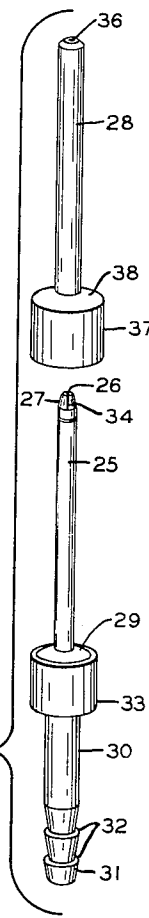
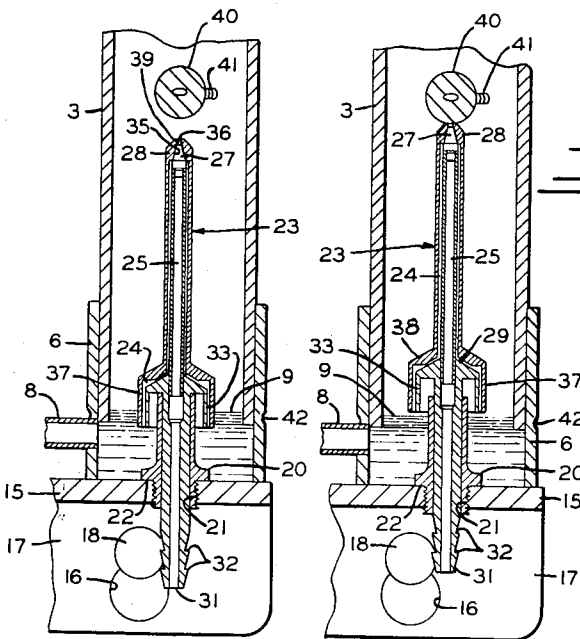
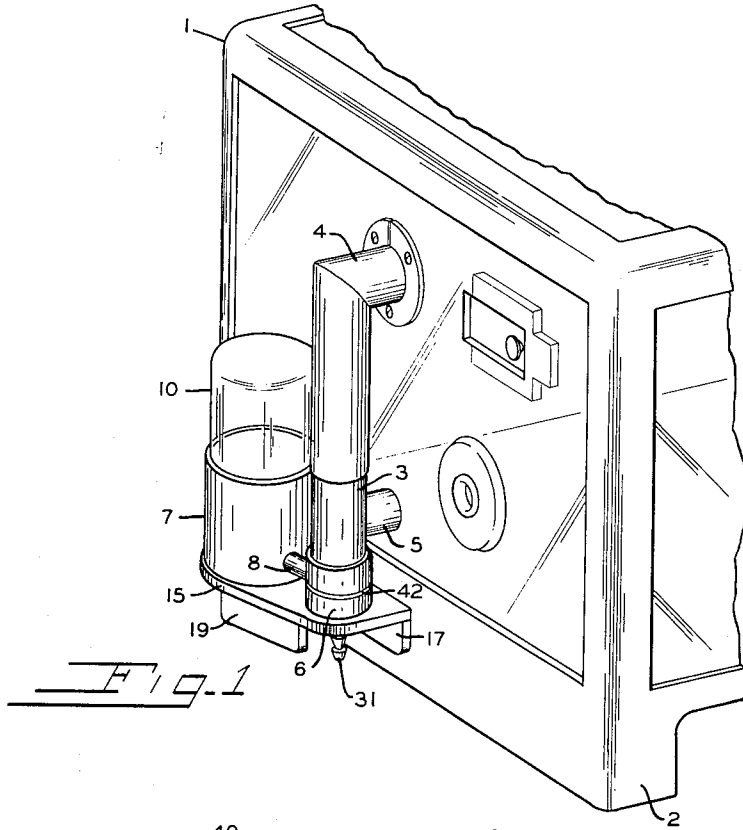


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J. DORSAK ET AL
NEBULIZER TIP ASSEMBLY

