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LIQUID ATOMIZERS

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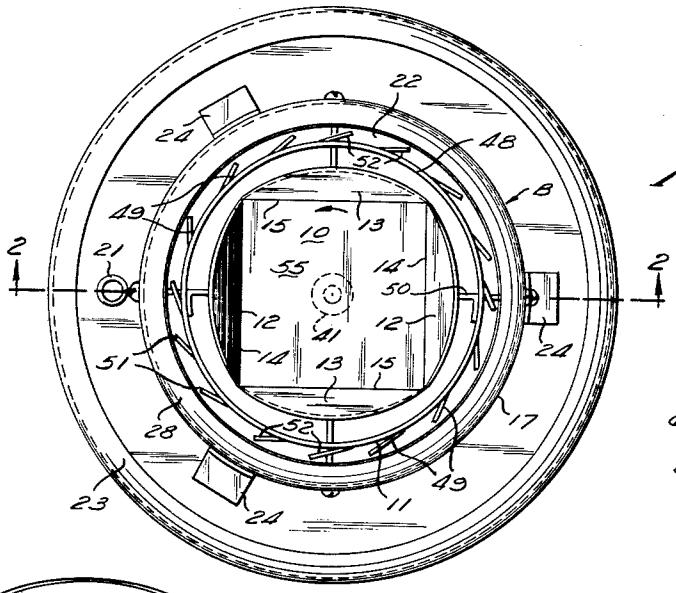


Fig. 1



Fig. 3

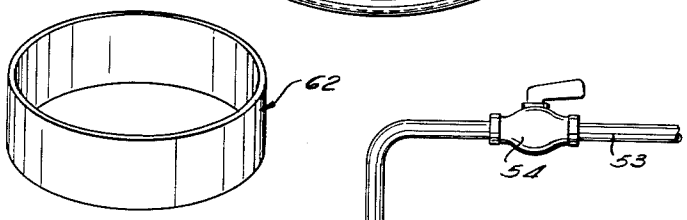


Fig. 4

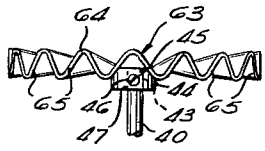


Fig. 5

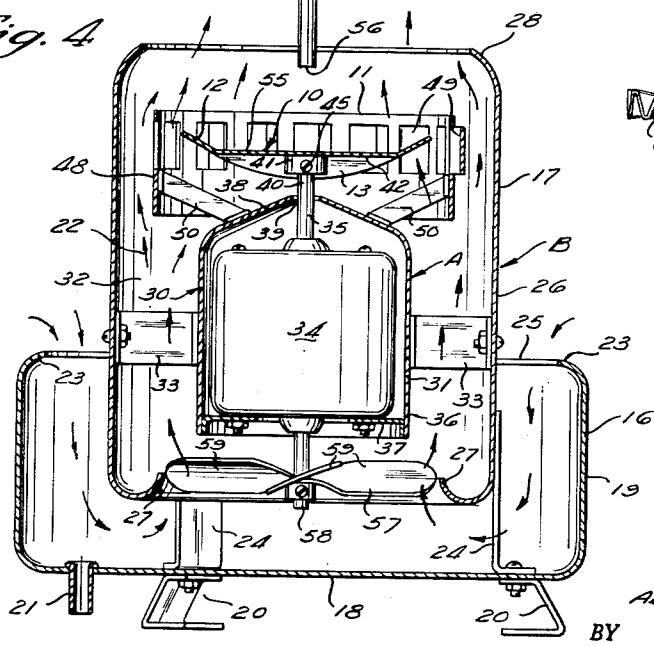


Fig. 2

INVENTOR.
ABRAHAM I. CAPLOW
BY
WATTS, EDGERTON, PYLE & FISHER
B. D. Watts
ATTORNEYS

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LIQUID ATOMIZERS

Abraham I. Caplow, University Heights, Ohio, assignor to Philip Borkat, South Euclid, Ohio

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This invention is a continuation-in-part of my copending application filed on February 11, 1957, Serial No. 639,338, Patent No. 2,970,824 dated February 7, 1961, entitled "Humidifiers."

