W. G. R. BRAEMER.

APPARATUS FOR PURIFYING AND HUMIDIFYING AIR.

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899,289. Patented Sept. 22, 1908.

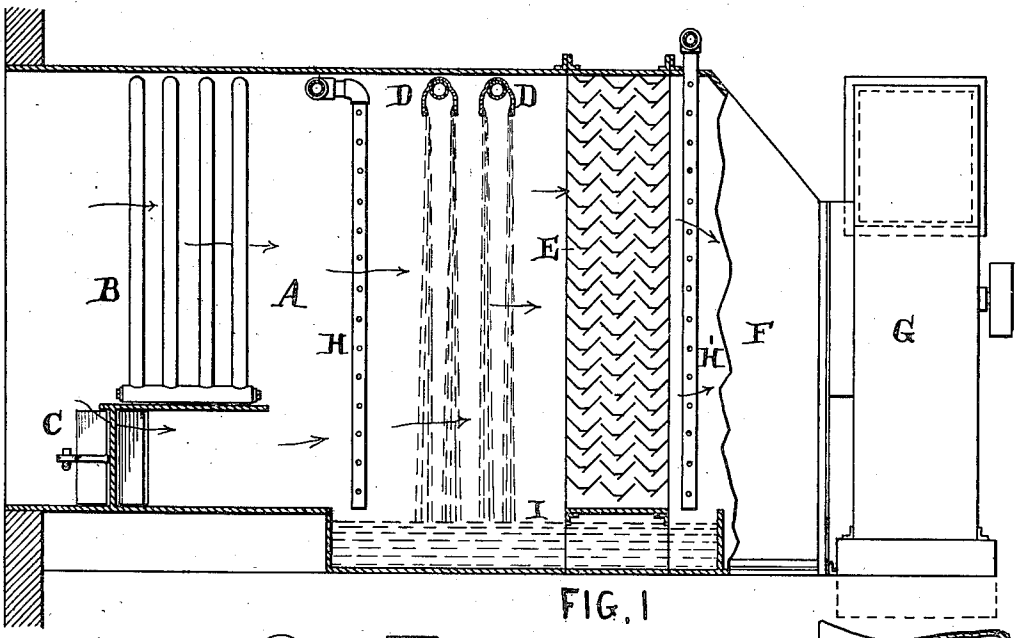
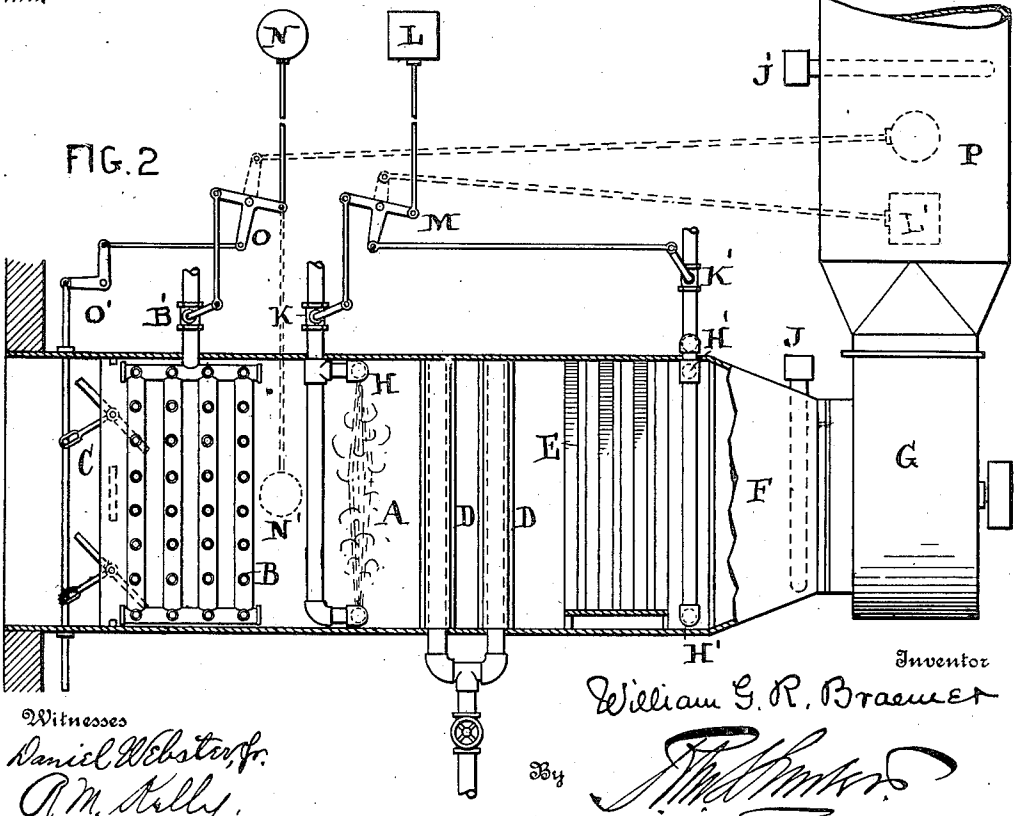


