S. W. CRAMER.

HUMIDIFYING AND AIR MOISTENING APPARATUS.

APPLICATION FILED MAR. 3, 1908.

908,963.

Patented Jan. 5, 1909.

2 SHEETS—SHEET 1.

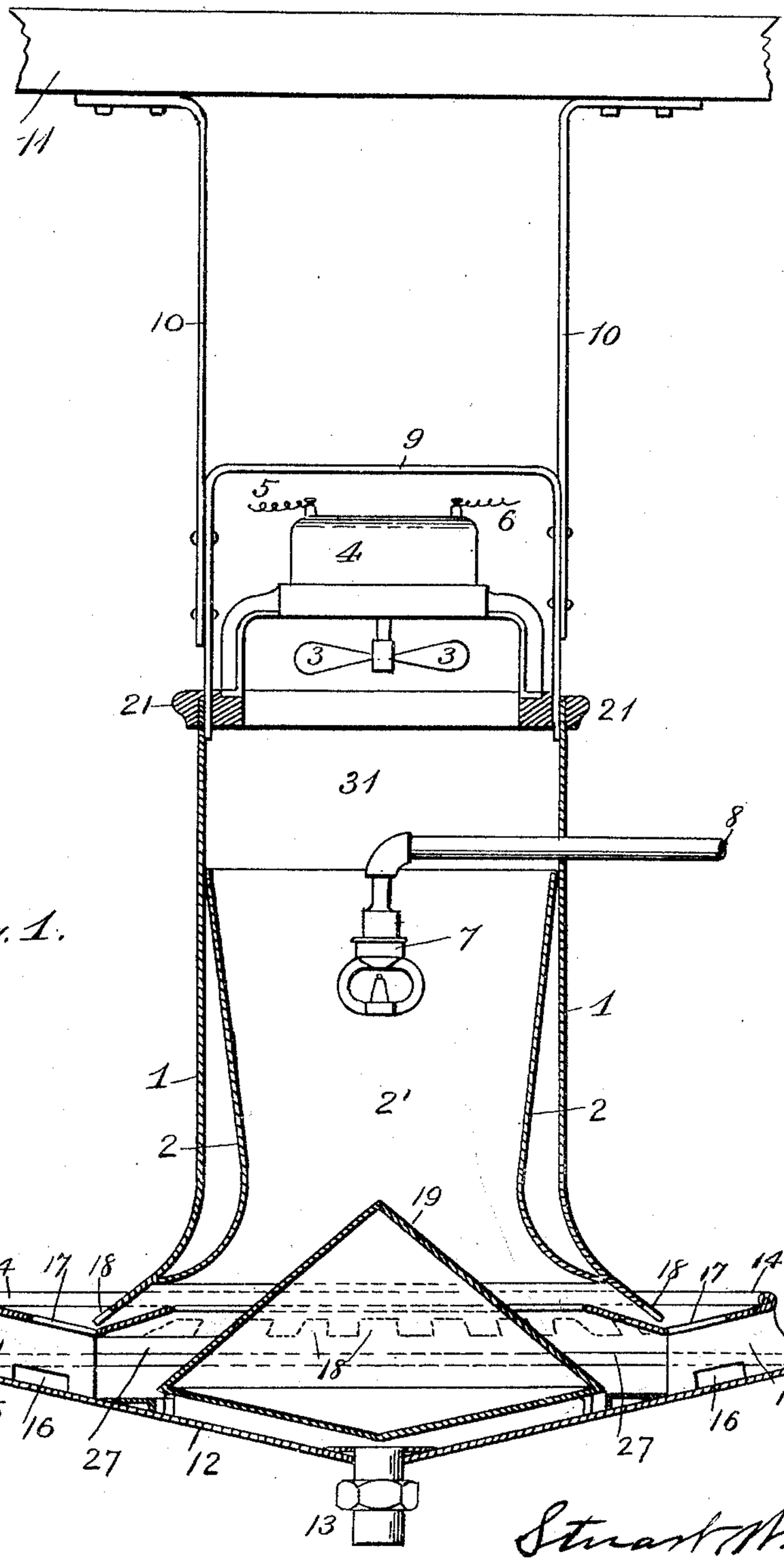

Fig. 1.

