May 7, 1946. W. FELDERMANN 2,399,862

HUMIDIFIER

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Fig. 1

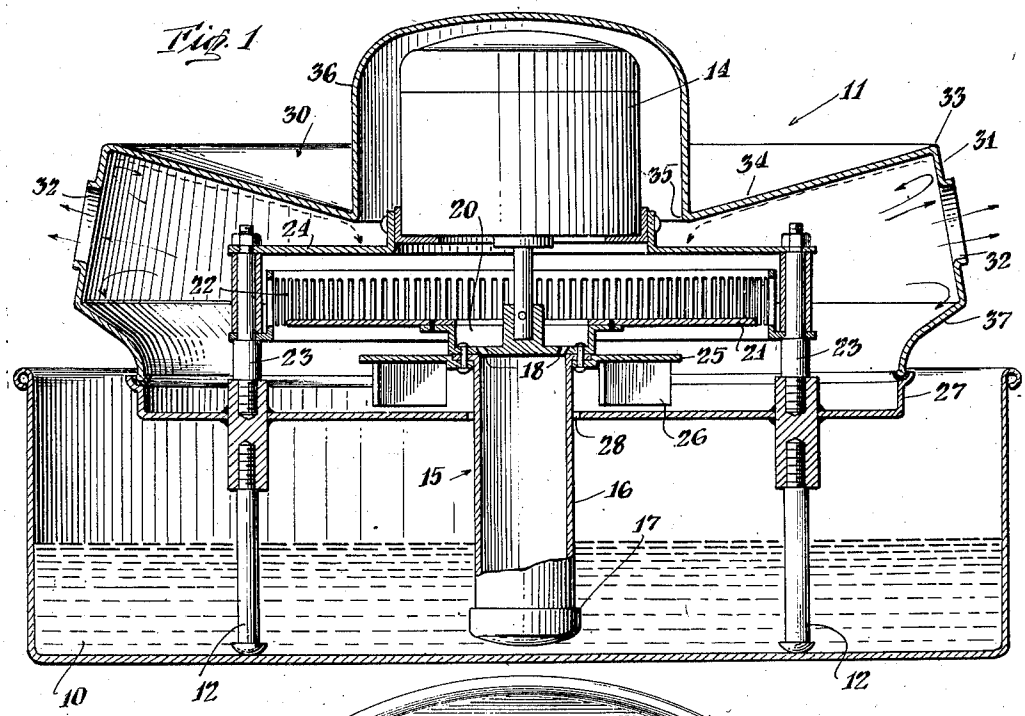
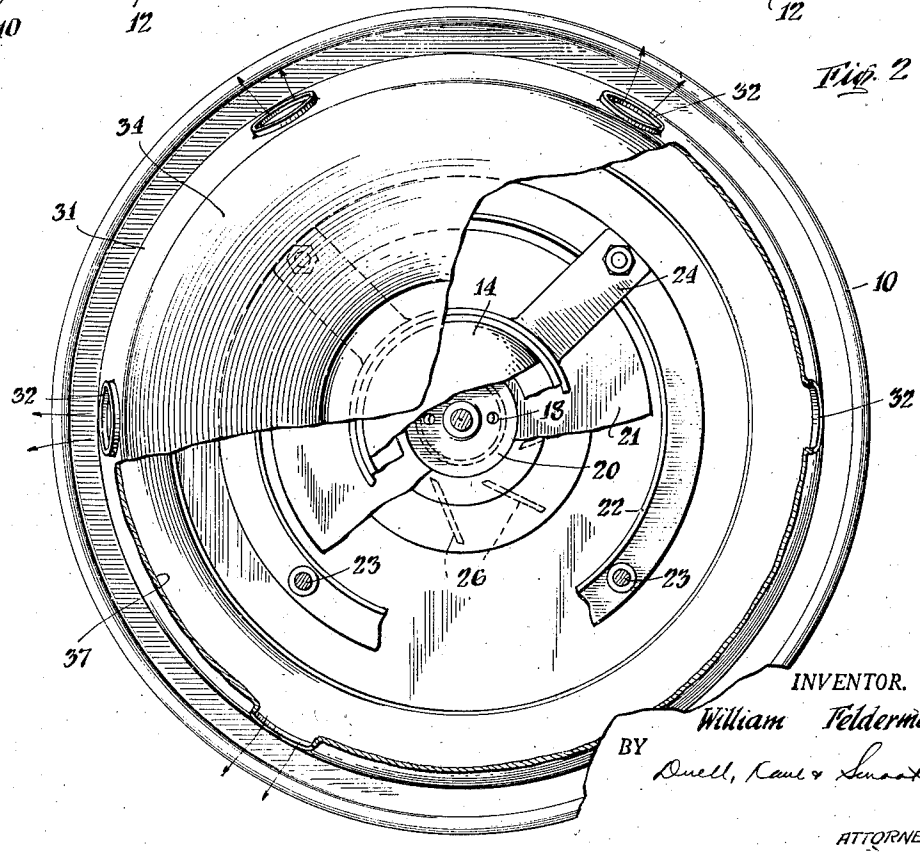


Fig. 2



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HUMIDIFIER

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4 Claims. (Cl. 261—30)

This invention relates to improvements in humidifiers, and particularly to an improved directional discharge hood for humidifiers of the water atomization type.