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INVENTOR.
JOHN DORSAK
THOMAS F. VAN DEN BERG
BY
DES JARDINS, ROBINSON & KEISER
Robert F. Robinson
THEIR ATTORNEYS

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2,740,665

NEBULIZER TIP ASSEMBLY

John Dorsak, Cleveland, and Thomas F. Van Denberg, Chagrin Falls, Ohio, assignors to The Gordon Armstrong Company, Inc., Cleveland, Ohio, a corporation of Ohio

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6 Claims. (Cl. 299—86)

This invention relates to an atomizer or nebulizer, and particularly to an atomizer or nebulizer so constructed for use in a vaporizer that it may be readily purged of any obstruction in the liquid feed supply line by directing the compressed gas feed supply through said liquid feed supply to remove the obstruction.

The atomizer or nebulizer is especially suited for being mounted in the liquid supply reservoir of a vaporizer with its discharge end disposed in or adjacent to a treating chamber, such as an incubator, or to a circulating air conduit associated with said treating chamber. It is advantageously mounted in a vertically disposed circulating conduit on one end of the incubator, and it is movably mounted so as to be readily raised for abutting the discharge nozzle end against a member for closing the outlet opening to direct the gas feed supply backward through the liquid feed passage or passages, said member being normally out of abutting relation with the nozzle end but sufficiently near to serve as a baffle against which the liquid and gas mixture is ejected for breaking up said liquid into the proper size globules and for more intimate mixture with the gas.

One of the main objects of the invention is an atomizer or nebulizer which is more simple in construction and more efficient in operation.

Another object of the invention is an atomizer or nebulizer comprising a plurality of telescoping tubular spindle members with a passage therebetween.

Another object of the invention is an atomizer or nebulizer comprising a plurality of nested tubular spindle members with a passage provided therebetween which is continuously open and unobstructed by any of the surrounding parts.

Another object of the invention is an atomizer or nebulizer composed of a minimum number of parts.

Another object of the invention is an atomizer or nebulizer in which the liquid and gas supply conduits are axially disposed, and the liquid and gas discharge openings are concentrically positioned and so maintained regardless of the radial position of the conduits.

Further objects, and objects relating to details of construction and economies of operation, will readily appear from a detailed description to follow. In one instance, the objects of the invention are accomplished by the device and means set forth in the following specification. The invention is clearly defined and pointed out in the appended claims. A structure constituting a preferred embodiment of the invention is illustrated in the accompanying drawings, forming a part of this specification, in which:

Fig. 1 is a perspective view of one end of an infant incubator equipped with an atomizer or nebulizer embodying the invention.

Fig. 2 is an exploded view of the atomizer or nebulizer unit.

Fig. 3 is a vertical cross-sectional view of the atomizer or nebulizer in a normal working position.

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Fig. 4 is a similar vertical cross-sectional view of the atomizer or nebulizer in purging position.

Generally described, the invention comprises an atomizer or nebulizer comprising two telescoping tubular spindle members, each provided with a smaller opening in one end opposite to the other end which is expanded to larger diameter below an offset shoulder. The inner tubular spindle member, the male part, has an extension tube below the expanded bottom end for being connected to a gas supply hose. The tubular spindle members are axially aligned to dispose the smaller openings in axial alignment. The enlarged portion of the male spindle and its extended hose connection form an annular socket resulting in a flange adapted to seat on a tubular pedestal fitting with said extended end, below the enlarged portion, projecting through the supporting pedestal fitting. The female spindle telescopes over the male spindle with their surrounding walls slightly spaced apart to provide a passage therebetween for feeding liquid from a supply well. Bearing surfaces are provided between the spindle members, at their top or bottom ends or some intermediate position, but with portions thereof out of contact to leave the liquid feed passage clear and unobstructed. The passage between the spindles connects with a water supply in the well to be drawn up for mixture with gas forced through the male spindle to the aspirating chamber from a compressed gas supply.