The present invention relates broadly to improvements in liquid atomizers and more specifically to an apparatus for increasing the amount of water or other liquid in the air of a room or other confined area.

One of the objects of the invention is to provide apparatus for the dispersion of a liquid in a highly atomized state of suspension in the air or other gaseous substance.

Another object of the invention is to provide a shroud around the tortuous circumferential edge of a rotor to disperse the liquid by impingement on the shroud in a wide band whereby a particle of liquid which is deposited on the shroud is not followed immediately by another particle along the same path, thereby resulting in a high degree of dispersion.

Another object of the invention is to provide a rotor having a tortuous circumferential edge and a louvered shroud surrounding the circumference of said rotor to arrest the flight of droplets of liquid being dispersed where such droplets are incapable of being held in suspension in the gaseous substance and to break such droplets of liquid into smaller particles that may be capable of being held in suspension.

Further objects of the invention reside in the provision of a liquid atomizer that is efficient of operation, economic of manufacture, attractive in appearance and noiseless in operation.

Other objects and advantages more or less ancillary to the foregoing, and the manner in which all the various objects are realized, will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiments of the invention.

In the drawings:

FIG. 1 is a top plan view of the improved liquid atomizer;

FIG. 2 is a front elevational view thereof shown in section on a line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view of a modified form of shroud having perforations therein;

FIG. 4 is a fragmentary sectional view of a modified form of shroud without perforations therein;

FIG. 5 is an elevational view of a modified form of the rotor of FIGS. 1 and 2 having a tortuous edge with radial corrugations;

Referring to the various figures of the drawings it will be seen that the liquid atomizer apparatus comprises a motor driven atomizer mechanism member A mounted within a metallic cylindrical air tube assembly member B.

Referring first to said member A, the liquid throwing circular metal rotor disc **10** and the shroud **11** surrounding the circumferential edge of said rotor disc **10** are shown in my copending application filed February 11, 1957, Serial No. 639,338, Patent No. 2,970,824. The said rotor disc **10** is formed with opposite segmental sections **12** and opposite segmental sections **13**. The segments **12** are bent upwardly from chords **14** and the segments **13** are bent downwardly from chords **15**, the segments **12** and **13** are inclined at an angle of approximately thirty degrees from the plane of the central portion of said rotor disc **10**.

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Referring first to FIG. 2, the said air tube assembly member B comprises a metal pan **16** and a cylindrical metal air tube **17**. The said pan **16** has a circular bottom **18** and a cylindrical side wall **19** and legs **20** forming a tripod mount secured to the bottom **18**. The said bottom **18** of the pan **16** has a drain **21** to remove the liquid that does not become air-borne as it passes through the air stream **22** within the air tube **17**. The said side wall **19** of the pan **16** has an inturned flange **23** integral with the top of said side wall **19**.

The said cylindrical air tube **17** is somewhat smaller in diameter than the diameter of the inturned top flange **23** and is vertically mounted within said pan **16** in coaxial alignment with the pan side wall **19**. The said air tube **17** is attached to and spaced apart from said pan **16** by legs **24** that may be secured in place by any suitable means such as spot welding or bolts and nuts. The said spacing apart provides an air passage **25** between the said flange **23** and the side wall **26** of said air tube **17**. The air tube side wall **26** has an inturned flange **27** at its lower edge and an inturned flange **28** at its upper edge.

The said motor driven atomizer mechanism member A comprises a motor housing **30** having a generally cylindrical side wall **31** and is mounted vertically within said air tube **17** and is spaced apart therfrom to form an air passage **32** therebetween and secured thereto by brackets **33**. An electric motor **34** having a source of power (not shown) with its armature shaft **35** in a vertical position is mounted within the motor housing **30** and secured to the lower end **36** thereof by brackets **37** in the usual manner.

