No. 670,237. Patented Mar. 19, 1901.

P. KESTNER.

MEANS FOR HUMIDIFYING THE AIR OF ROOMS.

(Application filed Sept. 4, 1900.)

(No Model.)

Fig. 2

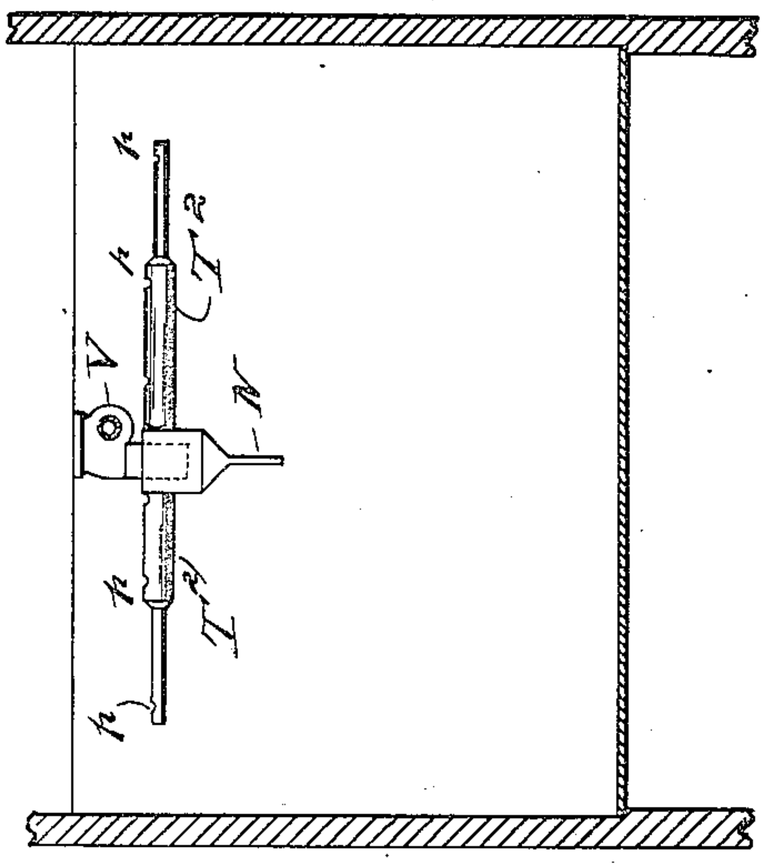
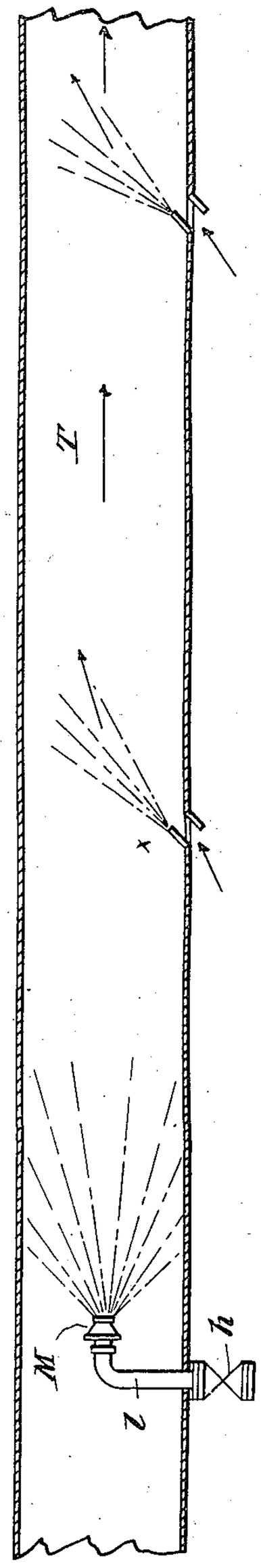


Fig. 1

Fig. 3



Witnesses:
S. S. Noble.
J. D. McMahon.

Inventor,
Paul Kestner
by B. Singer
Att'y.

UNITED STATES PATENT OFFICE.

PAUL KESTNER, OF LILLE, FRANCE.

MEANS FOR HUMIDIFYING THE AIR OF ROOMS.

SPECIFICATION forming part of Letters Patent No. 670,237, dated March 19, 1901.

Application filed September 4, 1900. Serial No. 29,019. (No model.)

To all whom it may concern:

Be it known that I, PAUL KESTNER, a citizen of the Republic of France, and a resident of Lille, France, have invented certain new and useful Improvements in Means for Humidifying the Air of Rooms, of which the following is a specification.

Numerous systems have been tried for supplying moisture to the air, such as that of causing a current of air from a ventilator to pass over an expanse of water or over porous surfaces kept constantly wet.

The object of my invention is to supply the air with a very considerable degree of moisture and at the same time to restrict as much as possible the consumption of water. A further advantage is that a uniform hygrometrical condition of the air is produced in every part of the room and the temperature in summer can be considerably lowered.

In the accompanying drawings, Figure 1 is a horizontal section through the walls of a room, showing my improved apparatus in plan view arranged therein. Fig. 2 is a side elevation of said room and apparatus, the walls of the room being sectioned; and Fig. 3 is an enlarged detail view of the spraying apparatus.

V represents a centrifugal ventilator placed at one end of the room. The suction-pipe of this ventilator communicates with a pipe T of large diameter, which extends the whole length of the room and communicates with the outer air at A. This pipe T is provided with two lateral branches T′ T′, which can be closed by dampers *r r* and which are provided with openings *o o o*. The tube T is provided with another damper R for shutting off communication with the air outside the room. By this arrangement, therefore, first, the outside air is drawn into the room at A, when the damper R is opened and the dampers *r r* are closed; second, the air of the room can be drawn into the pipe by closing the damper R and opening the dampers *r r*, and, third, air can be drawn into the pipe both from the exterior and the interior simultaneously by opening all three dampers or they may be adjusted so that the exterior and interior air may be drawn into the pipe in any desired proportions.

