

No. 813,083.

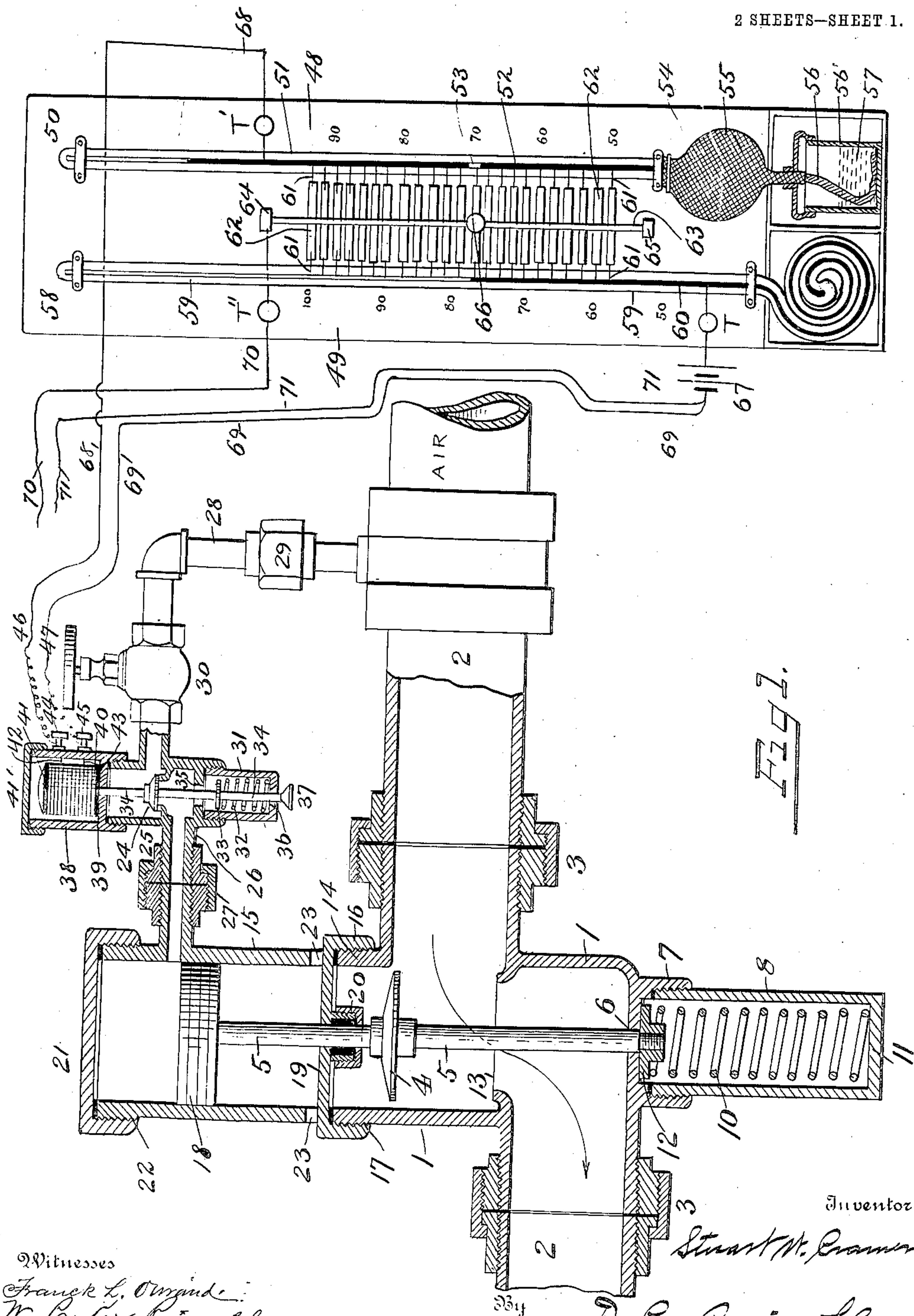
PATENTED FEB. 20, 1906.

S. W. CRAMER.

ELECTRICALLY CONTROLLED REGULATING VALVE FOR HUMIDIFYING
AND HEATING SYSTEMS.

APPLICATION FILED DEC. 29, 1904.