The motor housing **30** has an integral conical upper end **38** with a central opening **39** at the apex thereof through which the upper end **40** of the armature shaft **35** extends.

The said liquid throwing rotor disc **10** is mounted in a horizontal plane atop the upper end **40** of the vertical armature shaft through a co-axially aligned cylindrical boss **41** affixed to the lower face **42** thereof. The said boss **41** has a co-axially aligned recess **43** in the lower end **44** thereof into which the said upper end **40** of the armature shaft is inserted and is detachably secured thereto by a set screw **45** placed in a screw threaded tapped and drilled opening **46** in the side wall **47** of said boss and extending into said recess **43**.

The said rotor disc **10** is surrounded by the said shroud **11** which has a cylindrical vertical side wall **48**. The shroud side wall **48** preferably has spaced apart louvers **49** extending outwardly therefrom and with their faces in a vertical plane. The said shroud **11** has legs **50** that are mounted upon the upper conical end **38** of the motor housing **30** by the usual method such as spot welding or bolts and nuts so that the open ends **51** of the louvers **49** are first approached with respect to the rotation of said rotor disc **10**. It will be seen that when the said rotor disc **10** is operated the droplets of liquid thrown therefrom will then impinge upon the inner face **52** of the louvers **49** and thus become broken into smaller particles before passing into the air passage **32**.

A metal liquid supply pipe **53** having a valve **54** therein to regulate the amount of liquid received from a liquid supply source (not shown) to the upper face **55** of the rotor disc **10** is placed above and spaced apart from the rotor disc **10** and with its opening **56** in substantial vertical

alignment with the center of the upper face 55 of said rotor disc 10.

A multi-bladed fan 57 is mounted horizontally in the usual manner on the lower end 58 of said armature shaft 35 adjacent to the lower flange 27 of the air tube 17. The fan blades 59 are positioned so that the air stream 22 created by the operation of said armature shaft 35 and fan 57 will pass downwardly through the air passage 25 into the pan 16 and then upwardly through the area of the fan blades 59 and into the air passage 32 within the air tube 17 and out through the top opening thereof adjacent the flange 28.

Referring to FIG. 3, it will be seen that a modified form of a shroud 60 with perforations 61 therein may be substituted for the shroud 11. FIG. 4 shows a modified form of a shroud 62 without perforations may be substituted for the shroud 11 for the atomization of certain liquids where desirable.

Referring to FIG. 5, it will be seen that a modified rotor disc 63, having a tortuous circumferential edge 64 with radial corrugations 65 may be substituted for the rotor 10 and used for the atomization of certain liquids where desirable.

In the operation of the device it will be seen that when the motor 34 is energized the fan 57 and the rotor disc 10 mounted on the armature shaft 35 will begin to revolve. The fan 57 while revolving thus creates an air stream 22 having a path that will be downward within the pan 16 and toward the fan 57 because of the resulting partial vacuum and upward within the air passage 32 of the air tube 17 because of the additional pressure above the fan 57. When the liquid supply valve is opened the liquid to be atomized will flow through the opening 56 of the supply pipe 53 and drop upon the central area of the upper face 55 of the rotor disc 10. The centrifugal force of the revolving rotor disc 10 will carry said liquid toward and be thrown from the periphery thereof at approximately the speed of rotation of the said periphery.

The droplets of liquid will then reach the said air stream 22 within the air tube 17 and will become airborne and remain in suspension if not too heavy. The heavy or larger droplets will spatter against the side wall 48 and/or the louvers 49 of the shroud 11 in a wide band determined by the angle of the disc segments 12 and 13, and thus become broken into smaller particles that may be capable of being held in suspension and become airborne in the said air stream 22. The remaining droplets that do not become air-borne fall to the pan 16 and are removed through the drain 21.

