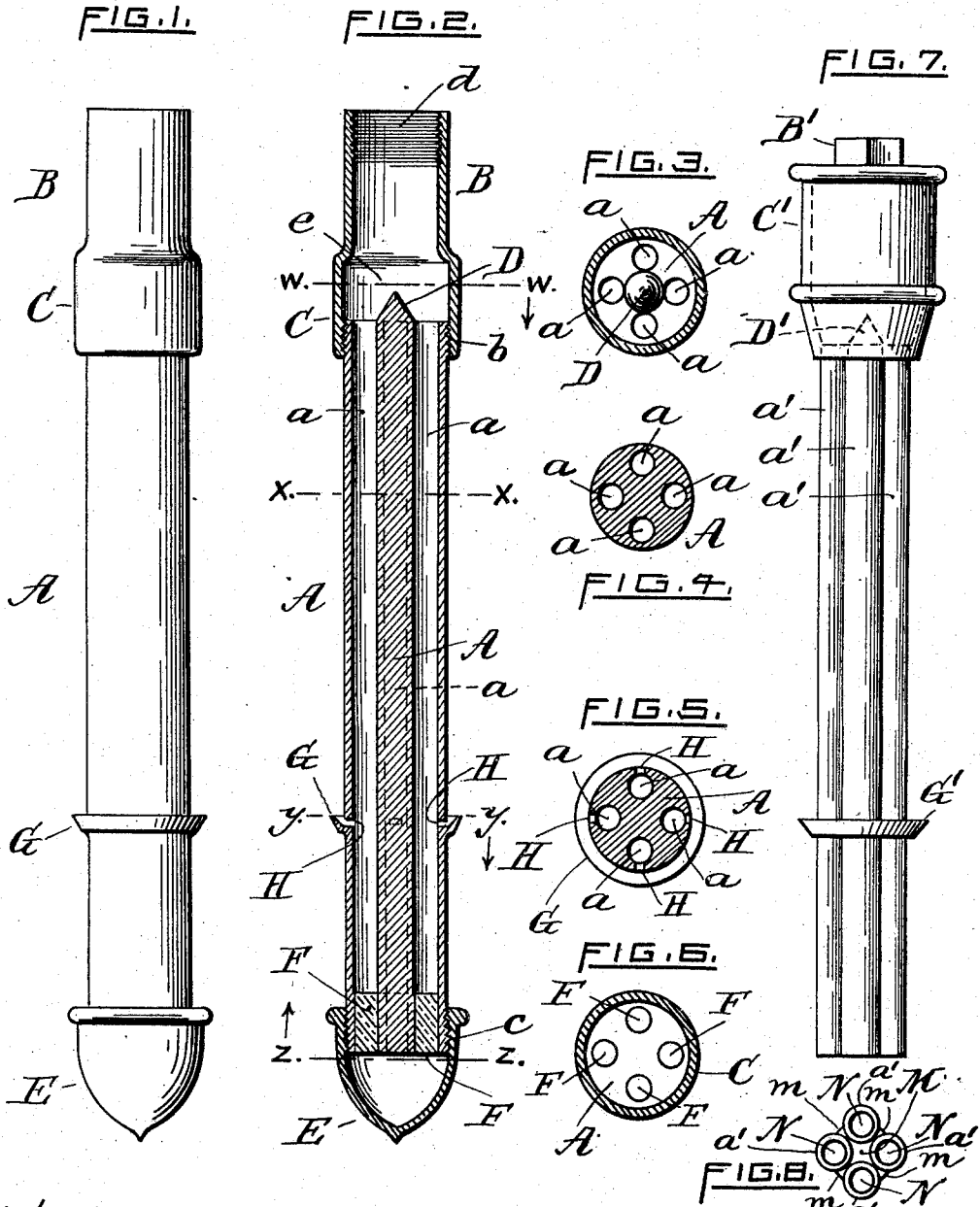


947,040.

Patented Jan. 18, 1910.



WITNESSES:

Charles D. Hannigan.
Howard A. Lamprey

INVENTOR:

James Kelly
By Warren R. Perce
Attorney.

UNITED STATES PATENT OFFICE.

JAMES KELLY, OF PROVIDENCE, RHODE ISLAND.

HUMIDIFIER.

947,040.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES KELLY, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Humidifiers, of which the following is a specification, reference being had therein to the accompanying drawings.

Like reference letters indicate like parts.

Figure 1 is a view in elevation of my improved discharging nozzle for humidifiers. Fig. 2 is a central longitudinal view of the same. Fig. 3 is a view partly in top plan and partly in cross section on line *w w* of Fig. 2. Fig. 4 is a view in cross section as seen on line *x x* of Fig. 2. Fig. 5 is a view partly in top plan and partly in cross section on line *y y* of Fig. 2. Fig. 6 is a view partly in plan and partly in cross section on line *z z* of Fig. 2. Fig. 7 is a view in elevation of a modified form of my invention. Fig. 8 is an inverted or bottom plan view of the lower end of the nozzle shown in Fig. 7.

