

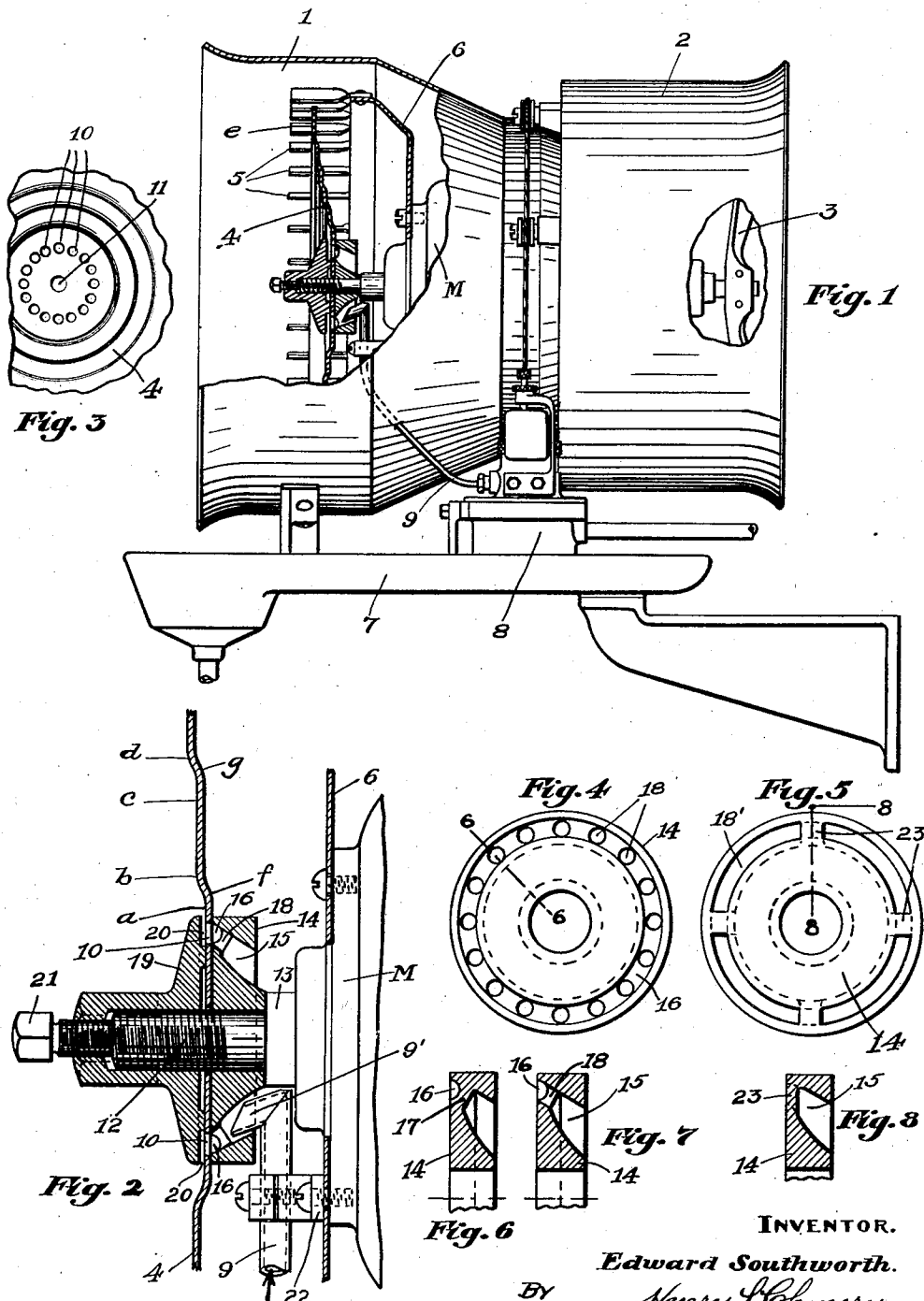
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E. SOUTHWORTH

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HUMIDIFIER

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INVENTOR.

Edward Southworth.

BY

Henry L. Cheney.

