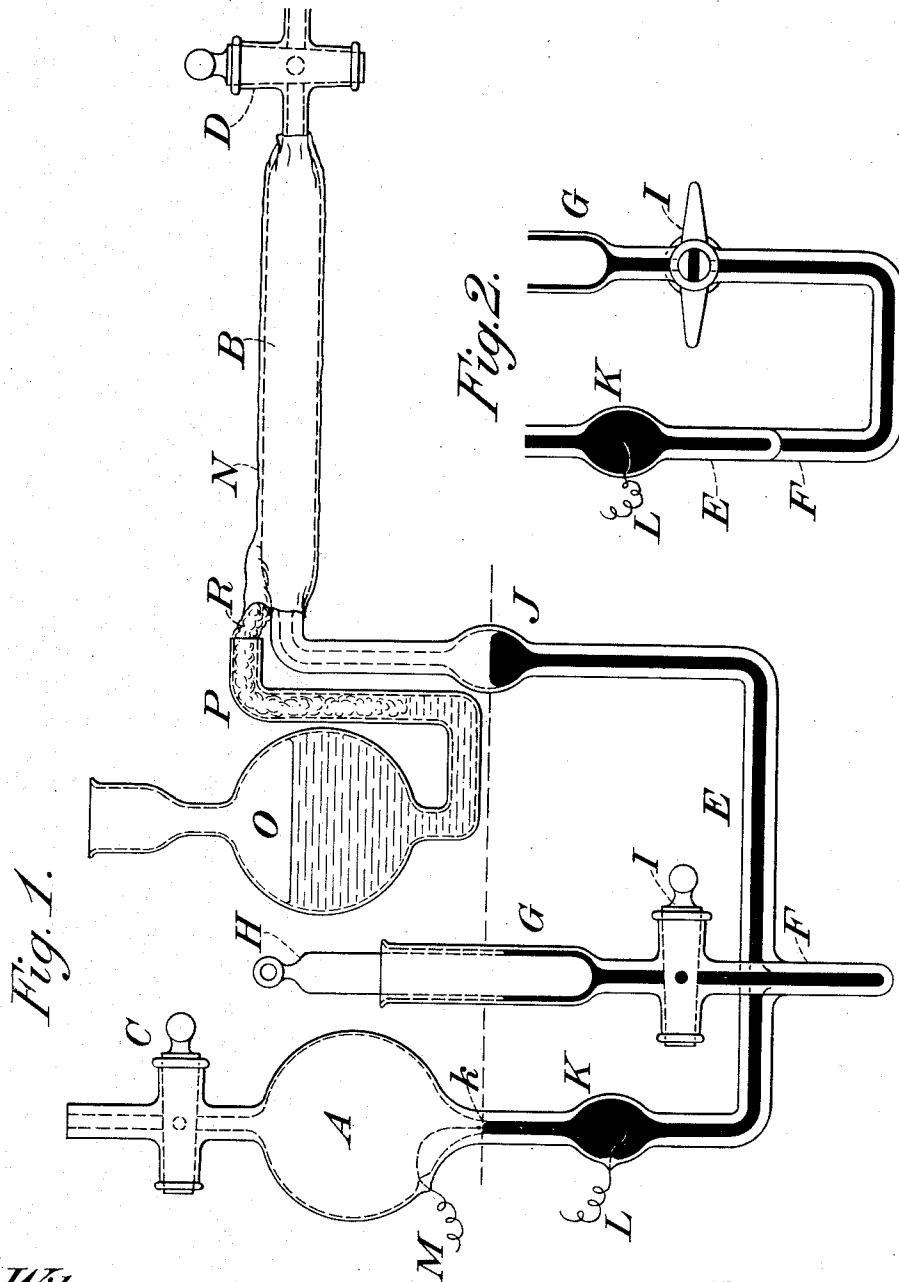


W. M. CLARK.
HUMIDOSTAT REGULATOR.
APPLICATION FILED SEPT. 12, 1912.

1,042,893.

