Aug. 11, 1953 C. J. OTTERHOLM 2,648,202

HUMIDITY REGULATING APPARATUS

Filed Jan. 20, 1951 2 Sheets-Sheet 1

FIG. 1

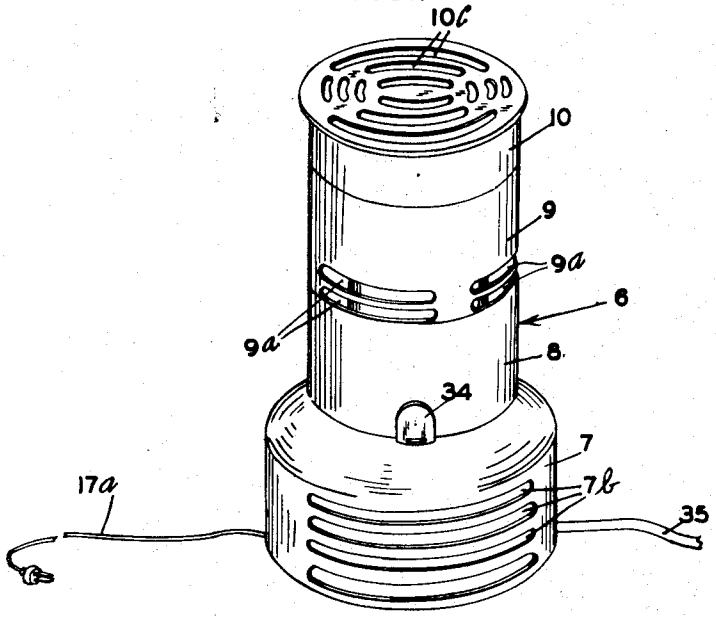


FIG. 2

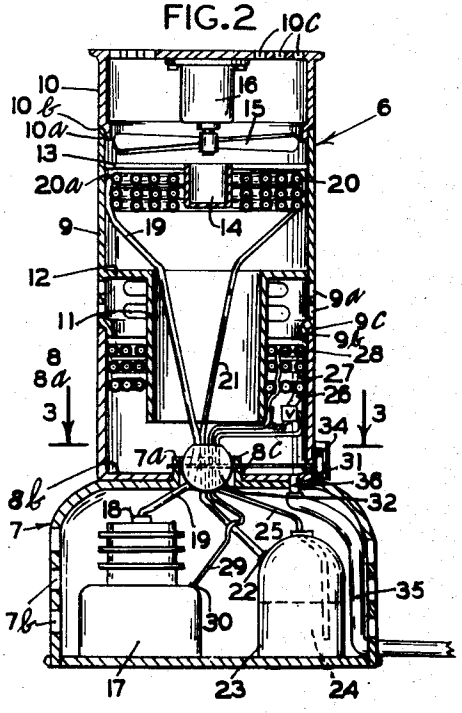
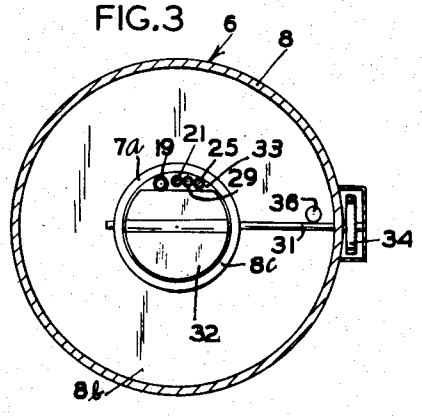


