to counteract the major portion of said differential value, a normally closed switch mechanism normally held open by said lever and releasable by the latter for movement to closed position upon a predetermined decrease in said differential value as an incident to a corresponding decrease in said percentage of humidity, an electric fan having a motor the circuit of which is completed upon closure of said switch, said fan when operated acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value in accordance with the adjustment of said spring means, and means associated with said wet-bulb to substantially continuously supply to the latter an amount of moisture which is directly proportional to the instantaneous percentage of humidity in said air.

11. In combination, a refrigerating compartment, means operable automatically to maintain at a substantially constant preselected value the refrigerating temperature within said compartment, such temperature normally tending to effect condensation of the moisture in the air in said compartment whereby the percentage of humidity in said air is gradually reduced, means responsive to a decrease in the percentage of humidity in said air below a predetermined value to automatically effect a predetermined increase in said percentage of humidity, said last mentioned means comprising a pair of opposed thermally responsive power elements one of which is of the dry-bulb type and the other of which is of the wet-bulb type, a pivoted lever interposed between said power elements and normally operable in accordance with the differential value of the forces applied by the latter, adjustable spring means associated with said lever to counteract the major portion of said differential value, a normally closed switch mechanism normally held open by said lever and releasable by the latter for movement to closed position upon a predetermined decrease in said differential value as an incident to a corresponding decrease in said percentage of humidity, an electric fan having a motor the circuit of which is completed upon closure of said switch, said fan when operated acting upon said condensed moisture to effect an increase in the percentage of humidity in said air to the aforementioned predetermined value in accordance with the adjustment of said spring means, means associated with said wet bulb to substantially continuously supply to the latter an amount of moisture which is directly proportional to the instantaneous percentage of humidity in said air, said last mentioned means comprising a wick surrounding said wet-bulb, a rod upon which the humidity in said air is condensed, and means for continuously maintaining said rod at a temperature substantially lower than the temperature of said compartment

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