Referring specifically to the drawings in which like numbers designate like parts, numeral 1 is a baby incubator, having four corner legs 2, provided with an air circulating and vaporizing conduit 3 mounted on one end to be connected with a treating chamber in the incubator by means of branches 4 and 5. The lower end of conduit 3 is connected to an auxiliary well 6 that is supplied from a main well 7, through connecting conduit 8, with a liquid, such as water, maintained at about the level 9 in the auxiliary well 6. A water supply bottle 10 is disposed in inverted position with its neck end extending into the top of the main well 7 and held in such position. A conventional bottle stopper is pushed in and out of the bottle neck from closed position by the projection extended therefrom and terminating in a ring which is in contact with the bottom of the well when the bottle is in upside down position.

The main and auxiliary wells 6 and 7 are mounted on a shelf 15 which is detachably connected to the end of the incubator 1 by means of enlarged openings 16 formed in flange 17, fixed to the bottom of the shelf at one end, and bolts 18 fixed to the end of the incubator. Another flange 19 is fixed to the bottom of the shelf at its opposite end for said flanges to serve as seating legs when the shelf is lifted from the incubator and temporarily seated on the floor. The shelf serves as the bottom of the wells.

A tubular pedestal fitting 20 is fixed to the shelf by means of a fitted end 21 extending through a perforation formed in the shelf to which the fitting 20 is screw-threaded. An annular flange 22 abuts against the top of the shelf when said fitting 20 is screwed tightly in place. This tubular fitting 20 serves as a pedestal support for the atomizer or nebulizer assembly unit, designated generally by the numeral 23, hereinafter described. The atomizer or nebulizer seats on top of the tubular fitting support 20 with a hose connecting end projecting downwardly through said tubular fitting.

The atomizer or nebulizer assembly unit 23 comprises two elongated tubes or spindles nested together with their adjacent walls slightly spaced apart to provide a passage 24 therebetween. The tubular male spindle 25 has its top end constricted with a gas opening 26 to form a bearing surface 27, preferably conical, to support

the female tubular spindle 28, and it is provided with a flange 29 adapted to seat on the tubular pedestal fitting 20. There is a tubular extension 30 below the flange telescoping within the tubular fitting 29 and extending there-through to have its terminal end 31 connected with a gas supply hose, the outer wall of said terminal end being provided with flanges 32. Extending downwardly from the peripheral edge of the flange 29, concentric with spindle 25, is a skirt 33, said skirt being radially spaced from the spindle 25. The bearing surface 27 of the conical end of the spindle 25 is provided with liquid passages 34.

The tubular female spindle 28 telescopes over the top end of male spindle 25 and is provided with a mating bearing surface 35 and an outlet opening 36 axially aligned with the gas opening 26 in the end of the male spindle. The bottom terminal end of spindle 28 is of increased diameter to provide a skirt 37 extending from the head 38 for fitting over the skirt 33 on the male spindle. The diameter of the female tube 28, including skirt 37, is sufficiently larger than that of male spindle 25 and skirt 33 so that they are spaced apart throughout their entire length for providing the passage 24 which is unobstructed by the adjacent parts. The bearing surfaces, at the top ends of the spindles, are interrupted by the liquid passages 34 to continue the passage 24 through to an aspirating chamber 39 and the outlet opening 36 in the end of the female spindle 28. The skirt 33 extends down to or below the water level 9 to provide an air seal.

In use, the tubular element 28 is supported in telescoping relation with the tubular element 25, by engagement of the internal surface 35 of element 28 with the conical bearing surface 27 of element 25. The parts are so proportioned that, when the outer element is thus supported by the inner element, the lower face of head 38 is spaced from the upper face of flange 29, as indicated in Fig. 3, thus permitting liquid to pass between them. Thus, the pressure of the gas passing through tube 25 and out the discharge opening 26 creates an aspirating action causing liquid to flow from the well 6 through the annular passage between skirts 33 and 37, between flange 29 and head 38, between the outer wall of tube 25 and the inner wall of tube 28, and through passages 34 to the outlet opening 36. The lower edges of skirts 33 and 37 extend below the liquid level 9, and air trapped within skirt 33 forms an air seal preventing the liquid from leaking out at the joint between the top of fitting 20 and head 29.