FIG. 3



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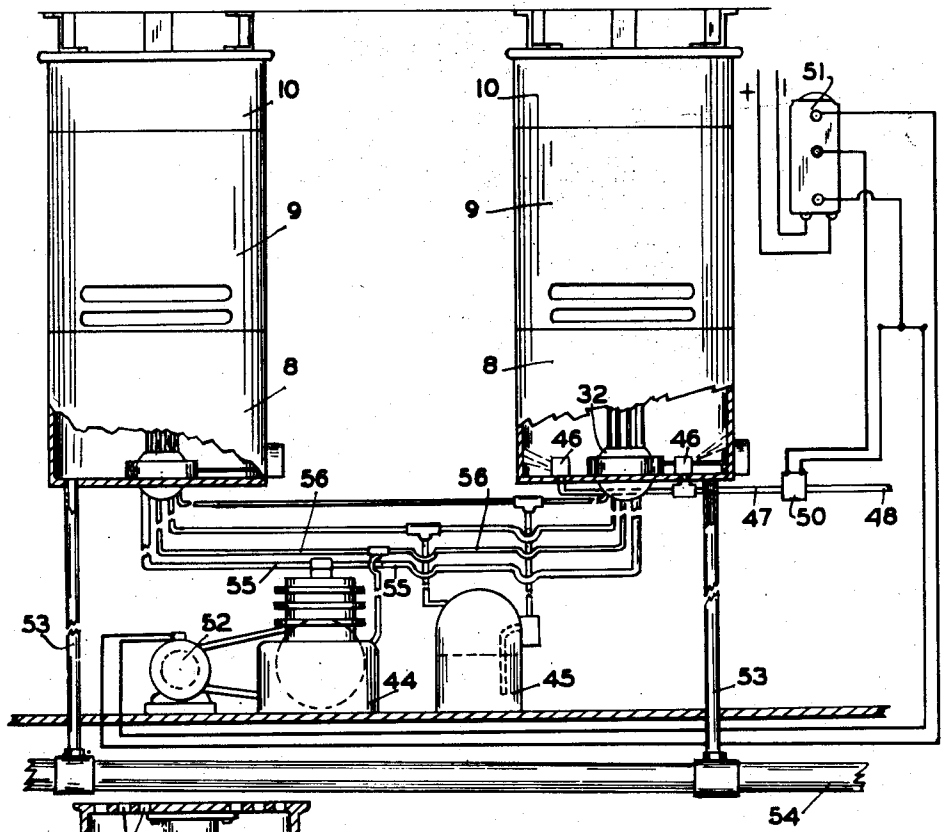


FIG.5

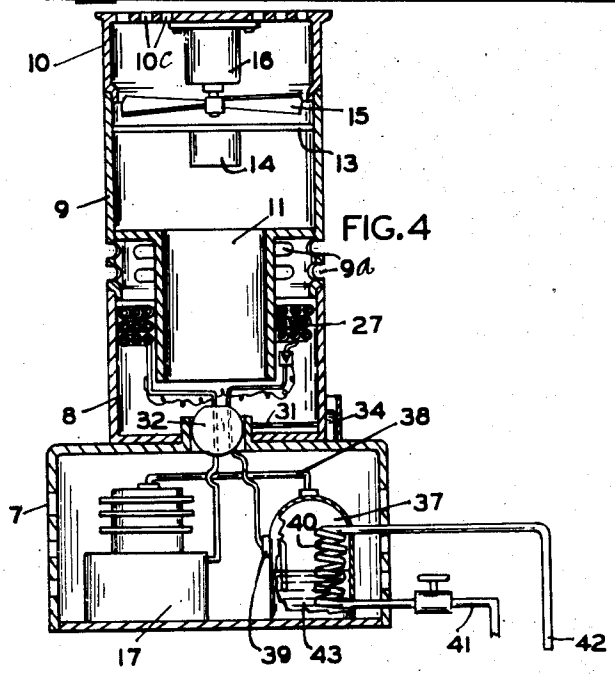


FIG.4

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Patented Aug. 11, 1953

2,648,202

UNITED STATES PATENT OFFICE

2,648,202

HUMIDITY REGULATING APPARATUS

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Application January 20, 1951, Serial No. 207,000

12 Claims. (Cl. 62—4)

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This invention relates to dehumidifying apparatus. More particularly, it relates to dehumidifying apparatus operable at maximum efficiency at all times despite varying air temperature conditions.

Dehumidifying apparatus is required today for successful commercial operation of many industries such as fur storage, photographic storage, etc. Such industries require that the air within the interior of the warehouse, storage vaults, and the like, be maintained at or below a given humidity content level. Because of the seepage which normally occurs and because of the moisture introduced within such warehouses as the result of the introduction of materials from outside the interior thereof, some means must be provided for maintaining the humidity at or below a predetermined level. The usual approach is to determine or approximate the amount of water which must be removed from the air within the given space daily in order to compensate for such seepage etc. and to provide a dehumidifying unit which will remove that amount daily. Certain industries, such as the printing industry, need a constant humidity content in the air to preclude dimensional changes in the paper being printed between successive prints on the same sheets of paper.

Dehumidifier units have previously, almost without exception, been constructed to move the same volume of air over the evaporator and condenser of the unit. Such units provide no way of changing the ratio of air passing over the condenser and evaporator. As a result, such units can operate at maximum efficiency only when temperature conditions within the room in which they are being utilized are the same as the temperature for which they were designed. For example, such a unit compels all the air which is driven across its condenser to be also drawn over its evaporator. The result is that when the temperature of the room is above that for which the unit was designed, the evaporator will be doing unnecessary work which is sensible work only. In other words, the temperature of the air will be reduced without any benefit insofar as removing moisture from the air is concerned.

