

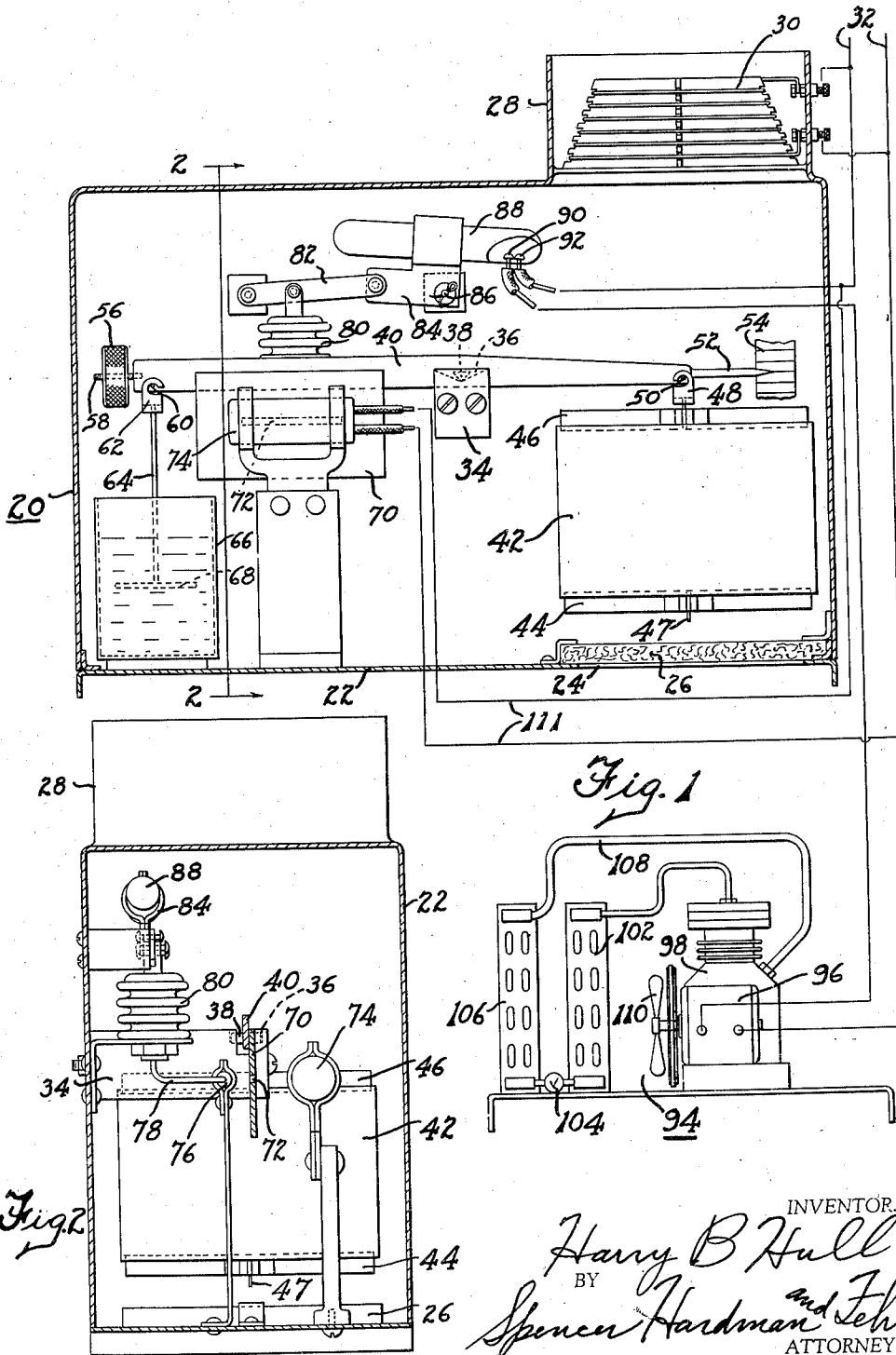
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REFRIGERATING APPARATUS

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## REFRIGERATING APPARATUS

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5 Claims. (Cl. 236-44)

This invention relates in a general way to refrigerating apparatus and more particularly to a humidity responsive control means.