A baffle member 40 is adjustably mounted upon the screwthreaded rod 41 whose opposite ends are supported by the connecting conduit 3. This baffle member 40 is normally disposed in vertical alignment with the discharge end of the atomizer unit but slightly spaced therefrom when the atomizer or nebulizer unit is in its normal position as shown in Fig. 3. However, when the liquid feed passage 24, and/or passages 34, in the atomizer or nebulizer is obstructed by a solid particle in the liquid, the assembly unit may be easily raised vertically from its seated position on the top of tubular pedestal fitting 20 for its discharge nozzle end to abut against the baffle member 40, thereby shutting off discharge of the gas and water mixture through the nozzle and directing it backwardly down through the liquid feed passages 24 and 34 for freeing them of any obstruction. Thereafter the atomizer or nebulizer assembly unit is returned to its normal seating position on the top end of the pedestal fitting. The gas is supplied to the terminal end 31 of the male spindle member.

The unit assembly is mounted on the top end of the pedestal support for the skirts 33 and 37 to extend below the liquid level 9 in the well 6 which is maintained at about point 42.

The assembly unit is not only simple in construction but is also readily assembled and disassembled without

the need of any tools. The disassembled parts can be easily cleaned by boiling or other simple means for removing any caked accumulations.

It will also be appreciated that the discharge liquid and air openings in the spindles are concentrically positioned and so maintained regardless of the radial position of the female spindle in respect to the fixed male spindle on which it is loosely mounted. With the male spindle vertically disposed and supported in vertical position, the female tubular member, loosely mounted thereon, will automatically axially align itself. However, whether or not the spindles are axially aligned, the discharge air and liquid openings will be concentrically disposed and so maintained irrespective of the radial position of the spindles in respect to each other.

While the spindles 25 and 28 are each illustrated as made in one piece, it will be understood that in commercial production they may be made in separate parts fitted together to be functionally integral.

From the foregoing description of the construction of the device, its operation is obvious. Water is maintained in the well or tank from a supply bottle at the desired level. The spray nozzle forcibly raises the water from the well by reason of the compressed gas, fed under pressure through the male spindle of the assembly. The sprayed water strikes against the baffle 40 to be further broken down into the proper size particles and for more intimately commingling with the gas and air that is being circulated in the incubator through the vapor conduit 3.

Whenever the water passage becomes obstructed or clogged by any foreign particles in the water, all that is necessary to do is to raise the nebulizer or atomizer assembly unit 23 from the supporting pedestal 20 in Fig. 3 to bring its discharge end against and covered by the baffle 40 (Fig. 4) for causing the gas feed to be forced backwardly down the liquid supply passages 24 and 34 until such obstruction or accumulation is removed therefrom.

It will be noted that the inner element 25 and the outer element 28 are not attached to each other but that the outer element 28 is suspended in telescoping relation with the element 25 by the engagement of the bearing surface 35 with the conical tip 27. This atomizer can be disassembled very readily, when the conduit 3 is removed, by simply lifting the outer tubular element 28 from the inner tubular element 25. When this has been done the inner tubular element 25 may readily be lifted from the fitting 20, it being understood that the hose will first be disconnected. Thus, it is a very simple matter to have access to the elements of this atomizer for the purpose of cleaning or sterilizing them, if desired.

It is understood that there may be various changes in details of construction without departing from the spirit of the invention, and, therefore, the invention is claimed broadly as indicated by the appended claims.