It is a general object of my invention to provide novel and improved dehumidifying apparatus of cheap and simple construction and improved efficiency.

A more specific object is to provide a novel dehumidifying unit which will operate at maximum efficiency at all times despite variations in conditions.

A still more specific object is to provide novel

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dehumidifying apparatus which will automatically regulate the relative volume of air flow drawn over its evaporator and condenser to provide maximum operating efficiency under varied air temperature—moisture relations existing naturally.

Another object is to provide dehumidifying apparatus which will insure maximum cooling of its air cooled condenser at high ambient temperatures to secure practical operating condensing pressures.

Another object is to provide a novel and improved humidity regulating unit capable of automatically and indefinitely maintaining the humidity of the air at a given level.

Another object is to provide novel and improved dehumidifying apparatus which will operate to expel the heat given off by the condenser from the conditioned air space.

Another object is to provide a novel and improved dehumidifying assembly capable of use in large numbers with a single compressor and receiver.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views and in which:

Figure 1 is a perspective view of one embodiment of my invention.

Figure 2 is a vertical sectional view taken centrally through the embodiment shown in Figure 1.

Figure 3 is a horizontal sectional view taken along line 3—3 of Figure 2.

Figure 4 is a vertical sectional view of a second embodiment of my invention wherein the condensing element is cooled through the use of a liquid medium.

Figure 5 is a side elevational view showing one embodiment of my invention in a new combination with a humidifier and humidistat to provide a humidity regulating unit and also showing an arrangement whereby it is possible to operate a fleet of dehumidifiers with a single central compressor and receiver.

One embodiment of my invention may include, as shown in Figures 1–3, a generally cylindrical housing indicated generally as 6, said housing having a generally dome shaped bottom portion 7, a lower medial portion 8, an upper medial portion 9 and a top portion 10. The drum-like bottom portion has an open upstanding neck 7a and is provided with a plurality of air intake slots 7b.

As best shown in Figure 2, the lower medial portion 8 is provided with generally cylindrical

walls 8a and a bottom 8b having a centrally disposed aperture 8c therein of sufficient diameter to receive the neck 7a therein. The walls 8a of the lower medial portion are straight and the top of that portion is open.

The upper medial portion 9 of the housing 6 is a generally cylindrical member having air intake vents 9a formed therein and having an inwardly bent lower end portion 9b which provides shoulders 9c adapted to rest upon the upper edge of the lower medial portion 8. Mounted within the upper medial portion 9 is a tubular element 11 which has an outwardly extending flange 12 secured to its upper end. The flange 12 is of sufficient diameter so that its outer edges may be secured by welding or any other suitable means to the walls of the medial portion 9. Mounted within the upper part of the medial portion 9 is a support strap 13 which extends across the diameter of the housing and has secured thereto a depending hub 14.

The top portion 10 of the housing structure 6 is a cover member the lower edge 10a of which is bent inwardly to provide shoulders 10b to support the cover member on the upper edges of the medial portion 9 as best shown in Figure 2. Formed in the upper surface of the cover member 10 are a plurality of air discharge vents 10c. Suspended from the top of the cover member is a suction fan 15 activated by an electrical motor 16.

Disposed within the bottom portion 7 is an electric motor-driven compressor 17 of the conventional type found in refrigerator systems. The electric motor, not shown, of the compressor 17 is provided with electric current through the cord 17a.

The outlet 18 of this compressor is connected by a conduit 19 which extends upwardly through the neck 7a and through the tubular element 11 to connect with the inlet 20a of the condenser 20. The condenser 20, as shown in Figure 2, is in coil form, is disposed around the hub 14 and is secured to the side wall of the upper medial portion 9 or to the hub 14 in any suitable manner such as spot welding. The outlet of the condenser 20 is connected by a conduit 21 extending downwardly through the tubular element 11, through the neck 7a to the inlet 22 of a receiver 23. As shown, the receiver is disposed within the bottom portion 7 of the housing 6 adjacent the compressor 17 and the inlet 22 of the receiver is disposed adjacent the top thereof. This receiver 23 normally has a supply of refrigerant indicated as 24 contained therein.

