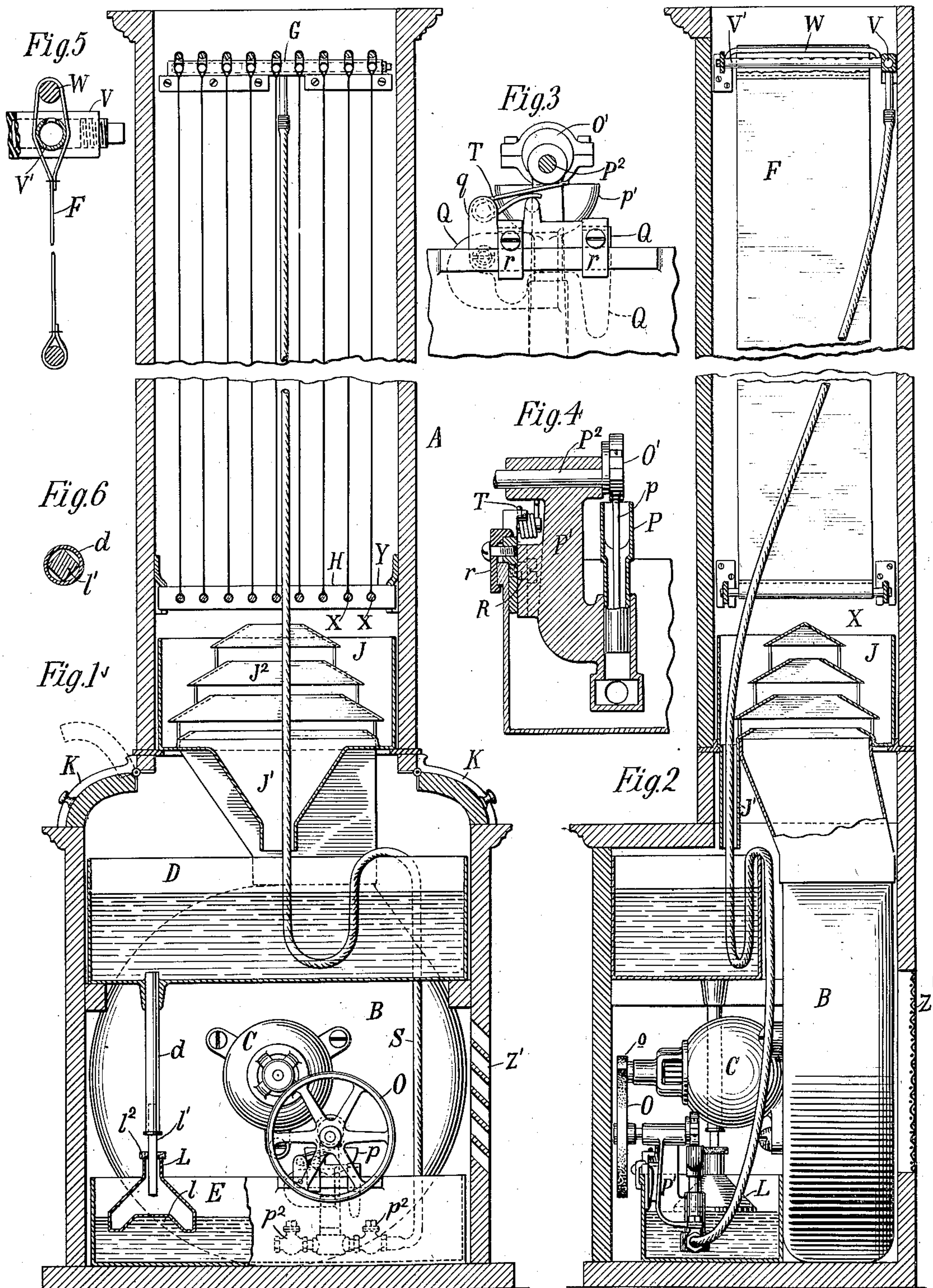


No. 835,894.

PATENTED NOV. 13, 1906.

J. J. SMITH.
HUMIDIFYING APPARATUS.
APPLICATION FILED APR. 23, 1902.



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HUMIDIFYING APPARATUS.