FIG. 1

FIG. 2



Witnesses

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By

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APPARATUS FOR PURIFYING AND HUMIDIFYING AIR.

No. 899,289. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed October 15, 1907. Serial No. 397,550.

To all whom it may concern:

Be it known that I, WILLIAM G. R. BRAEMER, of the city of Buffalo, county of Erie, and State of New York, have invented an Improvement in Apparatus for Purifying and Humidifying Air, of which the following is a specification.

My invention has reference to apparatus for purifying and humidifying air, and consists of certain improvements which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to automatically regulate the humidity of the air supply to the building or rooms therein irrespective of the variations in the external atmospheric conditions, whereby the air at a proper temperature and humidity may be supplied in quantity where desired and unaffected by the variations in the atmosphere outside of the building.

More specifically, my object is to provide means for imparting a definite amount of humidity to air being supplied to a building to give to it an absolute or fixed humidity while varying the relative humidity and temperature of said air when passing into the building from the humidifying apparatus, the change in relative humidity being secured by varying the temperature of the air after it has been brought to an absolute or fixed humidity, so that a definite amount of moisture is conveyed into the building with a given volume of air, irrespective of the variations in temperature of the air within the building.

My invention consists in providing a washer and eliminator with means for subjecting the air to aqueous vapor prior to its passing through the eliminator, or after having passed through the eliminator, as preferred, and independent of the washer or the temperature of the water thereof, which latter may be maintained constant at a definite high temperature, and regulating the admission of the aqueous vapor to vary the humidity of the air controlled by a suitable humidiostat or other automatic device under the action of the air in the building or room or in the flues through which it passes to reach its point of distribution. The hot water of the washer is given a temperature to be determined by test, and adapted to give slightly less absolute humidity to the air than required at the highest temperature of the air leaving the heating apparatus, the additional humidity required being provided by steam or aqueous vapor jets above mentioned.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:—

Figure 1 is a sectional side elevation of an apparatus for purifying and humidifying air; and Fig. 2 is a sectional plan view of the same.

A is the casing of the apparatus, and adjacent to its inlet side, it is provided with tempering steam coils B, by which the incoming air may be heated to the desired preliminary degree. Immediately below the tempering coils are the usual by-pass dampers C which permit more or less of the fresh air to pass into the humidifying apparatus without being heated by the tempering coils B. In this manner, the mixture of the incoming air may be heated to substantially the desired degree before being subjected to the humidifying treatment. The tempered air is purified and humidified by being made to pass through one or more sheets of hot falling water from the spraying pipes D D, the sheets of hot falling water being indicated in dotted lines in Fig. 1. The humidified air then passes through the eliminator E which removes the excess of moisture, and thence passes through the chamber F to the blower G, from whence it is driven through a flue P into the room or compartment in which it is to be utilized. The temperature of the water from the spraying pipes D D imparts to the air a less humidity than required at the highest temperature of the air leaving the heating apparatus for delivery into the room, and the additional amount of humidity which is required to make the predetermined absolute or fixed humidity to the air is supplied by means of the steam jets H H or H′ H′ or both combined. Ordinarily, one set of such jet pipes will suffice. The pipes H H are shown as located in the casing A between the tempering coils B and the spraying pipes D, so that they impart to the incoming air not only a degree of humidity but also some increase in temperature, and in that way the air after passing through the steam jets and the sheets of hot falling water from the spraying pipes is brought to the requisite absolute humidity, and then passes through the eliminator to