It has been customary to employ the expansion and contraction of humidity sensitive elements, such as hair, wood or paper to control humidity control devices such as humidifiers and refrigerating systems. The imposition of any physical force upon such elements for controlling purposes tends to disturb the characteristics of such elements and this necessitates frequent testing and adjusting in order to assure proper operation.

It is an object of my invention to provide a humidity responsive control means in which the humidity sensitive element is not burdened by any physical force capable of disturbing its humidity sensitive characteristics.

It is another object of my invention to provide a control means in which a sensitive element is employed for controlling the flow of radiant energy which in turn controls a temperature responsive switch means.

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

In the drawing:

Fig. 1 is a vertical sectional view through one embodiment of my improved control means shown operatively connected to a refrigerant dehumidifying apparatus; and

Fig. 2 is a sectional view along the lines 2-2 of Fig. 1.

In the embodiment I have disclosed, a pivotally mounted beam is provided with an element capable of absorbing varying amounts of moisture according to the relative humidity of the surrounding air to vary the balance of the beam and the beam is provided with a shield for controlling the flow of radiant energy to a thermal responsive switch means which may be used to control any sort of a device to be controlled according to the humidity content of the immediate atmosphere.

Referring to the drawing, and more particularly to Fig. 1, there is shown a humidity responsive control device generally designated by the reference character 20 provided with a metal casing 22, the bottom of which is provided with an opening 24 covered by a filter member 26. The top of the casing is provided with a chimney 28 which contains an electric heater 30 for inducing a draft which enters the casing through

the filter protected opening 24 and leaves the casing by the chimney. The heater 30 is connected to an electrical supply circuit 32. Within the casing, there is a support member 34 provided with a pair of notches 36 which receive knife edges 38 extending from and pivotally supporting a beam 40. This beam at one end holds a hollow cylinder 42 formed of a material which absorbs varying amounts of moisture according to the relative humidity or the moisture content of the air. The material which I prefer to use is a blotting paper which has been soaked in a lithia brine. This hollow cylindrical member is supported by spiders 44 and 46 which are threaded upon a wire stem 47 which in turn is connected to the beam by a hook shaped member 48 which hooks over a pin 50. This end of the beam is also provided with pointer 52 which co-operates with the scale 54 to indicate relative humidity or moisture content of the air.

At the opposite end, the beam is provided with an adjustable balance or weight 56 which is threaded upon a shaft 58 extending from the end of the beam. This end of the beam is also provided with a pin 60 which supports a hook shaped member 62 having a rod 64 extending downwardly into a dash cup 66 filled with oil of a suitable viscosity and having a disc 68 at its lower end which tends to dampen the movements of the beam 40. The beam 40 is also provided with a shield 70 having a slot 72 therein. On one side of the shield, there is provided an electric heater 74 and upon the opposite side of the shield, there is provided a thermostatic bulb 76 provided with a volatile liquid and connected by a small tube 78 to a metal bellows 80 which through a lever 82 and a bell crank member 84 pivoted at 86 controls a sealed mercury tube type of switch member 88 containing the contacts 90 and 92 for controlling an electric circuit. When the humidity sensitive element 42 has absorbed a sufficient amount of moisture to bring slot 72 in the shield in alignment with the electric heater 74 and the thermostatic bulb 76, the thermostatic bulb 76 receives the radiant energy from the electric heater which causes the volatile liquid within the bulb to vaporize according to its rise in temperature and to provide an increased pressure within the metal bellows 80 to cause the mercury tube 88 to be tilted in a clockwise direction so as to cause the mercury to bridge the contacts 90 and 92 to close an electric circuit.