It is an object of the invention to provide a discharge hood through which finely atomized water may be projected by air pressure or centrifugal force, and which will prevent the accidental discharge of relatively large drops of water.

It is an object of the invention to provide an improved humidifier wherein the relatively large drops of water which sometimes accompany the flow of microscopic droplets of atomized fluid are trapped and prevented from passing outwardly with the humidifying vapor.

It is an object of the invention to provide an improved humidifier hood in which relatively large droplets of water are prevented from mingling with the vapor discharge and are caused to flow countercurrently to the vapor stream to return to the unit for reatomization.

It is an object of the invention to provide an improved hood for a humidifier of the liquid atomization type, the upper surface of said hood sloping downwardly from the discharge ports area to the center to cause heavy drops of liquid to flow along such underside to the center of the unit.

Humidifiers which atomize water for discharge into the atmosphere are generally more efficient and adaptable to special installation requirements than are humidifiers of the evaporation type. Atomization humidifiers may readily be installed in the case of printing establishments or spinning mills, for example, directly above or adjacent the press or loom. In stores, atomization humidifiers may be located near the ceiling, effectively utilizing space which ordinarily is non-productive and protecting the humidifier against accidental damage by the patrons of the store.

A serious difficulty which has hitherto been encountered with atomization humidifiers is the tendency of them to spit or eject relatively large drops of water. In installations of such humidifiers above looms or presses the discharge of such drops of water may do serious damage to the materials being worked upon; and in stores or the like, the large drops of water may be a source of annoyance to the patrons.

I have found that while it is a relatively easy matter to atomize the water and to forcibly discharge it, as by air pressure or centrifugal force, from the atomizer unit, it is difficult to keep the outgoing vapor stream free of large drops of water. The large water drops seemingly result from the condensation or accumulation of water on the underside of the hood or discharge apparatus by means of which the atomized streams of fluid are directed outwardly into the room or space in which the unit is located. By sloping the upper surface of such hood downwardly from a high spot at the rim of the hood to a low spot substantially centrally of the hood, and by providing the said underside of the hood with a smooth relatively polished surface, the condensed and otherwise accumulated water is made to flow away from the discharge nozzles, to drop back into the reservoir of the unit at a location so remote from the discharge ports that the large drops of water cannot be discharged with the outgoing vapor streams.

The nozzles or other discharge ports are located below the outermost upper rim of the hood, and the turbulence created at the pocket above the nozzles acts to initiate the flow condensed water rearwardly along the sloping underside of the unit.

Other features and advantages will hereinafter be described.

In the accompanying drawing:

Fig. 1 is a section through a humidifier unit embodying the present invention; and

Fig. 2 is a plan view of the unit of Fig. 1, with certain elements broken away to reveal the underlying association of structures.

Referring to the drawing, the improved humidifier comprises a pan or reservoir **10**, which is preferably provided with means for automatically maintaining a water level, as is conventional, and a humidifier unit **11** supported within the reservoir as by any necessary or desirable number of standards **12**.

The humidifier, in the illustrated form, includes a relatively high speed electric motor **14**, to the shaft of which is fixed a pump and discharge assembly **15**. A tube **16** extends downwardly into the water content of the reservoir **10**, and terminates in an impeller **17** which, upon rotation by the motor, pumps the water upwardly through the tube and the ports **18**, **18** into a relatively small reservoir **20**.

The water within the reservoir **20** overflows on to the surface of the rotating plate **21** from which the water is centrifugally expelled, as a relatively fine sheet, to be broken up by a fixed circular comb or screen **22** disposed about the circumference of the plate **21**. The comb comprises a large number of relatively closely spaced apertures. Said comb, as shown in Fig. 1, is supported upon the standards **23** to the upper ends of which are secured the legs of motor support spider **24**. Beneath the reservoir **20**, and secured thereto for rotation with the unit, is a centrifugal fan **25** having a suitable plurality of angularly disposed blades **26**. A catch basin **27** is suitably secured to the standards **12** at a location below the fan blades such as to prevent the blades from contact with any water which may be in process of draining through the central aperture **28** into the reservoir **10**.

