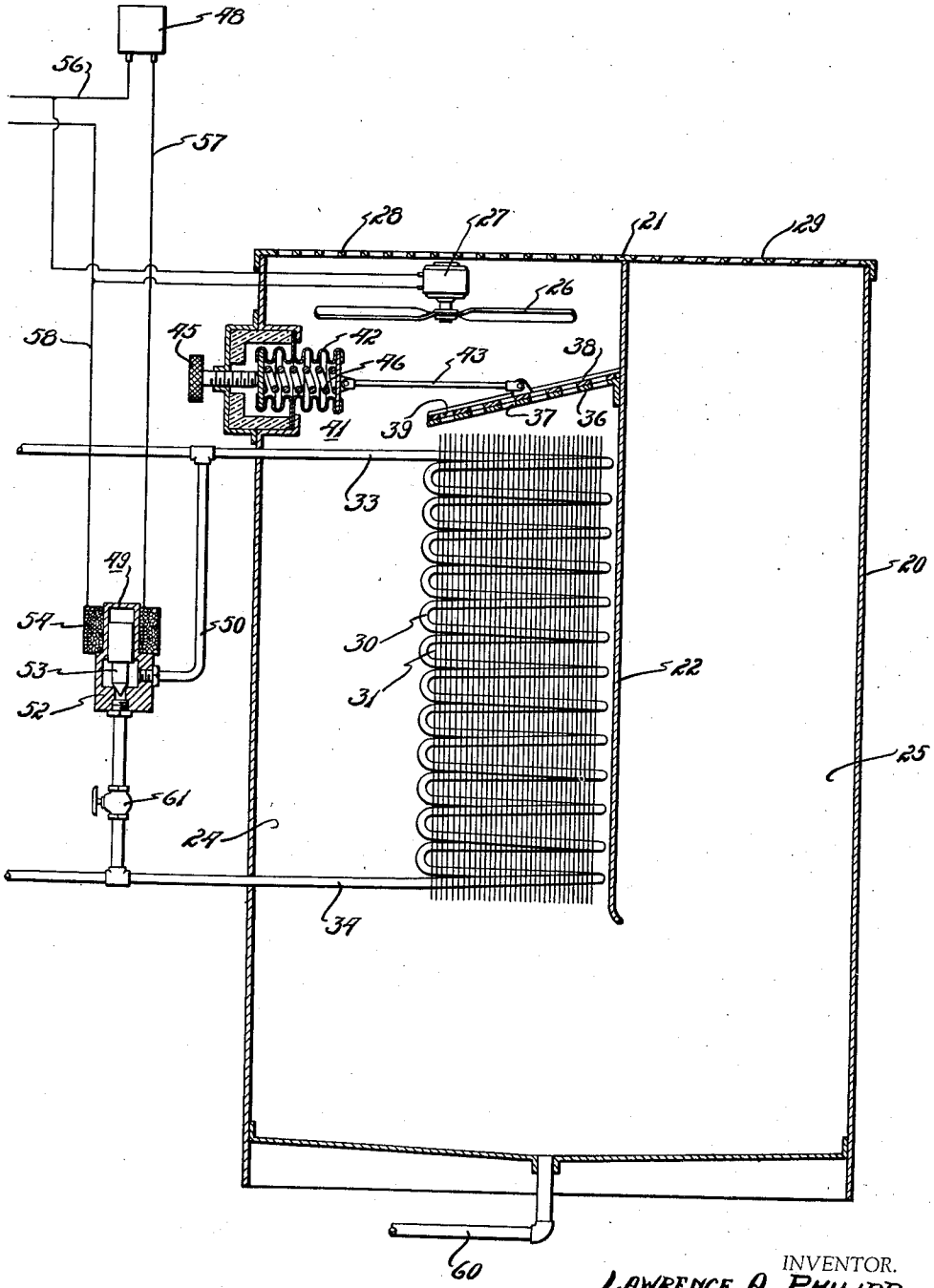
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AIR CONDITIONING SYSTEM

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AIR CONDITIONING SYSTEM

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1 Claim. (Cl. 236—44)

The present invention relates to air conditioning systems and particularly to systems for cooling and dehumidifying air.

One of the objects of the present invention is to provide an improved system for conditioning air. The improvement comprises an air conditioning system including a heat absorber about which air to be conditioned is circulated and including a temperature responsive device for controlling the air flow over the heat absorber and a humidity responsive device for controlling the flow of refrigerating medium through the heat absorber. In carrying out the above object, it is another object of the invention to vary the effective area of the heat absorber over which the air circulates in accordance with variations in temperature of the air.

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

The figure in the drawing is a diagrammatic view of an air conditioning system.

In accordance with the present system, a heat absorber is utilized for removing sensible heat and, at times, removing latent heat from the air and the system incorporates controls for maintaining the heat exchange between the air and the absorber such that the proper humidity and temperature conditions are insured. In carrying out the invention, the amount of air contacting with the absorber is controlled by the temperature of the air, i. e., when the air temperature increases above normal, the amount of air flow over the absorber is increased to again tend to reduce the temperature of the air, and vice versa. Also the humidity of the air is controlled, by a device responsive to changes in humidity condition, by increasing and decreasing the flow of refrigerating medium through the absorber.

Referring to the illustrated form of the invention, there is provided a cabinet **20** which is closed on all sides except the top **21**. A partition **22** depends from the top **21** and extends from the front to the rear of the cabinet for dividing the same into two main compartments **24** and **25**. The partition **22** stops short of the bottom of the cabinet so that air can freely flow from compartment **24** to compartment **25**. A fan **26**, driven by a motor **27**, is disposed in compartment **24** and causes air to flow first downwardly through compartment **24** and then upwardly through compartment **25**, the air entering compartment **24** between the louvers **28** and expelling between the louvers **29**.