2 SHEETS—SHEET 1.



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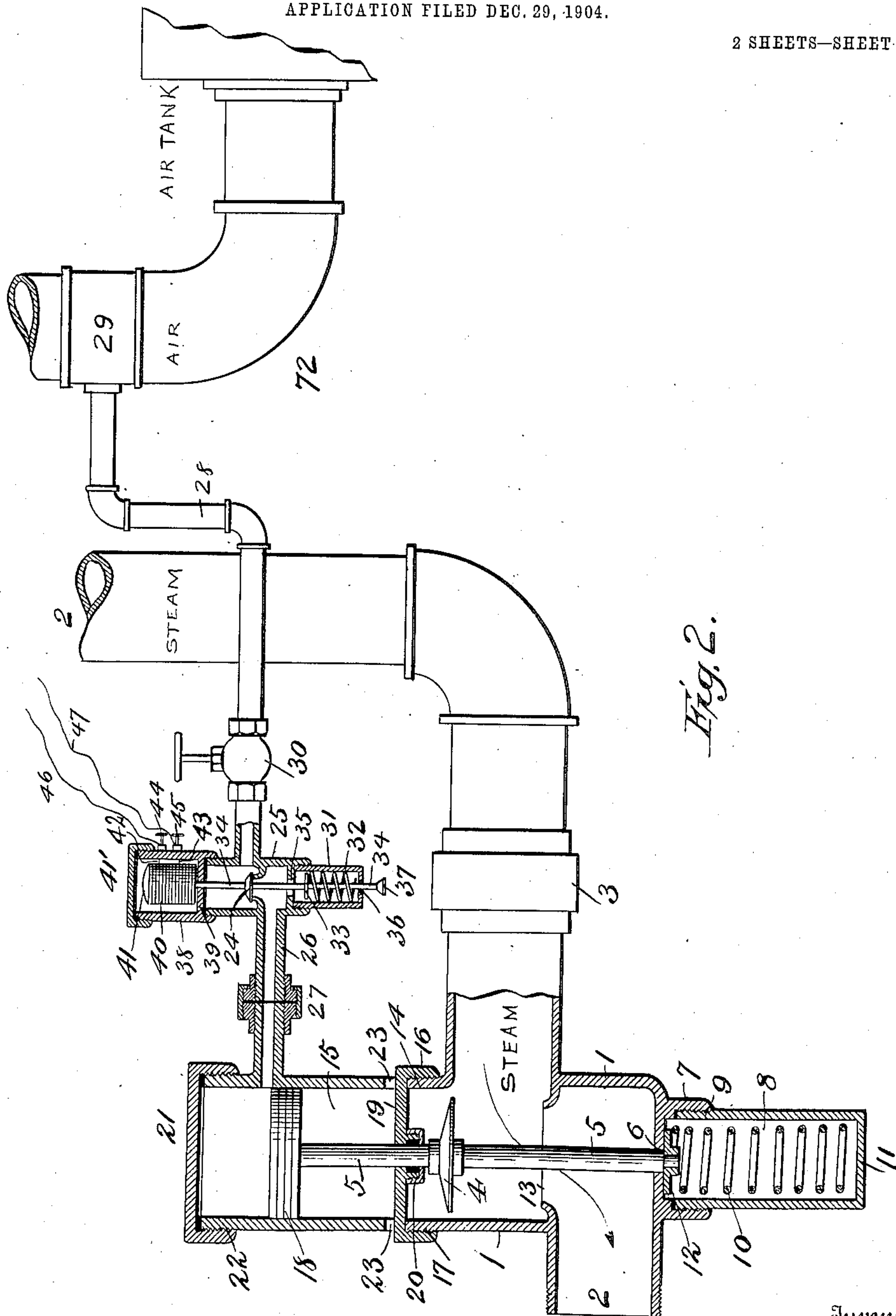
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UNITED STATES PATENT OFFICE.

STUART W. CRAMER, OF CHARLOTTE, NORTH CAROLINA.

ELECTRICALLY-CONTROLLED REGULATING-VALVE FOR HUMIDIFYING AND HEATING SYSTEMS.

No. 813,083.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed December 29, 1904. Serial No. 238,818.