A conduit 25 extends downwardly from the top of the receiver 23 to a point adjacent its bottom as shown in Figure 3 and is connected at the upper end with the inlet 26 of an evaporator 27. The evaporator 27 is in coil form and is connected to the side walls of the lower medial portion 8 of the housing 6 by spot welding or in some other suitable manner and, as shown in Figure 2, is disposed immediately below the air intake vents 9c and surrounds the tubular element 11. The outlet 28 of the evaporator is connected by a conduit 29 to the inlet 30 of the compressor. This conduit 29, as shown, extends downwardly through the neck 7a. An expansion valve indicated generally as V is provided to regulate the flow of refrigerant through the evaporator 27. This valve V is of the conventional type known in the standard refrigerant systems.

Mounted within the neck 7a on a pivot rod 31 is a damper 32 which is generally circular in

shape and of sufficient diameter to almost completely close the neck 7a. One side of the damper 32 is flattened as at 33 to permit the collective conduits 19, 21, 25, and 29 to pass through the neck while the damper is in closed position. This gives the damper the appearance resembling a D as best shown in Figure 3. The damper 32 is in closed position when the damper is substantially horizontal and in open position when the damper is substantially vertical. The position of the damper is controlled by a bi-metal thermal element 34 mounted on the end of the pivot rod 31 outside the housing 6. As the temperature of the air outside the housing changes, the bi-metal thermo element 34 will cause the pivot rod 31 to rotate accordingly and to, at the same time, turn the damper 32.

A drain tube 35 is connected to a nipple 36 which extends downwardly from the bottom of the lower medial portion 8 of the housing 6 to drain the water which collects in the bottom of that portion upon condensation of the same. This drain tube 35, as shown, extends outwardly beyond the bottom portion 7 of the housing.

Figure 4 shows a second embodiment of my invention wherein the housing structure is identical with that shown in Figure 2 as are the rest of the parts of the device with the exception of the compressor, the receiver and the conduit connected therewith. Accordingly, the respective parts of this device which correspond and are identical with those shown in Figure 2 have been given the same reference numerals. This embodiment, however, discloses a dehumidifier constructed to avoid returning the heat generated in the refrigerant by the compressor to the air (which in Figure 2 passes over the condenser). In the embodiment shown in Figure 4, the condenser and the receiver have been combined into a receiving chamber 37. As shown, the outlet of the compressor is connected by the conduit 38 with the inlet of the receiving chamber 37 while the outlet 39 of the receiving chamber is connected with the evaporator 27. The outlet of the evaporator is connected to the inlet of the compressor just as in Figure 2. In addition, a tubular coil 40 is mounted within the receiving chamber 37 in upright position and to one side of the receiving chamber, this coil being adapted to have a supply of cold water passing therethrough by means of conduits 41 and 42. The refrigerant indicated generally as 43 will collect in the lower portion of the receiving chamber 37.

Figure 5 shows an arrangement wherein a plurality of dehumidifying units such as disclosed in Figure 2 may be utilized in conjunction with each other and in conjunction with a single central compressor 44 and receiver 45. Thus it can be readily seen that it is possible to supply a number of such dehumidifying units with a single compressor and receiver.

The dehumidifying unit disclosed in the right hand side of Figure 5 has been modified to show a new arrangement and combination made possible through the utilization of one of the dehumidifier units shown in Figures 1–3. Adjacent the damper 32 is a plurality of spray elements 46 which are connected by a conduit 47 to a supply or source of water indicated as 48. Interposed within the conduit 47 is a solenoid valve 50 adapted to turn the supply of water on and off as desired when a current is supplied thereto or cut off therefrom. This solenoid valve 50 is governed by a three wire humidistat indicated generally as 51. This humidistat may be of the standard con-

ventional type such as Penn type Number 842. As shown, this humidistat is also connected with the compressor motor 52 to operate the same when the supply of current is supplied thereto by the humidistat 51.

The motor 52 provides power for the compressor 44. However, it is not governed by the flow of refrigerant through the evaporator as shown in Figure 2. Instead the sole control for operating the compressor 44 is contained within the humidistat 51.

The excess flow of water discharged by the sprayer 46 collects upon the bottom of the housing and is discharged through the outlet tube 53 which joins with a common discharge tube 54. In all other respects the dehumidifier corresponds with the dehumidifier shown in Figure 2 except for the fact that common conduits 55 are provided between the outlet of the compressor and the condenser and common return conduits 56 are provided to return the fluid to the compressor. The remaining connections are, as shown, the only variations being that common conduits are provided for the multiple dehumidifer unit.