Supported upon the rim of the basin 27 in water-sealing relationship therewith is a discharge hood 30. Said hood is advantageously formed from spun metal, and is characterized by an inwardly sloping peripheral wall 31 pierced at intervals by the discharge openings 32, disposed a relatively short distance beneath the upper rim 33. From said rim 33, the upper wall 34 of the hood slopes downwardly toward the center terminating in a relatively sharp drip edge 35 within the boundary of the comb 22. A central dome 36 provides a housing for the motor 14.

The underside of hood 30 is given a relatively polished surface, free of any greasy or oily film.

The water centrifugally discharged from the plate 21 is broken up into very fine droplets by passage through the comb 22 and is carried by means of the air stream created by the centrifugal fan 26, through the respective nozzles or discharge openings 32, whence it is absorbed by the atmosphere. Large droplets of water which may for any reason be passed through the comb 22 will impinge upon the lower side wall 37 of the hood beneath the openings 32 and will be caught by the basin 27. Water which may condense upon the underside of the upper wall 34 of the hood will flow back to drip from the edge 35 on to the rotating plate 21 whence it will be re-atomized for discharge.

The return flow of said condensed water is aided by the swirling or reverse flow of the air stream in the area immediately above the nozzles 32, as illustrated by the arrows in Fig. 1. Thus, in addition to the effect of gravity in returning the condensed droplets to the plate 21, there is a positive impulse afforded by the air stream.

The ports 32, as appears from Fig. 1, are at a level well above the level of the centrifugal disc 21, and heavy drops of water will fall into the pan, or impinge against the lower wall 37. An accumulation of water about the periphery of the respective ports 30 will not be picked up by the outflowing vapor stream, but will drop into the reservoir 10, which, as shown, has a diameter larger than that of the hood. The inward slope of the wall 37 beneath the openings 32 prevents such droplets from climbing to a position where they might be discharged through the openings.

The outflowing vapor stream, and condensation on the underside of the hood 30 maintains the hood at a relatively low temperature, which assists in dissipating the heat generated by operation of the motor 14.

It will be seen, therefore, that the several structural features of the hood 30, and their relationship with the atomization and fan means of the unit, cooperate in preventing the passage of undesirable large drops of water from the unit.

Whereas it is obvious that among the several objects of the invention as specifically afore noted are achieved, it is apparent that numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A humidifier comprising means for mechanically atomizing water, a fan for creating an air stream within which said atomized water is entrained, and a hood enclosing said atomizer, said hood having an apertured side wall through which a portion of said air stream is discharged, said side wall sloping upwardly and inwardly above the apertures thereof; an imperforate top wall connecting the said side wall and sloping uniformly downward therefrom to a sharply defined drip edge internally of said atomizer means; the corner defined by the upper portion of the side wall and the top wall providing an obstruction to free air flow which reverses the normal outward directional flow of a portion of said air stream beneath said top wall to assist the gravity flow to said drip edge, of water gathering on the undersurface of said top wall.

2. A humidifier, including a substantially circular, vertical wall having a plurality of closely spaced apertures, means for forcibly passing a film of water through said wall means to break up said film into a multiplicity of minute particles, a fan disposed beneath said wall means to generate an air stream to intersect said water particles for entrainment in said air stream, and a hood for said humidifier having apertured side walls through which the air stream and therewith entrained water is discharged in a susbtantially radial direction, said hood having a top wall sloping continuously uniformly downwardly from a high point at the said side wall to a sharply defined drip edge within the area bounded by said apertured wall means, whereby water condensed on the underside of said hood will be carried back to a drip point within said wall means for reatomization.

3. A humidifier, comprising a horizontally disposed plate, means for rotating said plate at relatively high speed, means for feeding a substantially continuous supply of water to the surface of said plate during rotation thereof whereby said water is horizontally discharged by centrifugal action; a screen disposed relatively closely about the periphery of said plate and having relatively small apertures through which said horizontally discharging water must pass; fan means disposed beneath said plate to create a radially flowing air blast; and a hood for said humidifier having a side wall and a top wall sloping downwardly from a high point at the junction with said side wall to a drip edge above said plate; said side wall having air discharge apertures above the level of said plate, whereby the water particles discharging through said screen intersect the air blast and are carried outwardly and upwardly thereby through said apertures.

4. A humidifier comprising a hood having a relatively low side wall terminating in a top wall which slopes continuously downwardly to a sharply angled drip edge, said side wall having air-discharge apertures spaced thereabout in an area beneath the junction of said side and top walls; a centrifugal-discharge fan disposed within said hood at a level beneath the level of the apertures for generating an air blast to be discharged through the said apertures in an upward and outward direction; a water reservoir; a horizontally rotatable disc disposed above said fan and beneath the level of said apertures; means for feeding water to the surface of said disc; wall means having a plurality of spaced apertures disposed relatively closely about said disc; and means for rotating said plate at high speed to centrifugally discharge water therefrom through the apertures of said wall means to intersect and commingle with the air blast flowing upwardly and outwardly through said apertures.

WILLIAM FELDERMANN.