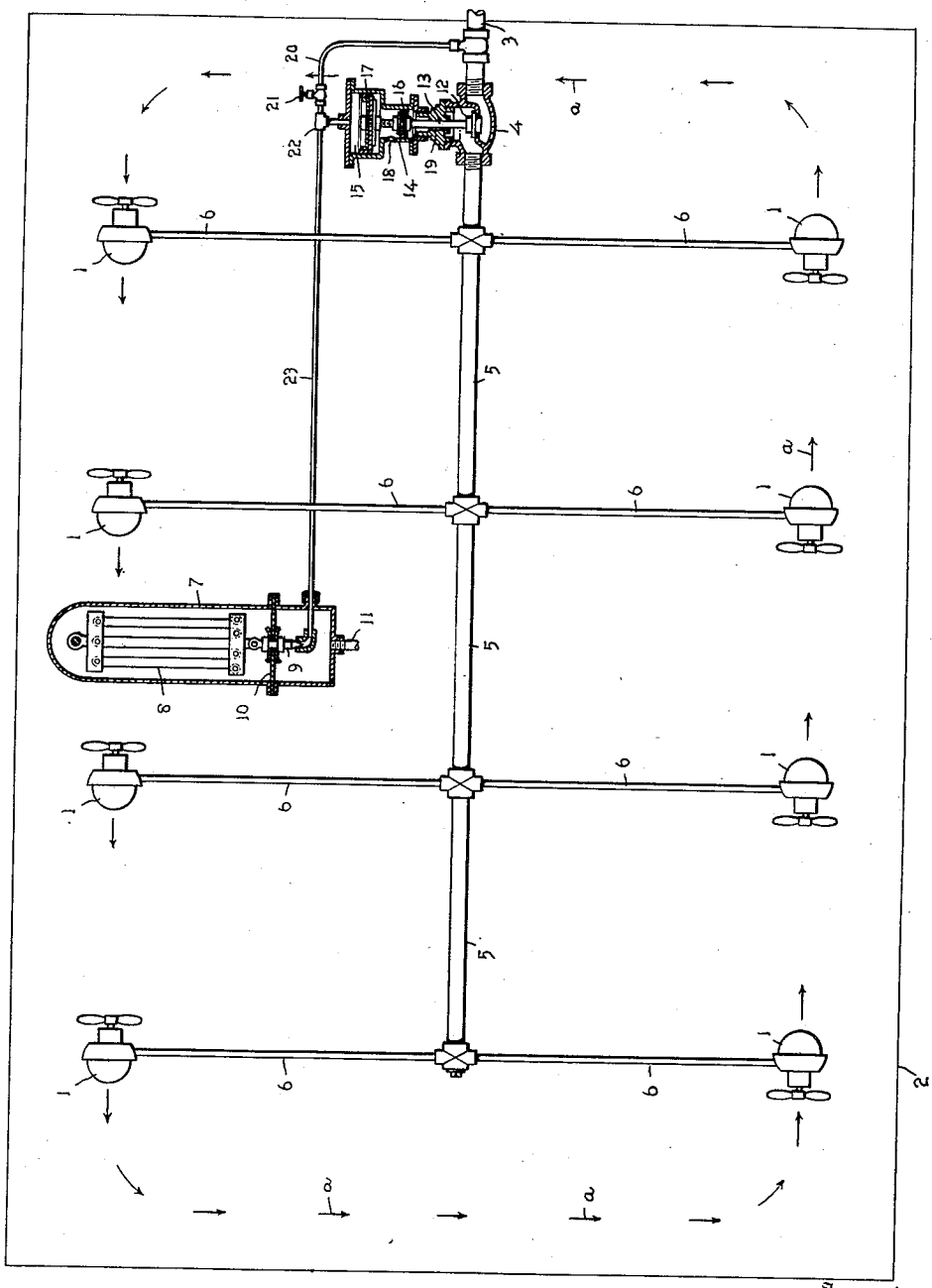
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HUMIDIFIER SYSTEM

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Inventor:

Harry M. Marsh,

By Potter, Prince & Scheffler,

Attorneys

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HUMIDIFIER SYSTEM

Harry M. Marsh, Hamilton, Ontario, Canada, assignor to The Bahnson Company, Winston-Salem, N. C., a corporation of North Carolina

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5 Claims. (Cl. 236—44)

This invention relates to humidifier systems and particularly to systems of the type in which the delivery of water to a plurality of atomizers of the rotary or the spray nozzle type is controlled by a master humidostat.

The usual types of humidity-responsive control devices are capable of developing only relatively small forces and the auxiliary electrical or mechanical devices that have been used between a humidistat and the controlled element, for example a valve in a water supply pipe, frequently reduce the sensitivity or the speed of the control operations.

An object of this invention is to provide a simple and rugged humidity control system of high sensitivity and of low time response. An object is to provide a humidifier system including a pressure-operated valve in the water line supplying one or more humidifiers, a low-capacity connection from the supply line to the pressure compartment of the valve, a bleeder line for venting the pressure compartment, and a humidostat for controlling the escape of the pressure fluid from the pressure compartment.

These and other objects of the invention will be apparent from the following specification when taken with the accompanying drawing in which the single view is a diagrammatic view of a humidifier system embodying the invention, the humidifier units being shown in plan and the control units being shown in section and on a relatively large scale.