Witnesses

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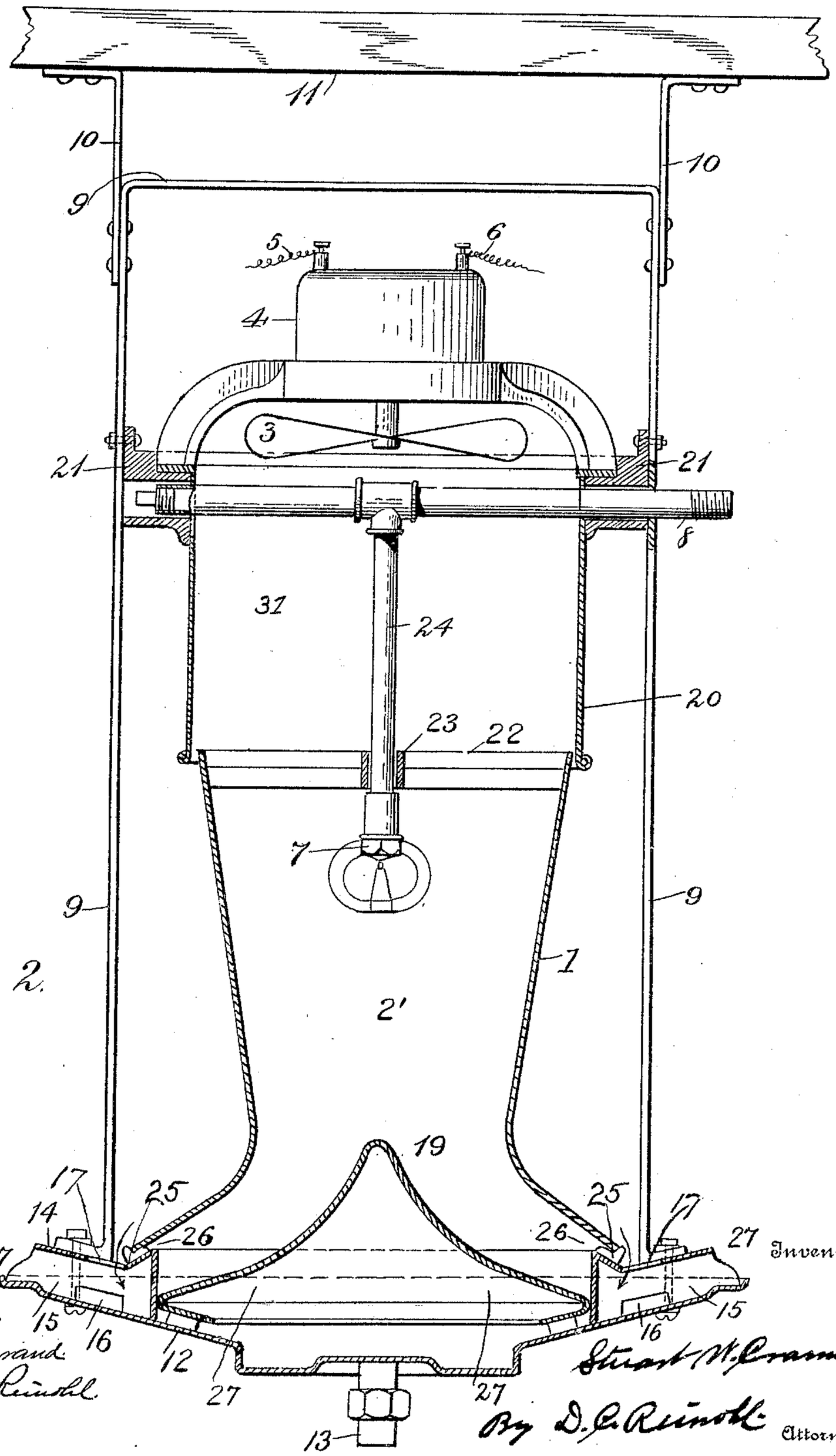

Fig. 2.

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UNITED STATES PATENT OFFICE.

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HUMIDIFYING AND AIR-MOISTENING APPARATUS.

No. 908,963. Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed March 3, 1908. Serial No. 418,973.

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 Humidifying and Air-Moistening Apparatus; 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 means for moistening the air in a room or factory, has for its object an apparatus which will keep the air constantly supplied with any preferred amount of moisture and diffuse the moisture throughout the room, and the invention consists in certain improvements in construction which will be fully disclosed in the following specification and claims.

In the usual type of spray humidifiers as at present constructed, dependence for air circulation through it is placed only on the inductive effect of the cone-shaped mass of spray discharged with considerable velocity under pressure longitudinally through the humidifier casing. In the absence of something better, this has answered the purpose of air moistening, but is lacking in air cleansing capacity. Also with the limited velocity of the commingled air and spray issuing from the humidifier, the particles of water are not carried far enough away but settle down near the humidifiers, so that there become wet and dry areas alternately throughout the room equipped with them, and oftentimes these wet areas become so damp as to "wet down" the machinery underneath. On the other hand, by forcing through the humidifiers an additional amount of air by a fan, so that there issues from the casing commingled spray and air with requisite velocity to carry the particles of water far enough away that they are completely evaporated, not only is immunity secured from "wetting down" but also the greatest possible air cleansing capacity is obtained, which is one of the legitimate and most desirable functions of the humidifier.