My invention relates to the class of humidifiers and more particularly to the discharging nozzles therefor; and it consists of the novel construction and combination of the several parts hereinafter described as specifically set forth in the claims.

The humidifiers to which my invention especially is applicable are those used for purifying, cooling and moistening the atmosphere in mills for the manufacture of yarns and textile fabrics. In such factories the air is liable to become very dry and to be more or less filled with floating particles and fibers, which are harmful to the health of the operators.

The improvement hereinafter described has for its purposes the simplification of the discharging portion of a humidifying apparatus, and the division within the nozzle, of the one entering current of mingled water and air under pressure into several currents, in contiguity, one with the others, by means of a plurality of parallel passages or tubes, which conduct the several currents to a common annular discharging device; and also an increase in the proportionate area of internal tube surface, against which the said water and air impinge during their passage, resulting in the greater degree of mixture of the two elements.

In the drawings, A indicates the nozzle,

which is preferably cylindrical in cross section and made of solid metal. This cylindrical body is longitudinally bored to form therethrough a plurality of parallel tubular passages *a*, of which in the drawings four are shown (which is a desirable and useful number, although any other number may be used), extending lengthwise of the cylindrical body, from end to end, and clustered about the axial line thereof symmetrically, as illustrated in the several Figs. 3 to 6, inclusive. At the upper end the nozzle has an exterior screw thread *b* and at the lower end it has an exterior screw thread *c*. A tubular coupling B has an enlarged tubular end C, concentric therewith, and is provided there with an interior screw thread, engageable with the screw thread *b* of the nozzle A; and it has at its upper end an interior screw thread *d*, by which it is engageable with a suitable pipe, which conducts to said nozzle mingled water and air under pressure, as is well known in devices of this class. Within the enlargement C of the coupling B, on account of the greater diameter of the former, there is a chamber *e*. At the center of the upper end of the nozzle A there is a conically-shaped, upwardly-directed deflector D, which extends up into the chamber *e*. The deflector D is thus located between the upper ends of the several tubular passages *a*, as seen in Figs. 2 and 3. A cap E, having an interior screw thread, is engageable thereby with the screw thread *c* at the lower end of the nozzle A, considerably below, however, the discharging orifices thereof, presently described. The lower end of each tubular passage *a* is closed by a plug F, or other suitable means, accessible by the removal of the cap E.

In Fig. 2, two of the tubular passages *a* are shown in full lines and one of the other tubular passages *a* is shown in dotted vertical lines.

An annular discharging flange G surrounds the nozzle A a short distance above the cap E, and is dished, or concaved, on its upper surface, as shown in Fig. 2. Each tubular passage *a* has a small slot or discharging orifice H, extending through to the outside of the nozzle A and located so as to discharge the contents of the tubular passage *a* upon the upper dished surface of the flange G.

The operation of my improved nozzle for

humidifiers is as follows. Mingled air and water, under pressure, as usual in humidifying devices, are discharged through a feed pipe (not shown), which pipe enters the open end of the coupling pipe B, and engages therewith by the screw threads *d*. The volume of mingled air and water passes through the upper tubular part of the coupling B into the chamber *e*, and is divided therein by the conical deflector D, and directed into the tubular passages *a*, and thence is discharged through the several orifices H. The currents, so discharged through the orifices H, impinge against the upwardly inclined surfaces of the annular flange G, and are thus projected radially outward at a sufficient angle to penetrate a considerable distance into the external atmosphere, which readily takes up and absorbs the moisture so provided.

Each of the tubes *a* is closed at the bottom by a plug F, inserted or engaged therein in any suitable manner. The current in the lower portion of the tube *a* is thus turned back against itself, which results in a still more thorough division of the water and the mixing thereof with the air to an increased degree of fineness. The discharge, therefore, through the orifices H is very forcible, as there is no exit for the air and water current from the tube *a*, except through the discharging orifices H, and as these openings are constricted and of limited capacity, there is an accumulation of power within the tube *a*, and a nozzle effect is given by the constricted passage H, so that the jet of mingled air and water issuing therefrom penetrates far into the external atmosphere. There is practically no sediment carried into the tubes *a*, but if there should be any it is forced to the bottom of said tubes. Any formation of sediment is removable therefrom by unscrewing the cap E, and withdrawing the plugs F.

In Figs. 7 and 8 is shown a modified form of the apparatus. In Fig. 7 B' is the coupling and C' the enlargement to form the internal space or chamber. Four (or any other desired number of) pipes, designated as *a'*, *a'*, are grouped or clustered symmetrically around a central rod M, which is longitudinally grooved, as illustrated in Fig. 8. These grooves are concaved and of a curvature to adapt them to serve as seats to receive and support the tubes *a'*, respectively. These tubes *a'* may be secured to each other by solder, indicated at *m*, or otherwise, and may also be soldered or secured to the central rod M. N, N, are plugs to close the lower ends of the tubes *a'*, *a'*. Each tube *a'* has a discharging orifice (not shown) which opens into the concaved portion of an annular flange G'. The deflector is indicated in Fig. 7, by dotted lines and is designated as D'. The operation of the

device illustrated in Figs. 7 and 8 is the same as that of the device shown in Figs. 1 to 6, inclusive.