ATTORNEY.

UNITED STATES PATENT OFFICE

EDWARD SOUTHWORTH, OF PORTLAND, MAINE

HUMIDIFIER

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The invention hereinafter to be described relates, in general terms, to apparatus employed for the purpose of artificially humidifying rooms and interior spaces, the air in which is required to be brought to a certain degree of humidity—usually considerably above that of the outside atmosphere.

Specifically, the invention deals with certain improvements in humidifiers of that type embodying a horizontally operable shaft upon which is mounted a circular, dished plate or disc onto the side of which there is conveyed a regulated discharge of water; a fan-wheel which blasts a current of air across an impeditive element made in the form of a grid and which surrounds the disc; a motor which actuates the disc and fan-wheel, and a forward and rearward casing partially enclosing the above mentioned elements.

For the purpose of comprehensively illustrating my invention I have depicted it as in association with apparatus substantially similar to that just briefly described.

In the manufacture of devices for humidification purposes it has heretofore been considered of prime importance to hold the weight of the parts, from which the devices are fabricated, to the lowest possible limit, and for this reason it has become common practice among builders of this class of machines to employ aluminum, or aluminum alloys of which to construct them.

But, due to certain inherent characteristics of this metal it has been found that, under certain circumstances, serious difficulties arise from its use.

It is well known to those versed in metallurgical matters that the various chlorides have a strong affinity for and a very destructive effect on aluminum, and inasmuch as in most instances the water for the humidifying operation is drawn from the municipal water system in the locality in which the humidifier is in service, and for the reason that in perhaps a majority of cases this water has

been subjected to a chlorination treatment, the possibility of successfully employing this metal for humidifying machines, unless substantially chemically pure water is used or its application made in a different manner than that which ordinarily obtains, is very remote.

It is possible that a slight corrosive action takes place even while the chlorinated water is passing swiftly across the surface of the aluminum disc, but its greatest deleterious effect is observed when the humidifying machine has ceased to operate and this chemically treated water remaining on the disc allowed to slowly evaporate thereon. The chemical then has opportunity to more directly and leisurely attack the metal and in some instances has been known to have destroyed the disc in a comparatively short space of time.

The destructive action of the chemical on the metal, as above referred to, more frequently occurs in those machines in which the water is conveyed to the inner or inaccessible side of the disc, and more or less of the corrosion difficulty could be prevented, or at least alleviated, by wholly removing the disc from the machine and wiping and polishing its wetted surface. But this involves considerable labor and loss of time on the part of the operator—and he is quite likely to neglect his duty in this respect.

In the present invention I have provided facilities for conducting the humidifying water to the surface of that side of the disc lying nearer the outlet or discharge end of the humidifier. As this side is conveniently accessible to the operator it may be cleaned and polished at any stage or period of humidifier operation and this alone is of particular advantage as no stoppage of machine or water, entailing loss of time, is required. Further than this, the cleaning operation involves so little effort on the part of the attendant that he is likely to keep the

wet side of the disc in prime condition with a consequent increased efficiency of the humidifier.

To further provide for longevity of the wetted parts of the humidifying machine I may elect to employ a material of which to make them having less susceptibility to corrode than either aluminum or other base metals ordinarily employed in constructing these parts.

This material comprises an alloy of zinc, copper and nickel in substantially the proportions of 30—60—10 in weight, respectively. This alloy combines strength sufficient for the purpose, has non-corrodible and easy machining qualities, and is, moreover, somewhat lower in cost than the harder cupronickel compounds.

The essence of my invention resides in the water-conducting and discharging elements of a humidifier and consists primarily in the novel structure by means of which water taken from one side of the revoluble disc is forced through openings therein by centrifugal force and deposited on the opposite side of the disc, this structure being intimately connected in combination with the particular form of the disc and the material of which it is constructed.

The character of my invention may best be understood by reference to the description found in the following specification when taken in connection with the accompanying drawing in which is disclosed an embodiment thereof which, at the present time, I consider preferable to other possible forms in which the invention might be carried out.