Having thus described the invention, what is claimed as new and useful and desired to be secured by United States Letters Patent, is:

1. An atomizer comprising the combination of a liquid supply well, means for maintaining a constant level of liquid in said well, a gas supply tube mounted in said well and extending vertically therefrom, said tube having a cylindrical portion extending below the level of liquid in said well, means for connecting said tube to a supply of gas under pressure, said tube having a tip at its upper end provided with a central opening for discharge of gas, and a liquid supply tube telescoping the gas supply tube and suspended from the tip thereof, said liquid supply tube having a cylindrical portion extending below the level of liquid in the well, whereby an annular passage for liquid is provided from below the liquid level to the tip of the gas supply tube, said liquid supply tube resting on but being freely removable from said gas supply tube.

2. The atomizer of claim 1 in which the tip of the gas supply tube is conical and provided with liquid discharge

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passages leading to the discharge opening from the annular space between the liquid supply tube and the gas supply tube.

3. An atomizer comprising the combination of a liquid supply well, means for maintaining a constant level of liquid in said well, a gas supply tube mounted in said well and supported in a vertical position, said gas supply tube extending through the bottom of said well and having a tip at its upper end provided with a central discharge opening, a laterally extending flange and a skirt depending from the periphery of said flange below the level of liquid in said well, and a liquid supply tube telescoping the gas supply tube and suspended from the top thereof, said liquid supply tube having a tip supported by the tip of the gas supply tube and provided with an outlet in line with said discharge opening, a cylindrical wall spaced from the gas supply tube to permit the passage of liquid therebetween, a head at its lower end supported in spaced relation to the flange on the gas supply tube to permit passage of liquid therebetween and a skirt depending from said head below the level of liquid in said well and spaced from the skirt depending from said flange, whereby an annular passage for liquid is provided from below the liquid level to the tips of said tubes, said liquid supply tube resting on but being freely removable from said gas supply tube.

4. The atomizer of claim 3 in which the gas supply tube has a conical tip at its upper end provided with liquid discharge passages leading from the space between the tubes to said discharge opening, and the liquid supply tube has a conical tip supported by the conical tip of the gas supply tube.

5. An atomizer comprising the combination of a liquid supply well, means for maintaining a constant level of liquid in said well, a supporting tube mounted in said well and extending through the bottom thereof, a gas supply tube slidably mounted in and extending through the supporting tube, and supported thereby in vertical position, said gas supply tube having a tip provided with a central discharge opening and a cylindrical portion extending below the level of liquid in said well, and a liquid supply tube telescoping the gas supply tube and suspended from the top thereof, said liquid supply tube having a tip supported by the conical tip of the gas supply tube and provided with an outlet in line with said discharge opening

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and a cylindrical portion extending below the level of liquid in said well and surrounding the said cylindrical portion on the gas supply tube, whereby an annular passage for liquid is provided from below the liquid level to the tips of said tubes, said liquid supply tube resting on but being freely removable from said gas supply tube.

6. An atomizer comprising the combination of a liquid supply well, means for maintaining a constant level of liquid in said well, a supporting tube mounted in said well and extending through the bottom thereof, a gas supply tube slidably mounted in and extending through the supporting tube and supported thereby in vertical position, said gas supply tube having a conical tip provided with a central discharge opening at its upper end and liquid discharge passages leading to said opening, a laterally extending flange normally seated on the upper end of said supporting tube, and a skirt depending from the periphery of said flange below the level of liquid in said well, forming with said liquid an air seal around the top of said supporting tube, and a liquid supply tube telescoping the gas supply tube and suspended from the top thereof, said liquid supply tube having a conical tip supported by the conical tip of the gas supply tube, a cylindrical wall spaced from the gas supply tube to permit the passage of liquid therebetween, a head at its lower end supported in spaced relation to the flange on the gas supply tube to permit passage of liquid therebetween, and a skirt depending from said head below the level of liquid in said well and spaced from the skirt depending from said flange, whereby an annular passage for liquid is provided from below the liquid level to the tips of said tubes, said liquid supply tube resting on but being freely removable from said gas supply tube.

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