Any suitable means may be employed for cooling the air as it passes through the cabinet and in the form illustrated a heat absorber, in the form of a water coil **30** having fins **31**, is utilized. The water coil is disposed within and to one side of compartment **24** and the fins extend in the direction of air flow. Cold water enters the coil **30** by way of pipe **33** and is carried away by pipe **34**.

Various methods and apparatus may be used for controlling the amount of air that contacts with the water coil **30**. In the present illustration, the fan is operated constantly and at a constant speed and the flow of air over the coil **30** is controlled by baffle mechanism. A stationary plate **36** having perforations **37** is attached to the front and rear walls of the cabinet and is disposed at an angle above the coil **30**. A slidable plate **38** is carried above the plate **36** and is provided with perforations **39** adapted to register with perforations **37** in plate **36**, as shown. Movement of the plate **38** to the right will cause said plate to partly or wholly obstruct the flow of air through plate **36**. In this manner the quantity of air flowing over the water coil **30** is controlled.

The amount of heat removed from the air will be governed by the amount of air flowing over and the amount of refrigerating medium flowing through the coil **30** and in order to control the amount of sensible heat removed in accordance with the need, I provide a thermostatic control **41** for the movement of plate **38**. This control **41** comprises a bellows structure **42** which is held stationary at the center thereof. The opposite ends of the bellows structure **42** are closed and one end is connected with plate **38** by a link **43** and the other end is movable longitudinally by an adjusting screw **45**. Bellows structure **42** contains a volatile fluid and is disposed in the path of the air and therefore responsive to variations in air temperature. The bellows structure **42** is shown in the position it assumes when the air is at its warmest temperature. At this time, perforations **37** and **39** are in full registry and the maximum amount of air flows over the water coil **30**. When the temperature of the air decreases, the bellows will contract and move the plate **38** to the left gradually decreasing the amount of air flowing over the cooling coil **30** in accordance with decrease in temperature of the air. When the temperature of the air increases, the bellows **42** will expand to increase the amount of air flow over the coil **30**.

Thus it will be seen that the air will be maintained at the desired temperature. The desired temperature can be regulated at will by increasing or decreasing the tension of spring 46 by the screw 45.

It is also desirable to control the relative humidity of the air and this is accomplished by controlling the flow of refrigerating medium (water) through the coil 30 in accordance with the relative humidity of the air. For this purpose I provide a humidostat 48 and an automatically operated valve 49. Valve 49 is connected in parallel with coil 30 by pipes 50 and 51. This valve includes a casing 52 containing a solenoid core 53 which functions as a valve. Core 53 is raised by a magnetic coil 54 which coil is controlled by the humidostat 48. The circuit for the coil 54 includes wire 56, humidostat 48, wire 57, coil 54 and wire 58.

When the relative humidity is too high, humidostat 48 closes valve 49 so that all of the water passes through the heat absorber coil 30 thus causing the heat absorber to decrease in temperature and the heat absorber will be decreased to such temperature so that the air is cooled to considerably below the dew point thereof thereby causing condensation of and precipitation of moisture from the air. This water will drip to the bottom of the cabinet 20 and will be drained therefrom by the drain pipe 60. It may be and it is usually desirable to permit some refrigerating medium to flow through the coil 30 when the relative humidity is proper and for this purpose I provide a restriction in the pipe system 50, 51 in the form of a restricting valve 61. Therefore, although the valve 49 is open, only a restricted amount of water flows therethrough, as governed by the valve 61, and some water consequently will flow through the coil 30. When the desired relative humidity is attained, humidostat 48 opens valve 49 to by-pass some of the water and causes less water to flow through the coil 30, sufficient for removing principally sensible heat from the air flowing thereover.

As previously stated, the motor fan 27 operates constantly, it being connected with wires 56 and 58 by wires 63 and 64.

From the foregoing, it is apparent that I have provided an air conditioning system which maintains desired temperature and humidity conditions. The temperature of the air is controlled by governing the amount of air passing over the heat absorber coil 30. This is accomplished by the thermostat 41 which is responsive to air temperature. The relative humidity of the air is maintained between predetermined high and low limits by the humidostat 48 which is placed preferably in the room in which the air is being conditioned. The humidostat opens the valve 49 after the relative humidity of the air in the room is decreased to a certain value and maintains the valve open until the relative humidity of the air increases to a higher and maximum desired relative humidity at which time it will interrupt the circuit to magnetic coil 54 to permit the core valve 53 to close on its seat. Then all of the water will be directed through the heat absorber coil 30.

Under certain conditions, it may be desirable to cause some precipitation of moisture when the valve 49 is open, and it is to be understood that when the heat absorber is referred to as functioning to remove principally sensible heat from the air when the valve 49 is open, such term is used merely to define the main functional purpose of the absorber at that time as distinguished from its main functional purpose at the time valve 49 is closed.

While the form of embodiment of the present invention as herein described constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claim which follows.

I claim:

An air conditioning system comprising in combination, a heat absorber through which a refrigerating medium flows and over which air to be conditioned is circulated, a conduit for refrigerating medium connected in parallel with the heat absorber, said conduit having a restricted passage, a valve for controlling the flow of refrigerating medium through said conduit, and means for controlling the temperature and humidity of the air while the air is being circulated at a substantially constant rate comprising a device responsive to air temperature for controlling the amount of sensible heat removed from the air by the absorber and a device responsive to the relative humidity of the air for controlling the valve.

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