In the drawing,—

Fig. 1 is a side elevation, partly in section, of a centrifugal type, horizontally disposed shaft driven humidifier;

Fig. 2 is a fragmentary sectional elevation showing the disc and water-receiving collar;

Fig. 3 is a fragmentary face view of the disc;

Figs. 4 and 5 show face views of two different designs of water-receiving collars;

Figs. 6 and 7 represent fragmentary sectional views of the water-receiving collar, shown in Fig. 4, before and after, respectively, drilling the water passage holes—the sections being taken on line 6—6, Fig. 4, and

Fig. 8 is a section on line 8—8, Fig. 5.

Similar reference characters are employed to identify like parts in all views of the drawing.

Referring to the drawing, 1 and 2 represent, respectively, the front and rear casing of a humidifier, M the motor which actuates the fan-wheel 3 and the water-discharging disc 4, 5 the grid or impeditive element and 6 the partition which excludes air, projected by the fan-wheel, from the space immediately at the rear of the disc 4. 7 is the catch basin, 8 the water-feed control apparatus

and 9 the pipe through which the water passes to the disc 4.

All of the foregoing, with the exception of the disc, form no part of the present invention.

By reference to Figs. 2 and 3 it will be observed that the disc 4 has drilled there-through a plurality of holes 10 spaced on a circle concentric with the shaft hole 11. Mounted on the shaft 12, adjacent the shaft collar 13, is a water-receiving collar 14 having an annular chamber 15 opening out of its rearward side. This chamber is of generally frusto-conical form, the smaller diameter being at the rearward side and its inner wall preferably of arcuate form in cross section.

On the side of the water-receiving collar, adjacent the disc 4, is a circumferential groove 16 of substantially semi-circular form and made of such depth as to leave a rib 17 forming the bottom of the chamber 15. Through this rib are bored a plurality of holes 18 preferably aligning, respectively, with the holes 10 in the disc 4.

On the opposite side of the disc is a clamp collar 19 having its side adjacent the disc and from its periphery inwardly cut away, as at 20, so as to completely uncover the holes 10.

The collar 4 is light-press fitted to the shaft 12 and the collar 19 has screw-threaded engagement with the shaft, which provides means for rigidly clamping the disc between the respective collars. To serve as a check to prevent accidental loosening of the collar 19 from its clamped engagement with the disc a set-screw 21 is provided.

The water supply pipe 9 is extended upwardly to a position immediately at the rear of the collar 14 and its end portion 9' bent downwardly at an acute angle to form an elbow which projects into the chamber 15. Suitable means are provided, as at 22, for fixedly securing the pipe to some stationary portion of the humidifier.

Fig. 5 illustrates a modified form of water-receiving collar. In this design the drilled holes are eliminated, for the rib 17 (in the form shown in Fig. 4) is cut away except at the bridges 23 which tie the outer and inner portions of the collar together, and the space 18', which serves the same purpose as the drilled holes 18 (Fig. 4), communicates directly with the chamber 15.

The collar illustrated in Fig. 4 has one advantage—it may be turned and polished all over previously to drilling the holes 18 thus permitting the water to flow more freely and the collar to be in better balance on the shaft than if portions (between the bridges) were left unfinished.

In describing the operating or functional characteristics of the invention reference should be had to Figs. 1 and 2.

Water under regulated control by any suit-

able means is discharged through and from the pipe 9 and elbow 9' into the chamber 15 and is immediately picked up by centrifugal force and thrown against the flaring side of the chamber, forced outwardly through the holes 18 and 10 into the space 20, thence radially along the surface of the disc 4.

As water thrown centrifugally off a revolving object travels in a plane substantially at a right angle to the axis of the revolving member, the water will, in the present instance, move along the surface *a* of the disc until it reaches the step *b* where it is slightly impeded, but after surmounting the step (*b*) proceeds along the surface *c*, and again meets slight opposition to its advance when it arrives at the step *d*,—this action continuing until upon reaching the surface *e* it flies off into space and into violent impact with the grid 5.