have the excess of moisture removed. When the air is thus purified and brought to the requisite degree of absolute humidity, it is subjected, on its way to the room where it is to be utilized, to the action of heaters in case the temperature is required to be considerably raised, especially where the air is to be conveyed over a long distance before reaching the room, and in which case it would have to be raised considerably in temperature because of the drop in temperature in transit. This increase in temperature to the humidified air may be produced by means of a steam heater J; J', the former operating upon the humidified air before passing into the blower G and the latter operating upon it after it leaves the blower. Either or both of these heaters may be employed as desired. Moreover, the means for heating the air to raise its temperature and also its relative humidity, while maintaining its fixed or absolute humidity, may be of the ordinary construction, similar to the tempering coils B with the by-pass controlling devices C, whereby the amount of heat imparted to the air may be easily regulated without varying the steam in the steam coils.

In case there is any variation in the humidity imparted to the air such as to produce a variation in the relative humidity of the heated air in the room when said air is supplied at a fixed temperature, then the amount of humidity imparted to the air in the purifying apparatus is regulated by controlling the action of the steam jets H H', and this is accomplished by the valves K K' which are automatically operated by means of a humidiostat or other automatic regulating apparatus L arranged in the room, in which the air is delivered, or arranged in the pipe B, as indicated in dotted lines at L'. By means of this humidiostat, the lowering of the relative humidity in the room, while the temperature remains fixed, will cause it to operate through the connections M, so as to open the valves K K', or either of them, to a greater extent and permit more steam to pass from the steam jets for the purpose of increasing the humidity in the air prior to its reaching the blower G. Should the humidity in the room increase above that required, then the reverse operation takes place with a reduction of the steam jets and a lowering of the humidity imparted to the air before reaching the blower.

The tempering coils B and the by-pass dampers C are preferably regulated automatically by means of a thermostat N, which may be arranged in the room to be heated or which may be arranged in the casing A, as indicated at N', so as to maintain the incoming air mixture at a fixed temperature. It is, in most cases, preferable that the thermostat shall be in the casing A, and such thermostat will operate through the devices O to regulate the steam valve B' of the tempering coils B and the devices O' to regulate the by-pass dampers C. Where the by-pass dampers C are employed, it is not essential to use the steam regulating valve B' because the variation in temperature may be controlled within reasonable limits by the dampers C, which are more rapid in inducing changes of temperature.

The water from the perforated pipes D falls in sheets of spray or like rain down into the tank I at the bottom, and the collected water taken from the air by the eliminator E is also delivered to this tank. The temperature of the water from the pipes D is maintained practically constant in any suitable manner, and this temperature is predetermined after deciding upon the maximum temperature which is required to be given to the humidified air delivered to the room and should be such as to impart slightly less than the required humidity for the air. Of course, it is evident that this fixed relative humidity which would be given by the hot water from the pipes D might be considerably below that which is required, reliance being placed upon the steam jets H H' to make up the deficiency in humidity to secure the proper absolute humidity in the purifying apparatus and the proper relative humidity in the room to be heated. I therefore do not restrict myself to any fixed amount of humidity to be given by the pipes D and hot water therefrom, except that it shall be less than the maximum humidity required. It is also evident that while the spraying pipes H H' are designed for producing jets of steam, they may nevertheless be employed to produce the jets of intensely hot water, which water might be held under considerable pressure, so that the water spray would burst into steam when projected into the casing A. The eliminator may be made in any suitable manner, that shown being similar to the structure set out in my application, Serial No. 392,251, filed September 11, 1907, but I do not restrict myself to any particular construction of eliminator, as this part of the device may be made in any convenient manner.