No. 835,894.

Specification of Letters Patent.

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Application filed April 23, 1902. Serial No. 104,266.

To all whom it may concern:

Be it known that I, JOSEPH J. SMITH, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Humidifying Apparatus, of which the following is a specification, reference being made to the accompanying drawings, wherein—

Figure 1 is a vertical section of the apparatus. Fig. 2 is a section at right angles to the section shown in Fig. 1. Fig. 3 is an elevation of a portion of the feed-tank with the pump mounted thereon. Fig. 4 is a transverse section of Fig. 3 through the pump-shaft. Fig. 5 is a detail of the jet-reservoir, and Fig. 6 is a transverse section through the shaft of the float-cock.

My invention relates to an apparatus for humidifying the atmosphere in apartments of any kind, particularly offices and dwelling-rooms; but it may likewise be used in any case where it is desired to maintain the humidity of the atmosphere at a definite point.

In general I provide for passing the air by means of a power-driven fan over saturated absorbent surfaces supplied with water, and my invention comprises means for performing this operation in a simple and reliable manner and particularly with a view to producing a sightly structure which may be used in rooms and offices and which will operate reliably with but a slight amount of attention.

Referring to Fig. 1, A represents the external casing of the device, which is preferably made of ornamental wood lined with a sheet of rubber or other suitable moisture-proof material, and in external appearance the apparatus is about of the general size and appearance of a hall-clock, it being highly important to diminish the floor-space occupied by the device and to utilize the vertical space for the necessary room required for the extended surface of the moistened sheets over which the air is driven. By so arranging the device I am enabled to provide a construction which takes up but one or two square feet of floor-space, is about seven feet in height, and which is not only unobjectionable in appearance, but may even be regarded as ornamental in certain situations.

Within the casing A aforesaid there is contained in the base or lower part a blower B,

driven by an electric motor C, and two metallic water-tanks, one a supply-tank D and the other a feed-tank E. Within the upper vertical part of the casing are contained the series of vertically-disposed moistening-sheets F, attached at their upper ends to the grid-shaped jet-tank G and at their lower ends to the cross-rods of a framework H, supported from the interior walls of the casing, so as to provide parallel passages between the sheets open at the bottom. Beneath the sheets is a water-collector J, containing an air-distributor J². Referring to these features in detail, the supply-tank D is contained in the upper part of the base of the apparatus which is provided with the hinged lids K K, which may be lifted up to admit of the water being introduced into the supply-tank. This supply-tank also receives the surplus water which drips from the sheets F and is received in the collector J and from there returned to the supply-tank through the spout J'. The water from the supply-tank passes downward through the pipe d into the feed-tank E, the flow being regulated by the float-cock L. This float-cock is of peculiar construction, the float being a conically-shaped hollow box having the cross-section shown in Fig. 1 and the external appearance shown in Fig. 2. The buoyancy of this float is secured by the air contained within it and also by the air trapped on its under side in the external depression l, the displacement being that due to the sum of the internal and external air-spaces. A float of this form has the requisite buoyancy within a small compass and also has a high degree of stability, causing it to act in a direct line without any tendency to bind in and obstruct the pipe d by tipping sidewise. A stem l' projects upward from the float l and enters loosely into the tube d. The stem l' is rectangular in cross-section, as shown in Fig. 6, so as to permit the passage of the water between it and the interior walls of the circular tube d. At the base of the stem l' is a leather washer l², which abuts against the lower extremity of the tube d when the float rises to its upper limit, and thereby seals the tube against any flow of water from the supply-tank D.