I am aware that fans have been used in connection with various types of humidifiers, as for instance, in a number of my own patents; but I am not aware that they have been successfully used in combination with the simple form of a single casing down draft water spray humidifier hereinafter described and claimed. That they have been tried and abandoned on account of failure to produce an operative device in a commercial sense, I do not doubt, for I experimented along that line; but the combinations of a fan and casing provided with the proper plenum space, and a fan and casing with a contracted passage or throat constitute the most important factors contributing to my present invention. I do not limit myself to a construction embodying both these combinations, for each one contributes its own part toward the result and could be used singly; but the best results are secured by the use of both of them.

Referring again to the value of a "plenum space" between the fan and the spray head; success in the use of a fan with this type of humidifier, lies in suitably proportioning the distance between the fan and the spray head so that there becomes a uniform pressure of air as it sweeps through the humidifier.

It is well known that disk or propeller type of fans deliver comparatively no air from their centers, and that a maximum amount is delivered by the tips of the blades, so that in order to get a uniform velocity of air through the casing it is evident that a plenum space is necessary, sufficient in capacity to permit the varying velocities of the air from the different parts of the fan to adjust themselves to a uniform average by the time the column of air reaches the cone-shaped mass of spray from the spray-head. In Figure 2 the supplemental casing, not only obviously provides this desirable plenum space but also constitutes a receptacle and guide into which the casing is vertically movable for cleaning purposes. In Fig. 1 the construction does not make the existence of this plenum space so evident, but a minimum plenum space is provided, that is to say, one which will be found sufficient by trial for each diameter of casing at which the velocity of the air from the fan will not beat down the outer edges of the cone-shaped mass of spray around the inside of the casing, thereby causing undue condensation, loss of air moistening capacity, and wetting down.

In the accompanying drawings, which form part of this specification:—Fig. 1 represents a vertical transverse section

partly in elevation of the simplest form of my improved type of humidifier, and Fig. 2 a like view of a modified form, in which the humidifier casing is vertically movable within a fixed supplemental casing.

Reference being had to the drawings and the designating characters thereon, the numeral 1 indicates a casing, within which is a concentric lining or supplemental casing 2, properly secured thereto and contracted in diameter for constricting the chamber 2′ in the casing near its enlarged or flaring discharge end. This contraction permits by its proportions an adjustment of the amount of spray delivered so it will not wet down. In other words, the advantage of such a contraction is, that it permits of the use of a larger casing and larger fan.

3 is a propeller fan preferably operated by an electrical motor 4, supplied with current through suitable conductors 5, 6.

7 is a spray head of the usual type for producing a conical body of spray and directing it longitudinally through the casing.

8 is a pipe for supplying water to the spray-head.

9 is a stirrup rigidly secured to the humidifier and to the supporting members 10, which are attached at their upper ends to the ceiling or a beam 11. The spray discharged by the spray-head 7, and the air supplied by the fan 3 are commingled in the contracted chamber 2′ before issuing from the humidifier. Between the fan 3 and the spray-head 7, is a chamber or plenum space 31 which receives the air directed from the fan and in which the air readjusts itself on its way to the spray-chamber adjacent thereto.

12 is a basin for catching the surplus water and conducting it to a waste pipe 13.

14 is an annular basin supported on hollow porters or spacing members 15, (between the two basins) above and around the outer part of the basin 12. The spacing members 15 are open at their outer ends and closed at their inner ends, and in the walls of the spacing members are openings 16, for the discharge of water into the basin 12, which gravitates through openings 17 in the basin 14.

In the lower end of the casing 1 are orifices or openings 18 through which water and lint are discharged, and collected on the basin 14. The conical body of spray passing through the casing washes from the air supplied by the fan, the impurities contained therein and drives them forcibly against the wall of the casing, which they follow down in the water with which they are commingled and are discharged from the lower end of the casing through the openings 18, and thence conducted laterally outside of the casing on to the annular basin 14, from which basin 14, the water is conducted through openings 17 to the basin 12, as described.

The construction of the openings in the casing for the lateral discharge of water and lint or "fly", and the porters or spacing members 15 are fully described in my application for a patent for humidifiers and air moistening apparatus, filed November 29th, 1907, Serial Number 404,389, and therefore requires no further elucidation.