The essential feature of my invention is in the combination of the means which impart less than the maximum humidity required with supplementing independent devices for supplying, under regulation, the additional amount of humidity required to produce the absolute humidity necessary to secure the relative humidity required at the predetermined temperature of the room.

In the operation of this apparatus, it will be observed that, assuming the air to be used at a certain temperature and relative humidity, it becomes necessary to impart to the air an absolute humidity and temperature such, that when the air is raised to the final temperature for use, the moisture due

to the absolute humidity will, with the rarefied air impart a relatively lower and constant relative humidity as compared with the relative humidity of the air before passing to the blower, and its humidity and temperature under these conditions will be that which is required for the building or room.

No claim is made in this application to the method of producing air of practically constant relative humidity herein described, as the same is reserved for a separate application.

While I prefer the construction shown as being excellently adapted for the purposes of my invention, the details thereof may be modified without departing from the spirit of the invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, and means for supplying to the current of air a hot aqueous vapor to raise the humidity of the air to the absolute humidity required.

2. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying to the current of air a hot aqueous vapor to raise the humidity of the air to the absolute humidity required, and means automatically controlled by the condition of the air delivered from the apparatus to vary the amount of aqueous vapor supplied to the air, whereby the absolute humidity thereof may be maintained constant.

3. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air before it is treated to the thin body of hot water to raise the humidity of the air to the absolute humidity required, and means to regulate the admission of the aqueous vapor to maintain the absolute humidity of the air practically constant.

4. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air to raise the humidity of the air to the absolute humidity required, and means to impart preliminary heat to the air before being treated to the aqueous vapor and thin body of water.

5. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air to raise the humidity of the air to the absolute humidity required, means to impart preliminary heat to the air before being treated to the aqueous vapor and thin body of water, and automatic devices for controlling the means for imparting preliminary heat to maintain the preliminary temperature of the air practically constant.

6. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air to raise the humidity of the air to the absolute humidity required, and means acting upon the humidified air to lower its relative humidity and increase its temperature.

7. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air to raise the humidity of the air to the absolute humidity required, the said aqueous vapor being delivered to the air both before and after being treated to the thin body of hot water, and means for regulating the aqueous vapor to maintain a practically constant absolute humidity.

8. In an air purifying and humidifying apparatus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air to raise the humidity of the air to the absolute humidity required, means for varying the supply of aqueous vapor to change the degree of humidification of the air, and a humidiostat operating under the influence of the humidified air to control the said means for varying the supply of aqueous vapor.

9. In an air purifying and humidifying ap-

paratus, the combination of means for producing a current of air, means for supplying a thin body of hot water of substantially constant temperature through which the air passes, an eliminator for removing the excess of water from the air, means for supplying a hot aqueous vapor to the current of air to raise the humidity of the air to the absolute humidity required, means to impart preliminary heat to the air before being treated to the aqueous vapor and thin body of water, and a thermostat arranged in the path of the current of air to be treated for controlling the means for imparting the preliminary heat whereby the preliminary temperature of the air is made practically constant.

10. In an air humidifying apparatus, the combination of means for producing a current of air, means for providing a hot aqueous body of practically constant temperature in the path of the current of air, and automatic means for providing a variable body of hot aqueous vapor also in the path of the current of air to supply to the air the additional humidity to that obtained from the aqueous body of constant temperature to impart a practically constant absolute humidity.

In testimony of which invention, I have hereunto set my hand.

WM. G. R. BRAEMER.

Witnesses:

R. M. KELLY,

M. F. DRISCOLL.