Patented Oct. 29, 1912.



Witnesses:

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UNITED STATES PATENT OFFICE.

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HUMIDOSTAT-REGULATOR.

1,042,893.

Specification of Letters Patent.

Patented Oct. 29, 1912.

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(DEDICATED TO THE PUBLIC.)

To all whom it may concern:

Be it known that I, WILLIAM M. CLARK, a citizen of the United States, and an employee of the Department of Agriculture of the United States, residing in the city of Washington, District of Columbia, (whose post-office address is Washington, District of Columbia,) have invented a new and useful Improvement in Humidostat-Regulators.

This application is made under the act of March 3, 1883, chapter 143 (22 Stat., 625) and the invention herein described and claimed may be used by the Government of the United States or any of its officers or employees in the prosecution of work for the United States or by any person in the United States without the payment of any royalty thereon.

My invention relates to a humidostat regulator.

The object of my invention is to provide a humidostat regulator which is simple in construction and easy of operation and adapted for use in controlling the relative humidity in paper laboratories, cold storage, cheese curing rooms, etc., where moderate circulation of air is permissible and where constant humidity is necessary.

The nature, characteristic features and scope of my invention will be more readily understood from the following description, taken in connection with the accompanying drawing, forming a part hereof, wherein—

Figure 1 is a side view of my humidostat regulator, and Fig. 2 is a sectional view of the capillary tube and T-joint.

Referring to the drawing, A, represents a dry bulb, and B, a cylindrical bulb to be kept moist as hereinafter shown. Either of said bulbs may be constructed of glass or other suitable material. Bulb, B, is made cylindrical in shape in order to present a large surface. For convenience in adjustment, as well as for cleaning and filling said bulbs, a stopcock, C, is fitted at the top of bulb, A, and another stopcock, D, is fitted at the end of bulb, B.

E, designates a U-shaped capillary glass tube, partially filled with mercury, and employed for connecting bulb, A, with bulb, B. This tube is connected at its base by a T-joint, F, to a leveling bulb or cup, G, and plunger, H. The cup, G, and plunger, H, serve the purpose of adjusting the height of the mercury in the capillary tube, E. The

T-joint, F, is provided with a stopcock, I, adapted for opening or breaking communication between the capillary tube, E, and the leveling bulb, G.

J, and K, indicate bulbs formed in the integral arms of tube, E, which serve as mercury reservoirs, so that great differences in pressure between the gas in bulbs, A, and B, due to accidental overheating or tipping of the apparatus are insufficient to force the mercury into the bulbs, A, and B, thereby permitting an interchange of gas. The bulb, J, is arranged at such a point in one of the arms of the tube, E, that its widest diameter is a little above the level of the point at which the mercury stands in the other arm of said tube, E, as at *k*, in Fig. 1 of the drawing. My object in arranging the bulb, J, in this manner is to compensate the differences in pressure of the gas in the bulbs, A, and B, chiefly by a change in the height of the mercury at *k*, rather than making a marked change in the height in both arms of the capillary tube, E.

Electrical connection is made with the mercury in the tube, E, by platinum wire, L, which is sealed in said tube at bulb, K.

M represents a platinum wire sealed in said tube, A, and having its tip extending into the capillary tube at *k*. The platinum wires, L, and M, are connected with a battery and relay, and are spanned with a condenser and a by-pass of high resistance in order to eliminate sparking at the contact *k*. In order to prevent fouling of the mercury should sparking occur at said point, the bulb, A, may be filled with hydrogen or oxygen-free air.

The cylindrical bulb, B, is kept moist by a thin muslin cover, N, which receives moisture from the reservoir, O, through the pipe, P, by means of the cotton wick, R, which is secured to said muslin cover, and enters said pipe, P.