It is obvious that a sufficient blast of air coming down the wall of the casing 1, and discharged with the water on the annular basin 14, will blow the impurities washed from the atmosphere well out upon the upper surface of the annular basin 14, so that they are separated from the surplus water, and do not, except in a small proportion, return with the waste water and get into the pipe 13. The lint and other impurities which collect on the basin 14 can be readily removed periodically.

19 is a conical deflector, which rests upon the basin 12, is readily removable for cleaning the deflector and the basin when required, and against whose upper surface the commingled air and spray is forcibly projected in its passage through the casing and deflected outward and away from the humidifier with such force, that comparatively no precipitation of water occurs.

The basins 12 and 14 are secured together by the members 15, by soldering or in any preferred manner, and the basins are detachably secured to the casing 1 by lugs or straps, not shown, so that the parts may be separated for cleaning.

In Fig. 2, an annular fixed casing is supported on and extends downward from the underside of the fan support 21 and into which the upper end of the casing 1 extends and is vertically movable therein for the purpose of cleaning the interior of the casing and its adjuncts. In this construction the space 31 within the casing 20, forms the chamber or plenum space. 22 is a spider provided with a central opening 23 through which the vertical portion 24 of the supply pipe 8 extends, and acts in conjunction with the interior of the fixed casing in guiding the casing 1 when being raised or lowered. The casing 1 in this construction rests upon lugs 25 on the basin 14 which forms a passage 26 between the lower end of the casing and the basin 14, for water and lint. The major portion of the air and the finely attenuated spray, in the form of vapor, are discharged through the annular passage 27 between the basins 12 and 14 in both constructions shown.

It is obvious that changes may be made in the details of construction, without departing from the spirit of my invention.

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

1. In a humidifier, a casing, a fan for supplying air, said casing providing an air chamber adjacent to the fan and having sufficient capacity to permit the air of varying velocities from the fan to adjust themselves to a uniform velocity by the time the column of air reaches the volume of spray, and a commingling chamber beyond said air chamber having a contracted wall and an enlarged discharge end; in combination with a spray-head in the latter chamber.

2. In a humidifier, a casing whose wall is contracted between the receiving and the enlarged discharge ends thereof, a fan above the casing, said casing providing an air chamber adjacent to the fan, and of sufficient capacity to permit the air of varying velocities from the fan to adjust themselves to a uniform velocity by the time the column of air reaches the volume of spray, and a commingling chamber in the contracted portion of the casing; in combination with a spray-head in the latter chamber.

3. In a humidifier, a casing whose wall is contracted between the receiving and the enlarged discharge ends thereof, a fan above the casing, said casing providing an air chamber adjacent to the fan and above the contracted wall of the casing and of sufficient capacity to permit the air of varying velocities from the fan to adjust themselves to a uniform velocity by the time the column of air reaches the volume of spray, and a commingling chamber in the contracted portion of the casing; in combination with a spray-head in the latter chamber, a lateral discharge passage, and means for collecting surplus water.

4. In a humidifier, a casing, a fan above the casing, said casing providing a plenum space adjacent to the fan forming an air adjusting chamber, a passage contracted between its receiving and enlarged discharge ends forming a commingling chamber of gradually reduced area and adjacent to said air adjusting chamber, and a spray-head in said commingling chamber; in combination with a deflector, a lateral discharge passage, and means for collecting surplus water.

5. A humidifier having a fixed supplemental casing, a casing vertically movable in the fixed casing, a spray-head within the latter casing, a fan for supplying air, a deflector, and means for collecting surplus water.

6. A humidifier having a fixed casing, a casing vertically movable in the fixed casing, a fan above the fixed casing, a spray head below the fan and within the movable casing, a lateral discharge passage for the commingled air and spray, and means for collecting surplus water.

7. A humidifier having a fixed casing, a casing vertically movable in the fixed casing, a spray-head within the latter casing, a supply pipe, a spider attached to the movable casing and engaging said supply pipe, a fan above the spray-head, a flaring extension at the lower end of the casing, a deflector, an upper and a lower basin having a lateral discharge between said basins.

8. A humidifier having a fixed casing, a casing having a contracted passage and vertically movable in said fixed casing, a spray-head within the latter casing, a fan above the spray-head, a fixed support for the fan and to which the fixed casing is secured, a basin below and on which the movable casing is supported, a flaring extension at the lower end of the casing, a deflector, and a lateral discharge surrounding the deflector.

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

STUART W. CRAMER.

Witnesses:
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