In the conventional type of dehumidifier unit previously known, the number of watt hours consumed per pound of moisture removed is considerably higher than the number of watt hours consumed by my invention because such units at all times pass the same volume of air over both the condenser and the evaporator. As a result, the compressor in such units is caused to operate more frequently than should be required in order to produce the sensible work. When the temperature is high, only a relatively small volume of air needs to be passed over the evaporator in order to remove a given amount of moisture as compared to air at a relatively low temperature. For example, reference to psychrometric charts will show that air at 95° F. and 60 percent relative humidity has 150 grains of moisture per pound of air while air at 65° F. at 40% relative humidity has only approximately 36 grains of moisture per pound of air. Thus under the latter conditions over four times as much air must be circulated over the evaporator to remove a given amount of moisture from the air. My invention allows for this difference in required volumes and automatically varies the volume over the evaporator so that at all times the optimum volume will be required to pass over the evaporator.

In operation, the fan 15 is continually operated by the motor 16 to draw air either through the air vents 9a or 7b into the housing and to discharge the same through the discharge vents 10c. At least some of this air will at all times come through the air intake 9a and will pass over the evaporator 27, thence progress downwardly and pass upwardly through the tubular element 11, across the condenser 20 and thence out through the discharge outlets 10c. Some of the air which will pass through the housing may enter through the air intake 7b, passing across the compressor 17 and be drawn upwardly through the neck 7a, depending upon the position of the damper 32. If the damper is closed, of course, practically all of the air drawn through the housing by the fan 15 must pass over the evaporator. If the damper 32 is open, a relatively small volume of air will be drawn over the evaporator since a very substantial portion of the air drawn out by the fan 15 will be supplied through the neck 7a. Thus it can be readily seen that the damper 32 positively controls the volume of air passed over the evaporator 27 and the condenser 20.

The position of the damper 32 is determined by the suitably proportioned bi-metal element 34 which is sensitive to the outside air temperatures since it is disposed outside the housing 6. The higher the temperature of such air rises, the further the vent 32 will move toward full open position. The lower the temperature of the outside air, the more nearly the damper 32 will move toward horizontal or closed position. Thus it can be readily seen that at very low temperatures, substantially all of the air drawn through the housing will be drawn across the evaporator 27 as well as across the condenser whereas at high temperatures, only a small proportion of the air passing over the condenser 20 will be drawn across the evaporator 27. It should be noted that the volume of air permitted to pass over the evaporator 27 is inversely proportional approximately to the temperature of the outside air.

The refrigerating apparatus consisting of the compressor, the condenser, the receiver, the evaporator and the valve mechanism provided therefor is of the conventional standard type used in refrigerating systems. My invention lies in the combination therewith of the temperature controlled damper and its unique disposition with respect thereto. The moisture which is condensed out of the air by the evaporator 27 collects on the bottom of the lower medial portion 8 and is discharged therefrom through the drain tube 35. The amount of such moisture, of course, depends upon the temperature of the outside air, the moisture content of such air, and the extent to which it is cooled. I have found that by varying the proportions of air passed over the evaporator, I can be assured that my dehumidifying apparatus will remove a predetermined amount of moisture from the air over a given period without doing a substantial amount of work consumed in the mere cooling of a large amount of air from a high to a relatively low temperature without removing water therefrom.

When the damper 32 is in open position, the amount of air drawn across the compressor 17 is increased and likewise the amount of air passed across the condenser 20 is substantially increased. Thus the higher the temperature of the outside air, the greater the volume of air passing across these two members and a lesser volume of air will be drawn across the evaporator. Thus when the air is at high temperatures outside the housing 6, only a relatively small amount of air need be passed across the evaporator 27 to remove the predetermined amount of moisture from the air and the operation of the damper 32 by the bi-thermo element 34 automatically provides the desired condition. Likewise when the temperature of the air outside the housing 6 is reduced, the bi-metal thermo element 34 will cause the damper 32 to close and thereby compel a much larger volume of cool air to be drawn across the evaporator. As shown above, this is exactly what is desired to remove the predetermined amount of moisture.

It is a well known fact that air cooled condensers require more air at highly ambient temperatures than at lower temperatures in order to secure practical operating pressures within the condenser. It should be noted that my invention provides mechanism wherein the higher the temperature of the air, the greater the volume of such air will be forced over the condenser. In this manner the condenser is able to operate

at maximum efficiency even though the temperature of the outside air has raised. The additional volume of air passing over the condenser, of course, is the result of the damper **32** being moved to open position by the bi-metal thermo element **34**.