P is a small pump mounted on a bracket P', Figs. 2 and 4, in the upper end of which is journaled the driving-shaft P², carrying at its

outer end a large friction-wheel O and on its inner end an eccentric O', which operates the piston-rod *p* of the pump. The upper end of the pump-cylinder is expanded into a flat cup *p'* and at its lower end is set into a socket in the bracket provided on each side with the usual check-valves *p''*, one communicating directly with the water in the feed-tank E and the other communicating with the flexible tube S, through which the water is forced to the jet-tank G at the top of the apparatus. The bracket P', which carries the pump, is pivoted at one side of the pump-cylinder to a plate Q, which is attached to a flange on the edge of the tank E by the clamps *r*. The pivot for the mounting of the pump is formed by the screw R. The pump, together with the bracket to which it is attached, is thus free to oscillate vertically around the screw R as a center. A coiled spring T is mounted on a projection *q* from the plate Q, and its outer end bears upon the bracket P', tending to lift the bracket and the pump, and thereby press the friction-wheel O, which drives the pump against the small friction-wheel *o* on the shaft of the motor C. By this arrangement the pump and its supporting-bracket may be readily removed and as readily applied to the edge of the feed-tank, and its position may be easily adjusted along the edge of the tank by the clamp *r* by simply loosening the screws which hold the clamp. This adjustment of the position of the pump also adjusts the tension of the spring T, and so causes a greater or less amount of friction between the wheels O and *o*. The driving of the pump is thus made reliable and extremely simple, and in the event of any clogging of the pump or other disturbance a new one can be substituted in a moment or the defective one removed and repaired. The flexible tube S leads, as above mentioned, to the jet-tank G, which is formed in the shape of a grid, being composed of the transverse tube V and a series of lateral tubes V', extending therefrom at right angles. The tubes V' have a series of perforations on their top sides. Each one also carries a bridge-rod W, over which one of the sheets F is passed at its upper end, so as to form a loop embracing both the tube V' and the bridge-rod W, as shown in Fig. 5. The bridge-rod holds the loop of the sheet out of contact with the upper side of the tube V' so as to maintain the perforations in the tube free from any obstruction by the material of the sheet. At the same time the water emerging from the said openings flows in both directions against the material of the loop and is thereby led down along the absorbent sheet F.

The capacity of the pump is comparatively small, yet by continuous operation it is able to lift sufficient water to fill the jet-tank

composed of the tubes V and V' until the water is distributed throughout the jet-tank up to the level of the openings on top of the several tubes V'. Thereafter each stroke of the pump simply causes a slight overflow through all of the jet-openings aforesaid onto the sheets F. By this arrangement the water remains distributed along the upper edges of the sheets by reason of the capacity of the jet-tank, while the pump simply adds pressure sufficient to slightly raise the level of the entire water-line on the tank, and thereby equally distribute the water along the entire upper edge of each one of the several sheets F. This method of securing uniformity of distribution is a feature of considerable importance in my apparatus, since without such a tank or reservoir feature the water introduced into perforated distributing-tubes such as have heretofore been used would tend to flow more freely out of the perforations nearest to the source of supply and less freely out of the remoter ones, thus preventing uniform distribution.

The sheets F may be of any suitable fabric, preferably one with a coarse weave, which will at the same time have sufficient durability and strength and also absorb and permit the downward passage of the water therethrough. Both surfaces of the sheet are thereby maintained uniformly wet. The lower ends of the several sheets are attached, respectively, to the cross-rods X, attached longitudinally to the transverse rods Y, which are secured to the interior of the casing. This leaves an open framework through which the surplus water from the sheets F may readily pass downward, and the air may readily pass upward into all of the passages between the several sheets. This exposes a large moistening-surface to the air. Beneath the said framework is the collector J, consisting of a rectangular metallic receptacle open at its upper end and fitting the interior of the casing, so that the water may drip entirely within it. In the bottom of this collector and at one side thereof is the spout J', which passes downward and delivers the water to the supply-tank D. This spout is also utilized as a passage-way for the flexible tube S, leading from the feed-tank to the jet-tank. Within this collector J is located the air-distributor J², which forms the outlet for the blower B. This distributor consists of a series of inverted open-bottomed pans separated a slight distance from each other and capped by a similar closed pan serving as a roof. These pans decrease in size from the bottom upward, so that the water dropping from the sheets is thereby caught and deflected from one pan to another and thence to the interior of the collector J, but cannot enter the air-passage from the blower. The incoming air enters through the lower pan

and passes thence through the upper ones in succession, a portion of the air being diverted out from under the edges of each pan, so as to be distributed thereby over the entire series of sheets F.