The ventilator forces the air back into a cylindrical box *s*, the bottom of which is cone-shaped and in which there is a drip tube or conduit N for the escape of water. Two pipes T^2 T^2 extend, one on either side of this box, in the direction of the width of the room exactly opposite to the pipes T′ T′ and are provided with openings *p p p*. It is through these openings that the air set in motion by the ventilator escapes.

At M a pipe *l*, provided with a valve *h*, conveys water to the center of the pipe T. The pipe T (shown on a larger scale in Fig. 3) is provided with openings or inlets *x* through its bottom, slanting in the direction followed by the current of air.

Mode of operation: Let us now suppose the ventilator V to be set in motion at a sufficient speed to occasion in the pipe T a current of air moving at the rate of not less than ten meters per second. Let us also suppose the damper R to be closed and the dampers *r r* to be open. The suction of air will under these circumstances take place at *o o o*, and the air will be expelled through *p p p* at the opposite end of the room. Thus a circulation of air will be established between the points *p p p* and *o o o*, as indicated by arrows in the drawings. This circulation is slow, it must be admitted, but it suffices to cause all the molecules of air in the room to pass at least once every hour through the system of pipes and the ventilator. Let us now introduce water in the form of a light jet or spray through the pipe *l* by opening the valve *h*. This water, meeting a rapid current of air, will be dispersed or finely divided, and in this state it will be drawn along with the air-current, which will absorb a portion thereof. After having traversed a certain distance the least-divided particles of water will fall to the bottom of the pipe. The object of the inlets or openings *x x* will now be apparent. They serve to form fresh sprays of the water which has fallen to the bottom of the pipe. (See Fig. 3.) Through these inlets or openings a small quantity of air finds access to the interior of the pipe T, rushing in with a very great velocity. Meeting the water flowing along the bottom of the pipe, these currents disperse it again in the form of fine showers or spray, which strike against the walls of the pipe, and thus keep them continually wet. A certain quantity of the

water thus dispersed evaporates and on arriving at the ventilator a considerable quantity will have been absorbed by the air in the pipe. The current, still drawing with it the excess of non-evaporated water, reaches the ventilator, where the water is again dispersed and mixes intimately with the air. Thus an intense evaporation is produced, owing to the mingling of water and air in close contact and the friction of the air along the surfaces of the passages, which, as has been stated, are being continually moistened by the sprays. The excess of non-evaporated water on leaving the ventilator is precipitated at the bottom of the box *s*, and the saturated air finally escapes into the room through the openings *p p*.

It will be seen that this apparatus constitutes a powerful evaporator. Not a drop of water introduced at M can escape without having been several times dispersed within the pipe T and again in the ventilator. If the quantity of water introduced is less than the air can absorb, the whole of it will be evaporated during its passage through the pipe, and consequently none will pass out at *p*. On the other hand, by introducing an excess of water at M in proportion to the length of the pipe the air which passes out at *p p p* will be found to be almost completely saturated. By a simple adjustment of the tap *h*, therefore, in accordance with the state of the air, as shown by the hygrometers in the room, the exact quantity of water can be supplied to give the required degree of moisture to the air, and this moisture will be equally distributed throughout the room, owing to the circulation produced between *p p p* and *o o o* in the direction of the arrows, as already explained.

Early in the morning, when the air is dry, the tap *h* should be fully turned on; but as soon as the requisite humidity has been given to the air the supply of water can be lessened and regulated according to necessity during the rest of the day.

Steam may be introduced at M instead of water to moisten the air more rapidly and bring it into the required hygrometric condition or when it is desired to heat the air instead of to cool it.

In the circulation of air above described the outside air is not utilized and the air within the room can be rapidly saturated. To admit the outer air, the damper R is opened entirely or partially, according to circumstances. If only the outer air is required to be drawn into the pipe T, the dampers *r* being closed, small openings at *c c* will allow the air expelled at *p p p* to escape in the direction of the dotted arrows. Thus the same regular circulation of air will be secured. The last-described circulation—namely, of air drawn from outside the building—is that usually preferred in summer. The outer air (being generally the drier the warmer it is) is susceptible of evaporating a large proportion of water. In its passage through the pipe T and the ventilator the evaporation is so intense that its temperature is sensibly lowered. In the heat of summer this lowering of the temperature by the caloric absorbed in the process of evaporation often equals from 6° to 8° centigrade.

The system herein described may be varied according to circumstances. For instance, in large rooms and halls several sets of the apparatus may be arranged; also, instead of drawing in air at one end of the room or hall and driving it out at the other end the suction may take place at both ends or sides and the air be driven out in the middle of the room or hall.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the pipe T having bottom openings or inlets slanting in the direction of the current, and valve R to shut off communication with the outer air, the perforated cross-pipe T′, the suction-ventilator V, with which pipe T connects, the perforated cross-pipe T^2 with which said ventilator connects, and the spraying-nozzle, with its regulating-valve, opening into the pipe T at the farther end from the ventilator.

2. The combination of the pipe T having bottom perforations or inlets slanting in the direction of the current, and valve R to close off the outer air, the perforated cross-pipe T′ having valves *v*, the suction-ventilator V, with which pipe R connects, the box *g* with its cone-shaped bottom and drip-conduit N, the perforated cross-pipe T^2 leading from said box, and the spraying-nozzle M with its regulating-valve N, opening into the pipe T at the farther end from the ventilator and between cross-pipe T′ and said ventilator.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

PAUL KESTNER.

Witnesses:
E. DUFOREST,
PAIVE.