In addition to the above, it should be noted that while the condenser **20** is being provided with a substantial increase in volume of air passing thereover at high ambient temperatures, a corresponding larger volume of air is being drawn across the compressor because of the unique deposition of the damper **32**. It is important that more air pass over the condenser during periods when the outside air is at a relatively high temperature in order to provide adequate cooling for the compressor.

Under certain conditions it is desirable to remove humidity from the air and at the same time return to the conditioned air space the heat which is given off by the condenser. Under certain other conditions it is oftentimes considered desirable to expel such heat from the conditioned air space. The embodiment disclosed in Figures 1–3 is adapted to return the heat to the air space whereas the embodiment disclosed in Figure 4 is adapted to remove such heat and expel it from the conditioned air space. Thus it can be readily seen that with the embodiment disclosed in Figures 1–3, the heat which is given off as the result of the condensation of the refrigerant is returned to the conditioned air space to maintain the temperature of such air at a relatively high level. In the embodiment in Figure 4 such heat is absorbed by the water passing through the coil **40** and is carried away to an exterior location by the discharge tube **42**.

The performance of the dehumidifier equipped with this new by-pass damper disposed in the manner disclosed, will be exceptionally high due to the fact that little or no air will be passed over the evaporator during the operation at high ambient temperatures and due to the fact that I have provided the full volume of air required at low temperatures. Simultaneously I have also changed the volume of air passing over the condenser surface in an inverse relationship to increase the efficiency of the condenser. Thus it can be readily seen that my dehumidifier will operate at maximum efficiency over a relatively wide range of ambient temperatures and is not dependent upon a certain given temperature for which such a unit may be designed.

In industries wherein a need exists for regulated humidity, my invention may be used in combination with a humidistat and humidifier arranged as shown in Figure 5. When the humidity of the outside air drops below a predetermined level, the humidistat **51** will close the circuit which will energize the valve **50** to cause the latter to open and permit a spray of water to be discharged by the sprayer **46**. Thus moisture will be introduced positively into the air flow through the humidity regulating apparatus. When the moisture rises above the predetermined level the humidistat **51** will break the circuit which opens the valve **50** and will close the circuit which causes the motor **52** to operate the compressor **44**. As a result of the operation of the compressor **44**, the dehumidifying portion of the humidity regulating apparatus will operate to eliminate the excess moisture from the air. It is obvious that such apparatus is of high commercial value to many industries wherein it is important that the moisture content of the air be maintained at an even level.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. A dehumidifier assembly for use in conjunction with a refrigerant compressor, a condenser and a receiver having valve mechanism associated therewith for controlling the flow of refrigerant through the outlet thereof, the compressor and the receiver and the condenser each having an inlet and an outlet the outlets of the compressor and the condenser being connected with the inlets of the condenser and the receiver respectively, said assembly including an evaporator having an inlet and an outlet adapted to be connected for fluid flow with the outlet of the receiver and the inlet of the compressor respectively, means for moving air across the surfaces of said evaporator for heat-exchange purposes and through the assembly, housing structure surrounding said evaporator constructed to cause at all times at least part of the air moved through the assembly to be moved over a path other than across said evaporator, and thermostatic control mechanism sensitive to outside air temperature for controlling the volume of air moved over the heat-exchange surfaces of said evaporator to thereby increase the over-all efficiency of the unit.

2. A dehumidifier assembly for use in conjunction with a refrigerant compressor and a receiver the compressor and receiver each having an inlet and an outlet, said assembly including a refrigerant condenser having an inlet and an outlet adapted to be connected for fluid flow with the outlet of the compressor and the inlet of the receiver respectively, an evaporator having an inlet and an outlet adapted to be connected for fluid flow therebetween with the outlet of the receiver and the inlet of the compressor respectively, valve mechanism for controlling the flow of refrigerant through said evaporator, means for drawing air across the surfaces of said evaporator and said condenser for heat-exchange purposes and control mechanism sensitive to temperature of the air prior to being drawn over said evaporator, said mechanism simultaneously controlling the volume of air permitted to pass over the heat exchange surfaces of said condenser relative to the volume of air permitted to pass over the heat exchange surfaces of said evaporator to thereby increase the over-all efficiency of the unit.