On each successive flat portion of the disc, as at *a*, *c* and *e*, in outward progression, the speed of the water gains in velocity due to the increased speed at which the portions of the disc move as the periphery is approached, but it is obvious that at each step, as at *b* and *d*, there is a tendency of the water to flatten out, so to speak, the water when starting from the collars near the axis of the disc being of more or less globular formation.

This slight resistance to the outward movement of the water tends to completely spread it over the surface of the disc and eventuates in its being thrown therefrom in a thin film which more readily is broken up into vapor when it is impacted on to the grid element than if it passed off in a denser mass.

Referring to Fig. 2, let it be assumed that the water is conducted on to the right-hand or inner surface of the disc 4. It would appear possible, if not in fact probable, that more or less of the water, when it reached the inner step *f*, would be thrown off centrifugally on a radial line from this point directly into space and into comparatively light impact with the grid, due to the slow peripheral speed of this part of the disc. This tendency, too, would become more pronounced as the remaining water moved outwardly to the other steps *g*, etc., because it would then have gained in velocity and have lost much of its surface tension on the disc.

It is, therefore, thought to be advantageous to convey the water wholly to the concave and outwardly disposed side of the disc, for in this case substantially all of the water remains on the disc and moves outwardly thereon until finally discharged therefrom at extreme peripheral velocity into violent impact with the grid element.

In recapitulation I desire to again point out and stress the advantage gained by disposing the working or wet side of the disc so that it is within easy access of the operator for cleaning and polishing (see Fig. 1), for

it is obvious that if the surface of the disc be kept bright the water will spread more evenly and flow more freely over its side than if it was left to corrode, or even tarnish, for the reason that less surface frictional resistance to the movement of the water is encountered.

What I claim and desire to secure by Letters Patent is:

1. A humidifier, comprising in combination a revoluble disc having a plurality of concentrically disposed, overhanging steps spaced on the water-contacting side thereof, said steps adapted to be arranged to form a depression on the side of said disc nearer the outlet end of said humidifier, a plurality of apertures through said disc arranged in a circle concentric with and near its axis, and means to conduct water to and through said apertures and thence to the depression side of said disc.

2. In a humidifier, the combination of a revoluble disc, a stepped depression on that side of said disc which faces the discharge end of said humidifier, a plurality of apertures through said disc arranged in a comparatively small circle concentric with the axis of said disc, a collar disposed at the opposite side of said disc and abutting therewith, and means whereby water may be conducted through said collar and through said apertures and then deflected on to the depression side of said disc.

3. In a humidifier, the combination of a revoluble shaft, a disc fixedly mounted on said shaft, a stepped depression on the forward, water-receiving side of said disc, a grid surrounding said disc and spaced therefrom, a plurality of apertures through said disc disposed in a circle concentric with the axis of said disc, a collar on said shaft abutting the rearward side of said disc, a chamber in said collar, a continuous annular passage-way out of said chamber on the rearward side of said collar, apertures out of the forward side of said chamber communicating, respectively, with the apertures in said disc, whereby, upon rotating said disc the water may be drawn from said chamber through the respective apertures and by centrifugal force distributed over the surface of the forward side of said disc.

4. In a humidifier, the combination of a revoluble, horizontally disposed shaft, a disc fixedly mounted on said shaft, a stepped depression on the forward side of said disc, nearest the outlet end of said humidifier, a grid surrounding and spaced from said disc, a plurality of apertures in said disc arranged on a circle concentric with the axis of said disc, a collar on said shaft disposed rearwardly of and abutting said disc, a chamber in said collar having tapering walls diverging toward said disc and having an annular, continuously extending opening out of its rearward side, a water-passage-way out of

the opposite side of said chamber in direct communication with the apertures in said disc, a second collar adaptable of screw-threaded engagement with the threaded end
5 of said shaft and disposed in advance of and in contact with said disc, an extended portion on said second collar spaced axially from said disc and extending radially beyond the apertures in said disc, whereby water passing
10 through said apertures is deflected radially and deposited on the forward side of said disc, a water-conveying pipe, and an elbow on said pipe extending into said chamber.

In testimony whereof I affix my signature.

15 EDWARD SOUTHWORTH.

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