To all whom it may concern:

Be it known that I, STUART W. CRAMER, a citizen of the United States, residing at Charlotte, in the county of Mecklenburg and State of North Carolina, have invented certain new and useful Improvements in Electrically-Controlled Regulating-Valves for Humidifying and Heating Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the art of moistening or attemperating and heating the atmosphere in textile or other factories or buildings, has especial reference to means for regulating the supply of fluid and liquid to the humidifying system and steam or hot water to the heating system intermittently, and automatically to maintain a predetermined degree of humidity and temperature of the atmosphere in any or all of the compartments of the factory.

The invention consists in the construction of an electrically-controlled valve operated by changes in the atmosphere, so that air and water will be supplied to the humidifiers or air-moistening devices and steam or hot water to the heating devices in the several compartments of the factory automatically as changes or variations in the atmosphere require.

The invention will be fully disclosed in the following specification and claims.

In the accompanying drawings, which form part of this specification, Figure 1 represents an air-controlling valve in vertical section, part of the service-pipe and the hygrometer and thermostat in elevation; and Fig. 2, a vertical section of a steam-controlling valve.

Reference being had to the drawings and the designating characters thereon, the numeral 1 indicates the main-valve case connected to a service-pipe 2, which may be used for conducting air under pressure to raise and atomize water for humidifiers in an air moistening or attemperating system, or it may be used for conducting steam or hot water to a heating system. The valve-case is connected to the service-pipe by suitable unions 3, is provided with a disk-valve 4, attached to a stem 5, one end of which extends through an opening 6 in the bottom of the valve-case, and from the bottom of the valve-case pro-

jects an annular boss 7, to which is secured an elongated cylinder 8 by a screw-threaded connection 9, and within the cylinder is a helically-coiled spring 10, which rests upon the bottom 11 of said cylinder and at its upper end engages a disk or plate 12 on the lower end of the valve-stem 5 to raise the valve off its seat 13 and allow the fluid in the service-pipe to pass through the valve-case.

At the upper end of the valve-case is an extension 14, to which a cylinder 15 is secured by a flange 16 and a screw-threaded connection 17, and within the cylinder 15 is a piston 18, secured to the upper end of the valve-stem 5. The valve-stem extends through the bottom 19 of the cylinder 15 and is provided with a stuffing-box 20 to prevent escape of fluid around the valve-stem, and on the upper end of the cylinder is a cap or head 21, secured by a screw-threaded connection 22 or in any other preferred manner. The cylinder 15 is provided with openings 23 to permit the air under the piston 18 to escape as the piston descends in the cylinder.

24 indicates a supplemental valve for controlling the supply of fluid to operate the valve 4 to force it to its seat 13 and cut off the supply of fluid in the service-pipe. The valve-case 25 is connected to the cylinder 15 by a pipe 26, provided with a union 27, and to the service-pipe 2 by a pipe 28 by a union 29, and is provided with a stop-cock 30 for controlling the supply of fluid from the service-pipe to the supplemental valve. The supplemental valve is almost a duplicate of the main valve in construction and is provided with a cylinder 31 at its lower end containing a spiral spring 32, engaging a collar 33 on the valve-stem 34, an opening 35 in the bottom of the valve-case, an opening 36 in the bottom of the cylinder 31, having a valve-seat on the lower side, and a valve 37 on the lower end of the valve-stem 34, which valve 37 controls the escape or discharge of the fluid above the piston 18 from the cylinder 15 as the valve 4 is raised from its seat by the spring 10 in the cylinder 8. To the upper end of the valve-case 25 is attached a cylinder 38, through the bottom 39 of which extends the valve-stem 34, and extends upward between the poles of an electromagnet 40, and secured to the upper end of the valve-stem is an armature 41, and on the upper end of the cylinder is a cover 41'. The electromagnet is supplied with an electric current

through terminals or wires 42 and 43, the binding-posts 44 and 45, and feed-wires or terminals 46 and 47, leading to a combined electrical hygrometer 48 and thermostat 49, the former being operated or controlled by changes or variations in the humidity of the atmosphere, and the latter by changes or variations in the temperature, under well-known principles or laws in physics and known in the art to which they belong.

The hygrometer (shown in Fig. 1) comprises a wet-bulb thermometer and a dry-bulb thermometer, the wet-bulb thermometer 50 having the usual graduated tube 51, provided with a column of mercury 52, in which is an insulating-float 53 of non-conducting material, which separates the column into an upper and a lower leg and will not allow the current of electricity to pass from the upper leg to the lower leg.