3. A dehumidifier assembly for use in conjunction with a refrigerant compressor and a receiver, the compressor and receiver having an inlet and an outlet, said assembly including a refrigerant condenser having an inlet and an outlet adapted to be connected for fluid flow with the outlet of the compressor and the inlet of the receiver respectively, an evaporator having an inlet and an outlet adapted to be connected for fluid flow therebetween with the outlet of the receiver and the inlet of the compressor respectively, housing structure restricted at its medial portion and surrounding said condenser and said evaporator, means for drawing air across the surfaces of said evaporator and said condenser for heat-exchange purposes, said housing structure being constructed to insure that at least part of the air passing over said condenser passes over said evaporator, and control mechanism sensitive to temperatures

of air outside said housing solely controlling the relative volume of air passing over the heat-exchange surfaces of said condenser and said evaporator to thereby increase the over-all efficiency of the unit.

4. A dehumidifier assembly for use in conjunction with a refrigerant compressor, a condenser, and a receiver having valve mechanism associated therewith for controlling the flow of refrigerant through the outlet thereof, the compressor and the receiver each having an inlet and an outlet, the outlets of the said compressor and the condenser being connected with the inlets of the condenser and the receiver respectively, said assembly including an evaporator having an inlet and an outlet adapted to be connected for fluid flow with the outlet of the receiver and the inlet of the compressor respectively, housing structure restricted at its medial portion and surrounding said evaporator and adapted to surround the condenser as well, means for moving air across the surfaces of the condenser and said evaporator for heat-exchange purposes, said housing structure being formed to permit at all times at least part of the air passing over the condenser to be drawn over a path other than across said evaporator, and thermostatic control mechanism sensitive alone to temperature of the air outside said housing solely controlling the relative volume of air passing over the heat-exchange surfaces of the condenser and said evaporator to thereby increase the over-all efficiency of the unit.

5. A dehumidifying unit having in combination a refrigerant compressor having an inlet and an outlet, a condenser connected for fluid flow with the outlet of said compressor and having a discharge outlet, a receiver having an inlet connected to the discharge of said condenser and having an outlet, an evaporator having an inlet and an outlet connected for fluid flow with the outlet of said receiver and with the inlet of said compressor respectively, valve mechanism for controlling the rate of flow of refrigerant through said evaporator means for causing air to pass over said evaporator and said condenser, and automatic control mechanism sensitive alone to outside temperatures and solely controlling the relative volumes of air passing over the heat exchange surfaces of each of said condenser and said evaporator whereby the over-all efficiency of the unit may be substantially increased.

6. A dehumidifier assembly for use in conjunction with a refrigerant compressor, a condenser, air moving means, and a receiver having valve mechanism associated therewith for controlling the flow of refrigerant through the outlet thereof, the compressor, the receiver and the condenser each having an inlet and outlet the outlets of the compressor and the condenser being connected with the inlets of the condenser and the receiver respectively, said assembly including an evaporator having an inlet and an outlet adapted to be connected for fluid flow with the outlet of the receiver and the inlet of the compressor respectively, housing structure surrounding said evaporator and adapted to be connected with the air moving means and constructed to cause at least part of the air moved by such means through the assembly to be moved across the surfaces of said evaporator and to permit at all times at least part of the air moved by such means to be moved over a path other than across said evaporator, and thermostatic control mechanism sensitive to temperature of the air outside said housing structure for controlling the volume of air moved by such means over the heat exchange surfaces of said evaporator said mechanism being constructed to increase the volume of air passing over said evaporator as the temperature of such air lowers and to decrease the volume of air passing over said evaporator as the temperature of such air raises whereby the over-all efficiency of the entire unit may be increased.

7. A dehumidifying unit having in combination a housing having a restricted medial portion, a compressor disposed within the lower portion of said housing and having an inlet and an outlet, a liquid cooled condenser connected for fluid flow with the outlet of said compressor, an evaporator disposed in the upper portion of said housing and having an inlet and an outlet connected with the outlet of said condenser and the inlet of said compressor respectively, means for moving air out of said housing, said housing having an intake vent arranged to permit air to pass from the outside over said evaporator and having air vents arranged to permit air to pass from the outside over said compressor, and thermostatic control mechanism mounted in said restricted portion of said housing said control being sensitive to temperature of the air outside said housing and being adapted to permit air to flow freely therethrough across said compressor when the temperature of such air is high and to decrease such flow as the temperature of such air increases.