In operation the supply-tank D is filled occasionally through the lids K, and whenever it is desired to use the apparatus it is only necessary to turn the current onto the electric motor C, which drives the blower B and operates the pump P. The air then enters the blower through a wire screen Z at the back of the apparatus and also, if desired, through the shutter-openings Z' on the side of the apparatus, as shown in Fig. 1. The air is then forced through the distributor J² and passing upward between the several moistened sheets F becomes thereby humidified and emerges into the apartment through the top of the casing or, if desired, through lateral openings placed near the top above the sheets F. The moistening of the sheets is maintained in the manner already described by means of the pump P. As the pump draws the water from the feed-tank E, the loss is supplied from the supply-tank D by means of the float-cock E, and so maintained at a uniform level. When the apparatus is placed in the room or apartment to be treated, the air of the apartment will be drawn into the casing through the screen Z and the shutters Z' and after becoming moistened by contact with the absorbent sheets will be delivered back into the apartment through the top of the casing or through the openings in its side. Moreover, this results in economy of power, since the entire atmosphere of the room will in time be passed through the machine, and passed through repeatedly, so that a small machine can be used for a comparatively large room. It also acts to keep the entire atmosphere of the room in movement, so that it is all thoroughly mixed with the moisture and local collections of impure air avoided. The apparatus in the example given is manifestly portable, resembling, as above mentioned, a tall clock and being about the same weight. It can readily be moved from one room or apartment to another, having no fixed connections other than the cord carrying the electric wires that supply the motor and which simply engage a socket like those used with electric lamps.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a humidifying apparatus, the combination with a casing having inlet and outlet openings communicating with the apartment to be treated, of a series of absorbent sheets stretched vertically therein, means for distributing a downflow of water to the upper parts of said sheets, a blower for directing a current of air longitudinally along and be-

tween the said sheets, a drip-tank, and means for returning the water from said tank to the said water-distributing means.

2. An apparatus for humidifying the atmosphere of a living apartment, comprising in combination an upright casing, having inlet and outlet openings at the top and bottom thereof, both communicating with the apartment to be treated, a series of absorbent sheets stretched vertically therein and dividing the casing into a series of side-by-side passages between the said inlet and outlet openings; a blower adapted to force a current of air through said passages, a motor for the blower, and means for distributing a downflow of water to the upper portions of the several sheets.

3. An apparatus for humidifying the atmosphere of apartments, comprising an upright casing having inlet and outlet passages communicating with the apartment to be treated, a series of absorbent sheets stretched vertically and dividing the casing into a series of side-by-side passages, a tank below the said sheets, a pump having its intake-pipe communicating with the said tank and its outflow-pipe leading to the upper ends of the said sheets, a blower transmitting an air-current longitudinally along said sheets from the inlet to the outlet passage in the said casing, and an electric motor operating both the said blower and the said pump.

4. An apparatus for humidifying the atmosphere in apartments, comprising an upright casing having an inlet-opening at one end and an outlet-opening at the other end, both communicating with the apartment to be treated, a series of absorbent sheets stretched between the said openings and dividing the casing into a series of side-by-side passages, a tank within the casing below the said sheets, a pump within the casing having its intake-pipe communicating with the said tank and its outflow-pipe leading to the upper ends of the said sheets, a blower within the said casing, the blower communicating at one end with the inlet-opening in the casing and at the other end with the interior space within the casing, and a mechanical connection between the said motor and the said pump.

5. An apparatus for humidifying the atmosphere in an apartment, comprising in combination an upright casing communicating at opposite ends with the apartment to be treated, an intermediate series of absorbent sheets dividing the casing into a series of side-by-side passages, a blower located in the casing and delivering air at one end of the said sheets, a tank in the lower part of said casing, a pump communicating on one side with the said tank and on the other with the upper ends of the said sheets and an electric motor operating both the blower and the pump.

6. An apparatus for humidifying the atmosphere in apartments comprising an upright inclosing casing having inlet and outlet passages communicating with the apartment to be treated, a series of vertical absorbent sheets dividing the casing into a series of side-by-side passages, a distributing-tank at the upper ends of the said sheets provided with perforations adjacent to the said sheets respectively and containing a water-supply normally level with the said perforations, means for directing an air-current longitudinally over said sheets from the inlet to the outlet openings in the said casing, a drip-tank within the casing and a pump communicating on one side with the drip-tank and on the other side with the distributing-tank.