In the illustrated embodiment, the contacts 90 and 92 are connected in series with a refrigerant

dehumidifying device generally designated by the reference character 94 and provided with an electric motor 96 which drives a compressor 98 for compressing the refrigerant and for forwarding the compressed refrigerant to a condenser 102 where the compressed refrigerant is liquefied and then forwarded under the control of an automatic valve 104 to an evaporating means 106, which cools the air below its dew point and evaporates the refrigerant which is returned to the compressor through the return conduit 108. A fan 110 driven by the electric motor 96 is provided for drawing the air first through the air passages in the evaporating means 106 to reduce the temperature of the air below its dew point and to condense moisture from the air and then decrease the relative humidity of the air by drawing it through the air passages in the condenser 102 and circulating the air over the warm walls of the compressor 98.

This decreases the relative humidity of the room and this is reflected by the humidity sensitive element 42 which loses some of its moisture, thus becoming lighter and disturbs the normal balance of the beam 90 so as to permit its movement in a counter-clockwise direction to remove the slit 72 from alignment with the heater 74 and the bulb 76 to prevent the bulb 76 from being further heated. This causes a reduction of the vapor pressure within the bulb 76 and the bellows 80 which in turn causes the mercury tube 88 to be tilted in a counter-clockwise direction to cause the globule of mercury to move to the opposite end of the tube, opening the circuit between the contacts 90 and 92 to stop the operation of the refrigerant dehumidifying device. The electric heater 74 is connected to the electric circuit 32 by the conductors 111 in parallel with the chimney heater 30 and the refrigerant dehumidifying device and the switch contacts 90 and 92 so that this heater 74 as well as the heater 30 operate at all times. While in this disclosure, my improved control means have been shown as operating a dehumidifying device, it may also be used to control a humidifying device by placing contacts in the opposite end of the mercury tube to control the humidification of the air.

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

What is claimed is as follows:

1. A control means including a thermostatic bulb containing a volatile liquid, a pressure operated switch means operatively connected in a pressure operating circuit with said thermostatic bulb, an electric resistance heater for transmitting radiant invisible heat rays through air to the thermostatic bulb, a movable shield, and means responsive to a condition of a fluid for moving the shield into the path of the heat rays between the electric heater and the thermostatic bulb for controlling the operation of

the switch means according to a condition of the fluid.

2. A control means including a temperature responsive mechanical power means providing mechanical power solely by changes in temperature for controlling the operation of a device, means for supplying radiant heat to said temperature responsive means for controlling the operation of a device, and means responsive to a condition of a fluid for intercepting the transmission of radiant heat to said means responsive to radiant heat at a predetermined condition for controlling the operation of the device without affecting the amount of radiant heat emitted by the radiant heat supply means.

3. A control means including a temperature responsive mechanical power means providing mechanical power solely by changes in temperature for controlling the operation of a device, means for supplying radiant heat to said temperature responsive means, a pivoted member, means responsive to a condition for changing the center of gravity of the pivoted member to move the pivoted member, and means controlled by the movement of the pivoted member at a predetermined position for intercepting the transmission of radiant heat to said temperature responsive means for controlling the operation of the device without affecting the amount of radiant heat emitted by the radiant heat supply means.

4. A control means including a temperature responsive mechanical power means providing mechanical power solely by changes in temperature, switch means having circuit opening and circuit closing positions, said switch means being moved from one of said positions to another directly by said temperature responsive power means, means for supplying radiant heat to said temperature responsive mechanical power means, a rockable member, a shield carried by said rockable member for intercepting at a predetermined position the passage of radiant heat from said radiant heat supply means to said temperature responsive switch means, and humidity responsive means for changing the center of gravity of said rockable member at a predetermined condition to move the shield into and out of the path of the radiant heat for controlling the switch means.

5. A control means including temperature responsive mechanical power means substantially insensitive to light providing mechanical power solely by changes in temperature, switch means operated directly by the mechanical power provided by said temperature responsive means for controlling the operation of a device, means for supplying radiant heat to said temperature responsive means, and means for intercepting at a predetermined condition the transmission of radiant heat from the radiant heat supply means to said temperature responsive mechanical power means without affecting the amount of radiant heat emitted by the supply means for controlling the operation of the switch means.

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