8. A dehumidifying unit having in combination a housing having a restricted medial portion, a compressor disposed within said housing beneath said restricted portion and having an inlet and an outlet, a condenser mounted within said housing in spaced relation to said restricted portion of said housing and having an inlet connected for fluid flow with the outlet of said compressor and having an outlet, a receiver having an inlet connected with the outlet of said condenser and having an outlet, an evaporator disposed within said housing between said condenser and said restricted portion and having an inlet connected with the outlet of said receiver and having its outlet connected with the inlet of said compressor said housing having intake vents formed therein and arranged to permit air to flow inwardly over said evaporator and having air intake vents formed therein to provide ready access of air to said compressor and having air discharge vents in its upper portion, means for moving air upwardly through said housing and out said discharge vents, and thermostatic control mechanism disposed within said restricted portion sensitive to temperature of the air outside said housing to permit free flow of air therethrough when the temperature of such air is relatively high and to reduce such flow substantially when the temperature of such air is relatively low whereby the relative volume of air passing over said evaporator may be regulated inversely with respect to increases and decreases in the temperature of such air.

9. In a dehumidifying system, an evaporator element adapted to be connected to and to form a part of a cooling unit, a housing medium surrounding said evaporator element and defining an air passage wherein said evaporator element is disposed, air circulating mechanism related to said housing to cause a flow of air therethrough, said housing medium having an air intake related to said evaporator element to cause at least a portion of said air flow to im-

pinge against said evaporator element, an auxiliary air-intake communicating with said housing and disposed out of the path of air traveling over said evaporator element, and control mechanism mounted within said auxiliary air intake and simultaneously controlling the amount of air flow through said auxiliary air intake and across said evaporator element.

10. In a dehumidifying system, an evaporator element adapted to be connected to and to form a part of a cooling unit, a housing medium surrounding said evaporator element, an outwardly flanged cylindrical element mounted within said housing medium and having its unflanged portion extending downwardly through said evaporator element to define an air passage between said cylindrical member and said housing wherein said evaporator element is disposed, air circulating mechanism related to said housing to cause a flow of air therethrough, said housing medium having an air intake related to said evaporator element to cause at least a portion of said air to impinge against said evaporator element, an auxiliary air intake communicating with said housing and with the interior of said cylindrical member and disposed with respect to said evaporator element and said air circulating mechanism so that said evaporator is out of the path of air travelling through said auxiliary air intake, and mechanism controlling the amount of flow through said auxiliary air intake.

11. Humidity regulating apparatus comprising a refrigerant compressor, a condenser, a receiver, said compressor and said receiver and said condenser each having an inlet and an outlet and the outlets of said compressor and said condenser being connected with the inlet of said condenser and said receiver respectively, an evaporator having an inlet and an outlet connected for fluid flow with the outlet of the receiver and the inlet of said compressor respectively and having valve mechanism associated therewith for controlling the flow of refrigerant through the outlet thereof, and housing structure restricted at its medial portion and surrounding said evaporator and having an air intake arranged to permit air to pass over said evaporator from the outside and having an auxiliary air intake formed therein out of the path of air flow over said evaporator, means for drawing air through said housing structure via said air intakes, control mechanism sensitive to temperature of air being drawn into said housing structure and mounted within said auxiliary air passage, said control mechanism simultaneously and automatically controlling the relative volumes of air passing over said evaporator and through said auxiliary air intake and being constructed to move from open position at high temperatures of the outside air to closed position at low temperatures of such air, a humidistat disposed outside said housing structure and electrically connected with said compressor to cause the latter to operate at relatively high humidities, and a humidifier disposed within said housing and connected to said humidistat to be activated thereby at relatively low humidities.

12. A dehumidifier assembly for use in conjunction with a refrigerant compressor, a condenser and a receiver having valve mechanism associated therewith for controlling the flow of refrigerant through the outlet thereof, the compressor and the receiver and the condenser each having an inlet and an outlet, the outlets of the compressor and the condenser being connected with the inlets of the condenser and the receiver respectively, said assembly including an evaporator having an inlet and an outlet adapted to be connected for fluid flow with the outlet of the receiver and the inlet of the compressor respectively, means for moving air across the surfaces of said evaporator for heat exchange purposes and across the condenser, a housing structure surrounding said evaporator constructed to cause at least a part of the air moved through the assembly to be moved over a path other than across said evaporator, and thermostatic control mechanism sensitive to outside air temperature for controlling the volume of air moved over the heat exchange surfaces of said evaporator and simultaneously decreasing the volume of air passing over said evaporator while increasing the volume of air passing over the condenser when the outside air temperature rises above normal.

CYRIL J. OTTERHOLM.

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2,438,120	Freygang	Mar. 23 1948