On the bulb 54 is a covering 55 of textile netting having an extension 56 of textile material, which extends down into a receptacle 56', containing water 57, and which water rises to the netting by capillary attraction and keeps the bulb wet.

The dry-bulb thermometer 58 is provided with a graduated tube 59, provided with a column of mercury 60, and the tubes of the two thermometers are connected by fine wires 61, which enter the adjacent sides of the tubes, extend to the bore of the tubes to come in contact with the columns of mercury, and said wires are connected by metallic bars 62 for completing an electrical circuit between the thermometers.

63 indicates a metallic bar insulated at its upper and lower ends 64 and 65, but electrically connected with the wire 70, and on said bar is a movable metallic brush 66, which engages any of the bars 62 over which it is placed to complete the electrical circuit.

67 indicates a source of electrical energy, which may be of any preferred form, such as a battery or a dynamo, and from which extends wires 69 71, connecting in circuit the thermometers and thermostat to the regulating-valve of the air-supply pipe of the humidifying system and the regulating-valve of the steam-supply pipe of the heating system by wires 68 and 70.

It is evident that when the lower end of the upper leg of the mercury in the wet-bulb thermometer is above the corresponding point at which it is in electrical connection in the dry-bulb thermometer the circuit is broken and no current can pass. On the other hand, when the mercury drops in the wet-bulb thermometer, so that the lower end of the upper leg is in contact with the corresponding point to which it is electrically connected in the dry-bulb thermometer, the circuit is made and current passes and is led off by wires 68 and 69 to the valve operating the fluid-supply to the humidifiers; also, that

this current will continue to flow until the mercury in the wet-bulb thermometer rises enough to break the circuit, which action will take place when more moisture has been imparted to the air in the room and the relative humidity brought back to its predetermined standard.

The construction of the moisture-registering instrument or electrical hygrometer is claimed in another application for a patent, filed December 28, 1904, and numbered 238,626.

In Fig. 2 I have shown the main valve applied to a service-pipe for conducting steam or hot water to a heating system (not shown) and in this application of the invention the supplemental valve is connected to a service-pipe 72, which supplies air under pressure to a humidifying system, (not shown;) but in each application of the invention the operation of the supplemental valve is the same. In the application of the regulating-valve to the air-service pipe the valve 4 controls the supply of the fluid and is operated thereby, while in its application to a steam or hot-water service-pipe the valve 4 controls the passage of steam or water in the pipe, but is operated by a fluid (air) from another service-pipe, which supplies the humidifying system.

In the application of the hygrometer to control the supply of water to the humidifiers changes in the humidity of the atmosphere cause the mercurial columns in the thermometer to make and break the electric circuit, and thereby transmit electrical current to the electromagnet of the supplemental valve (shown in Fig. 1) to operate the same, while changes in the temperature cause the thermostat to produce the same effect upon the supplemental valve (shown in Fig. 2) regulating the supply of steam or hot water to the heating system.

Having thus fully described my invention, what I claim is—

1. A fluid-service pipe, a main valve to control the fluid therein, and a supplemental valve controlling the fluid to operate the main valve; in combination with a source of electrical energy, means for indicating temperature and means for indicating humidity, each of said means being adapted to close an electric circuit, separate electrical conductors connecting said source of electrical energy with each of said means, one of said conductors including an electromagnetic device, a plurality of electrical conductors connecting said means, and each of said latter conductors uniting selected points on the indicating means.

2. A fluid-service pipe, a main valve to control the liquid therein, and a supplemental valve controlling the fluid to operate the main valve; in combination with a source of electrical energy, a dry-bulb thermometer and a wet-bulb thermometer, each of said ther-

5 mometers being adapted to close an electric circuit, separate electrical conductors connecting said source of electrical energy with each of said thermometers, one of the said conductors including an electromagnetic device, a plurality of electrical conductors connecting said thermometers, each of said latter conductors uniting selected points on the

dry-bulb thermometer with selected points on the wet-bulb thermometer.

In testimony whereof I affix my signature in presence of two witnesses.

STUART W. CRAMER.

Witnesses:

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