Although the foregoing description is necessarily of detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

What is claimed is:

1. A device which is designed to receive a liquid and air from suitable sources of supply and transform said liquid into a suitable mixture for providing a humidity condition and said device comprising in combination:

(a) a drainage pan,

(b) a cylindrical air tube mounted vertically in said drainage pan and spaced apart therefrom and support means therefor,

(c) a cylindrical motor casing mounted centrally within said air tube and affixed thereto in co-axial relation therewith and spaced apart therefrom and defining thereby an annular airstream passage therebetween,

(d) a motor mounted within said motor casing and in vertical co-axial relation therewith,

(e) a double extended armature shaft in said motor,

(f) a liquid throwing rotor disc having peripheral segments alternately bent in opposite oblique planes from the plane of said disc and mounted within said air tube in a horizontal plane on the upper extension of said shaft and driven by said shaft,

(g) an apertured shroud positioned above said annular airstream passage and in the path of the liquid thrown from said rotor and surrounding said rotor disc and spaced in relation with the periphery thereof and support means therefor,

(h) liquid supply means above and spaced apart from said rotor disc, and

(i) a fan mounted on the lower extension of said shaft in a horizontal plane below said motor and driven by said shaft for generating an upward air current in said annular airstream passage.

2. A device which is designed to receive a liquid and air from suitable sources of supply and transform said liquid into a suitable mixture for providing a humidity condition and said device comprising in combination:

(a) a drainage pan,

(b) a cylindrical air tube mounted vertically in said drainage pan and spaced apart therefrom and support means therefor,

(c) a cylindrical motor casing mounted centrally within said air tube and affixed thereto in co-axial relation therewith and spaced apart therefrom and defining thereby an annular airstream passage therebetween,

(d) a motor mounted within said motor casing and in vertical co-axial relation therewith,

(e) a double extended armature shaft in said motor,

(f) a liquid throwing rotor disc having peripheral segments alternately bent in opposite oblique planes from the plane of said disc and mounted within said air tube in a horizontal plane on the upper extension of said shaft and driven by said shaft,

(g) a shroud with outwardly extending louvers positioned above said annular airstream passage and in the path of the liquid thrown from said rotor and surrounding said rotor disc and spaced in relation with the periphery thereof and support means therefor,

(h) said shroud louvers extending across the planes of the ridges of the upper and lower bent segments of said rotor disc with the free ends thereof pointed in a direction opposite the direction of travel of said rotor disc,

(i) liquid supply means above and spaced apart from said rotor disc, and

(j) a fan mounted on the lower extension of said shaft in a horizontal plane below said motor and driven by said shaft for generating an upward air current in said annular airstream passage.

3. A device which is designed to receive a liquid and air from suitable sources of supply and transform said liquid into a suitable mixture for providing a humidity condition and said device comprising in combination:

(a) a drainage pan,

(b) a cylindrical air tube having an inturned flange at its lower end mounted vertically in said drainage pan and spaced apart therefrom and support means therefor,

(c) a cylindrical motor casing mounted centrally within said air tube and affixed thereto in co-axial relation therewith and spaced apart therefrom and defining thereby an annular airstream passage therebetween,

(d) a motor mounted within said motor casing and in vertical co-axial relation therewith,

(e) a double extended armature shaft in said motor,

(f) a liquid throwing rotor disc having a tortuous circumferential edge with radial corrugations mounted within said air tube in a horizontal plane on the upper extension of said shaft and driven by said shaft,

(g) a shroud with outwardly extending louvers posi-

tioned above said annular airstream passage and in the path of the liquid thrown from said rotor and surrounding said rotor disc and spaced in relation with the periphery thereof and support means therefor,

(h) said shroud louvers extending across the planes of the ridges of the upper and lower radial corrugations of said rotor disc with the free ends thereof pointed in a direction opposite the direction of travel of said rotor disc,

(i) liquid supply means above and spaced apart from said rotor disc, and

(j) a fan mounted on the lower extension of said shaft in a horizontal plane below said motor and driven by said shaft for generating an upward air current in said annular airstream passage.

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HARRY B. THORNTON, *Primary Examiner.*

HERBERT L. MARTIN, *Examiner.*