It is evident that the device need not be constructed of several (originally) separate pipes or tubes, soldered or secured together as specified, but may be cast in one piece of metal, having the longitudinal exterior corrugations illustrated in Fig. 7 and provided with tubular passages, which are either formed while in the mold, or subsequently bored out.

The purpose of having a plurality of tubes or passages *a* (or *a'*) is to increase the proportionate interior tubular surface in relation to the volume of the contents of each tube or passage, so that said contents have a relatively increased impinging contact with the tube or passage, by means of which the passing current is more frequently diverted and with more comparative force, and so more broken up, thus insuring a very thorough mixture of the air and water. The finer this mixture, the more readily it is absorbed by the external atmosphere, and the greater the quantity of water which said atmosphere can take up and assimilate; and besides this, the discharge is more uniform in quantity, and the distribution of it in the different radial directions is more equal than if there were one single column of mingled air and water in a single tube, discharged through a single nozzle, or even through a plurality of radially directed orifices. The comminution of the water element of the volume in the tubes *a* (or *a'*) should be so fine and the mixture so nearly perfect that the water discharged is in a sufficiently fine spray so as not to be liable to condense and consequently to drip. I have demonstrated that by my improved humidifying device hereinbefore described, three gallons of water per hour can be discharged and dissipated into the natural atmosphere without any drip.

It is seen that the discharging orifices H are not adjustable, but are of invariable capacity. It has been found by experience that by attempting to vary the dimensions of such discharge openings, a considerable degree of skill and care is necessary in order to prevent drippage. In my device, the size of the discharging orifices is determined carefully by experiment, and when so fixed, is incapable of variation, thus obviating all danger of drippage, or the exercise of any special care or skill, the results having been exactly predetermined and the discharge rendered positive, uniform and reliable.

I claim as a novel and useful invention and desire to secure by Letters Patent:—

1. In a humidifier for discharging mingled water and air under pressure, the combination of a nozzle having a plurality of tubular passages extending longitudinally

through said nozzle and parallel with each other, each of which passages has a closed bottom and is provided with a radially directed discharging orifice; a deflecting device mounted in the upper end of said nozzle centrally between said tubular passages; and an annular flange mounted on the nozzle at or adjacent to all said discharging orifices and approximately in the plane thereof, and provided with a concaved upper surface; all arranged so that the current of said mingled water and air is divided and separated by the deflecting device and directed thereby through the tubular passages in separate currents, which are discharged therefrom upon the concaved surface of the annular flange.

2. In a humidifier, the combination of a plurality of parallel tubular passages constituting a nozzle, and each having intermediate its ends a discharging orifice directed radially outward; a detachable plug closing the bottom of each of the tubular passages; an annular flange mounted on the nozzle at right angles thereto and having a concaved upper surface adapted to receive the discharge from all the tubular passages and to spread and direct the currents discharged from said passages; a conical deflector located at the upper end of said passages and centrally between the same; and a tube having a chamber wherein said passages open at the upper end thereof and wherein said deflector is located, which tube is adapted to conduct into said chamber mingled water and air under pressure.

3. In a humidifier, the combination of a nozzle, having its upper and lower ends threaded and provided with a plurality of parallel tubular passages; a supply pipe in

threaded engagement with the upper end of the nozzle and having a concentric chamber at its inner end, which pipe is adapted to conduct to said chamber and nozzle mingled water and air under pressure; a discharging device in each of said tubular passages intermediate its ends, all said discharging devices being in one plane which is at right angles to said tubular passages, respectively; a detachable plug closing the lower end of each of the tubular passages; a cap engaged with the lower screw threads of the nozzle; a spreader upon the nozzle in said plane adapted to receive the discharge from all said passages and to direct radially and dissemminate in the external atmosphere the said discharge; and a conical deflector located in said chamber upon the upper end of the nozzle and centrally between the upper ends of the tubular passages, arranged and adapted to divide the mingled water and air currents in the chamber and direct the divided currents equally into said tubular passages.

4. In a humidifier, the combination of a cast metal nozzle having a plurality of longitudinal bores and discharging orifices for said bores, respectively; a supply pipe adapted to convey to said nozzle mingled water and air under pressure; and a flange upon the exterior surface of the nozzle and so located and adapted as to receive and deflect said mingled water and air under pressure when discharged thereon from said chamber.

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

JAMES KELLY.

Witnesses:

HOWARD A. LAMPREY,
WARREN R. PERCE.