In the drawing, the reference numerals 1 identify a plurality of humidifiers that are located at spaced points within a room, the walls of the room being indicated by the rectangle 2. The illustrated humidifiers are of the fan and water-throwing disk type, and the fans establish a circulation of the air along the closed path of the arrows *a*. The water supply is from the pressure line 3, through the control valve 4, the header 5 and the branch lines to the several humidifiers.

A humidostat 7 is located at an appropriate control point within the room for effecting an automatic control of the water supply in accordance with changes in humidity. The humidostat may be, and preferably is, of the type described in the patent to Frederic F. Bahnson, No. 1,891,133, and includes an elongated strand 8 of paper which changes in length with humidity to raise and lower a needle valve 9 with respect to its seat. The valve 9 extends through the flexible diaphragm 10 which seals off the lower end of the casing to form a waste chamber having a drain outlet 11.

The valve element 12 of the valve 4 has a stem 13 that extends into an operating cylinder that has a small diameter section 14 adjacent the valve 12 and an outer section 15 of substantially larger diameter. Pistons 16, 17 in the form of leather washers are secured to the stem 13 with the washer flanges turned from each other, and a vent opening 18 is provided through the cylinder wall at a point between the two pistons. Water from the discharge side of valve 12 may enter the small pressure chamber through a groove 19 that extends through the casing along the stem 13.

Pressure fluid is supplied to the larger chamber 15 through a small pipe 20, such as flexible copper tubing, that is connected to the water supply pipe 3. The pipe 20 is connected through the needle valve 21 to a T-fitting that has a branch communicating with the chamber 15, and another branch connected through the pipe 22 to the bleeder valve 9 of the humidostat.

The needle valve 21 is adjusted to allow only a limited flow of water through the pipe 20, the rate being so low that full pressure cannot be maintained in the chamber 15 when the valve 9 is opened by the hygroscopic strip 8. The operation of the main water valve is then controlled by the humidistat in the following manner.

When the moisture content has been at or above the desired value for some time, the strip 8 will be elongated and its bleeder valve 9 will be closed. The pressure within chamber 15 will be substantially that of the main supply line 3 and the valve 12 will be held to its seat as there will be little or no pressure in the smaller chamber 14. The strip 8 will contract as the relative humidity of the air decreases and the bleeder valve 9 will be moved from its seat at some preselected humidity value. This results in a pressure drop within the larger chamber 15, and the valve 12 starts to open due to the main line pressure on the bottom of the valve. Water enters the header 5 and flows to the humidifiers, and water also flows to the smaller pressure chamber 14 through the groove 19. The pressure within the chamber 14 and the pressure of the water flow past valve 12 act in opposition to the pressure within chamber 15 to position the valve 12 in a more or less open position that is determined by the rate of flow through the bleeder valve 9.

The control action is positive as the pressure areas of pistons 16 and 17 can be designed to develop adequate forces for moving the valve, but the design of the pressure-actuated valve does

not affect the primary control element, i. e. the humidostat. The only mechanical burden placed on the hygroscopic strip is that of displacing the valve 9 and the sensitivity of control is substantially independent of the power required for moving the main valve.

It will be apparent that the invention may be used with atomizing nozzles and other types of humidifiers, and that the construction of the control elements may be varied to meet different design requirements without departing from the spirit of my invention as set forth in the following claims.

I claim:

1. In a humidifier system, a plurality of humidifiers, a pipe system for supplying water under pressure to the humidifiers, a valve in said pipe system, said valve including a movable valve member on a stem, a piston on said stem and movable in a pressure chamber, a pipe connection between said pressure chamber and the inlet side of said pipe system for admitting water to said chamber to urge the movable valve member towards closed position, hygroscopically controlled means for venting water from said pressure chamber, and means tending to move said movable valve member towards open position; said last means comprising a second piston of relatively small diameter on said valve stem, a pressure chamber in which said smaller piston is movable, and means connecting the second pressure chamber to the pipe system at the outlet side of said valve.

2. In a humidifier system of the type including a pipe system for supplying water to a plurality of humidifiers, a valve in said pipe system, means including a pressure chamber and piston for establishing a force tending to close said valve, means for creating a force that varies with the degree of opening of the valve and tends to move the valve to open position, and means controlled by humidity for venting the pressure chamber at a rate that varies with the relative humidity.

3. In a humidifier system, the combination of a humidifier, a pipe line for supplying water to said humidifier, and a pressure-actuated valve in said pipe line, said valve including two pressure chambers and pistons of different diameters for applying forces in opposite directions to the movable member of the valve, of humidity responsive means for controlling said valve; said means comprising a connection from the pipe line at the inlet side of said valve to the pressure chamber of larger diameter, a connection from the pipe line at the outlet side of the valve to the smaller pressure chamber, a bleeder line connected to the larger pressure chamber, a bleeder valve controlling the flow of water from the bleeder line, and a hygroscopic device for actuating said bleeder valve.

4. In a humidifier system, the invention as claimed in claim 3 in combination with an adjustable valve in said first connection for limiting the flow of water to the larger of said pressure chambers.

5. In a humidifier system, the combination with a plurality of humidifiers, a pipe line for supplying water to said humidifiers, a valve in said pipe line including pressure-actuated means tending to close said valve, means responsive to the water pressure at the outlet side of said valve for creating a force tending to move said valve to open position, and means for supplying water to said pressure-actuated means from the pipe line at the inlet side of said valve, of means for bleeding water from said pressure-actuated means; said last means including a valve, and a humidostat for controlling the action of said pressure-bleeding means in accordance with the departure of the relative humidity from a predetermined value.

HARRY M. MARSH.