In practising my invention, I place the apparatus in a moving current of air the humidity of which it is desired to control. When so arranged, evaporation takes place on the moist bulb, B, producing a cooling of the inclosed gas. As a result the pressure is diminished, and by the excess of pressure in the bulb, A, the mercury is forced away from the platinum contact at *k*. The cooling of the bulb, B, will be inversely proportional to the humidity of the air. When the air is

at the proper humidity the mercury is brought into contact with the platinum wire at *k*, by adjusting the height of mercury by the leveling device consisting of cup, G, and plunger, H. Any diminution of the humidity of the air will then cause further cooling of the gas within the bulb, B, and a consequent diminution of the pressure which breaks the contact at *k*. The electrical circuit having been broken at *k*, the relay may be released in such a way that it will actuate a steam or water spray or heating unit for raising the vapor tension of a body of water, by any one of which means the humidity of the air may be increased. As the humidity increases, the evaporation on bulb, B, diminishes, thereby lessening the cooling process. The pressure within said bulb, B, regains its former value and contact is made at *k*. After the operation the electric circuit is then closed at *k*, the relay is actuated, and by suitable appliances the source of moisture is shut off.

If the air whose humidity it is desired to control is not to be kept at constant temperature and it is desired to maintain a constant relative humidity, the volumes of bulbs, A, and B, may be suitably adjusted so that this relative humidity may be controlled. For example, suppose a relative humidity of 60 is to be maintained while the temperature varies between 64° and 75° Fahrenheit. When the dry bulb is at 64° the wet bulb, if the humidity is 60, will be at 56°. While if the dry bulb is at 75°, the wet bulb will be at 65.5°. The increase in the temperature dry bulb is 11° while that of the wet bulb is only 9.5°. If then it is desired to maintain a relative humidity of 60 within this range of temperature, the relative volumes of the dry and wet bulbs must be as 9.5 is to 11. At the same time there is a variation in the volume of the mercury due to the variation in the temperature of the surrounding air. If, however, the volumes of the two bodies of gas are large in proportion to the volume of mercury the expansion or contraction of the mercury is of insignificant importance.

In order to prevent sticking of the mercury, the capillary tube, E, is made of fairly large bore, preferably two millimeters to three millimeters. In placing the apparatus in operation an electrical tapper may be further provided for insuring a free movement of the mercury, or the whole apparatus may

be fastened where it will receive a slight vibration for accomplishing such purpose.

Having thus described my invention I claim:

1. In a humidostat regulator, comprising a dry bulb and a cylindrical bulb incased in muslin, said bulbs provided with stopcocks, a U-shaped capillary tube containing mercury, said tube connecting and supporting said bulbs, a T-joint having connection with said capillary tube at its base, said T-joint supporting a cup and plunger for adjusting the height of the mercury in said tube, said T-joint provided with a stopcock for intercepting communication between the capillary tube and said cup and plunger, a reservoir containing water and having an integral pipe, a cotton wick secured to said muslin cover and entering said pipe, said cotton wick absorbing moisture therefrom and transmitting such moisture to said muslin cover for cooling said cylindrical tube, substantially as specified.

2. In a humidostat regulator comprising a dry bulb, a cylindrical bulb incased in muslin and a capillary tube containing mercury, said bulbs provided with stopcocks and said tube having dual integral upwardly extending arms, said arms having connection with said bulbs, thereby affording means of communication from one to the other, a T-joint having connection with said tube at its base and supporting a cup and plunger for adjusting the rise of the mercury in said tube, said T-joint provided with a stopcock for intercepting communication between said cup and plunger and said tube, a reservoir containing water and having an integral pipe, a cotton wick secured to said muslin cover and entering said pipe and absorbing moisture therefrom, said wick transmitting moisture to said muslin cover for wetting said cylindrical tube, bulbs formed in said arms for holding mercury, and platinum wires sealed in one of said arms as a means for forming electrical connection with the mercury in said tube, substantially as specified.

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

WILLIAM M. CLARK.

Witnesses:

HARRY GODING,
CHARLES W. BOYLE.