7. An apparatus for humidifying the atmosphere of apartments, comprising an upright casing having inlet and outlet passages communicating with the apartment to be treated, a series of absorbent sheets stretched vertically and dividing the casing into a series of side-by-side passages, a drip-tank below the said sheets, a series of tubes perforated on their upper sides and normally containing water below the level of the perforations and mounted adjacent to said sheets respectively, a pump having its intake-pipe communicating with said tank and its outflow-pipe communicating with said tubes, and a blower transmitting air-currents along said sheets from the inlet to the outlet passages in the said casing.

8. An apparatus for humidifying the atmosphere of an apartment comprising an upright casing having inlet and outlet openings communicating with the apartment to be treated, a series of absorbent sheets dividing the casing into side-by-side passages, a distributing-tank at the upper ends of said sheets with perforations adjacent to the said sheets respectively and normally containing water below the level of said perforations, means for raising the water-level at all of said perforations simultaneously, and a blower for directing a current of air along the said sheets from the inlet to the outlet opening of the casing.

9. A portable humidifier for rooms and apartments comprising, in combination, an upright casing having inlet and outlet openings for the air communicating with the apartment in which the device is placed, a series of absorbent sheets dividing the casing into side-by-side passages, a supply-tank into which the drip from said sheets is received, a pump taking water from said tank, a pipe leading from said pump to the upper parts of said sheets and delivering the water thereto, and a blower directing currents of air through the passages formed by said sheets.

10. A portable humidifier for rooms and

apartments comprising in combination, an upright casing having inlet and outlet openings communicating with the apartment in which the apparatus is placed, a series of absorbent sheets stretched vertically therein and dividing it into side-by-side passages by which both sides of said sheets are exposed, a tank at the bottom of the apparatus which receives the drip from the sheets, a pump taking water from said tank, a pipe from said pump leading to the upper parts of said sheets and a blower delivering a current of air against said sheets which is divided thereby and the separate currents passed over the exposed surface thereof.

11. A humidifier for treating the atmosphere of living apartments, comprising a casing communicating with the apartment, a series of absorbent sheets dividing the casing into side-by-side passages, a blower delivering an air-current into said passages at a point opposite the opening into the apartment and means for distributing water over said sheets in quantities proportional to the flow of air through the humidifier.

12. In a humidifying apparatus, the combination with a series of absorbent sheets, of a distributing-tank composed of a series of tubes having perforations adjacent to the said sheets and normally containing water to a point below the level of said perforations and means for simultaneously raising the water-level at all the perforations.

13. In a humidifying apparatus, the combination with a series of absorbent sheets and a distributing-tank at the upper ends of said sheets, provided with perforations adjacent to the said sheets respectively, and a pump for raising the water-level at all of said perforations simultaneously, whereby the distribution of the water over said sheets is uniform and independent of the rate of flow of water through the distributor.

14. In a humidifying apparatus, the combination with a distributing-tank comprising a series of tubes perforated on their upper side and normally containing water below the level of the perforations, of a series of absorbent sheets looped over the respective tubes but held away from the perforations therein and means for raising the water-level of the distributing-tank at all the perforations simultaneously.

15. In a humidifying apparatus, the combination with a series of tubes perforated on their upper side, a transverse duct connecting the said perforated tubes, an absorbent sheet looped over each of the said tubes and a bridge-piece for holding the sheet away from the perforations in the tubes.

16. A humidifying apparatus for apartments, comprising an upright casing having inlet and outlet openings, a series of absorb-

ent sheets dividing the intermediate parts of the casing between said openings into side-by-side passages, a motor and blower contained within the casing below the said absorbent sheets, a water-shield for the said motor and blower intervening between them and the said sheets with a passage communicating between the blower and the intermediate portion of the casing containing the

said sheets for allowing the air-current to pass around the said shield.

In witness whereof I have hereunto set my hand, before two subscribing witnesses, this 22d day of April, 1902.

JOSEPH J. SMITH.

Witnesses:

L. T. SHAW,

G. W. HOPKINS.