

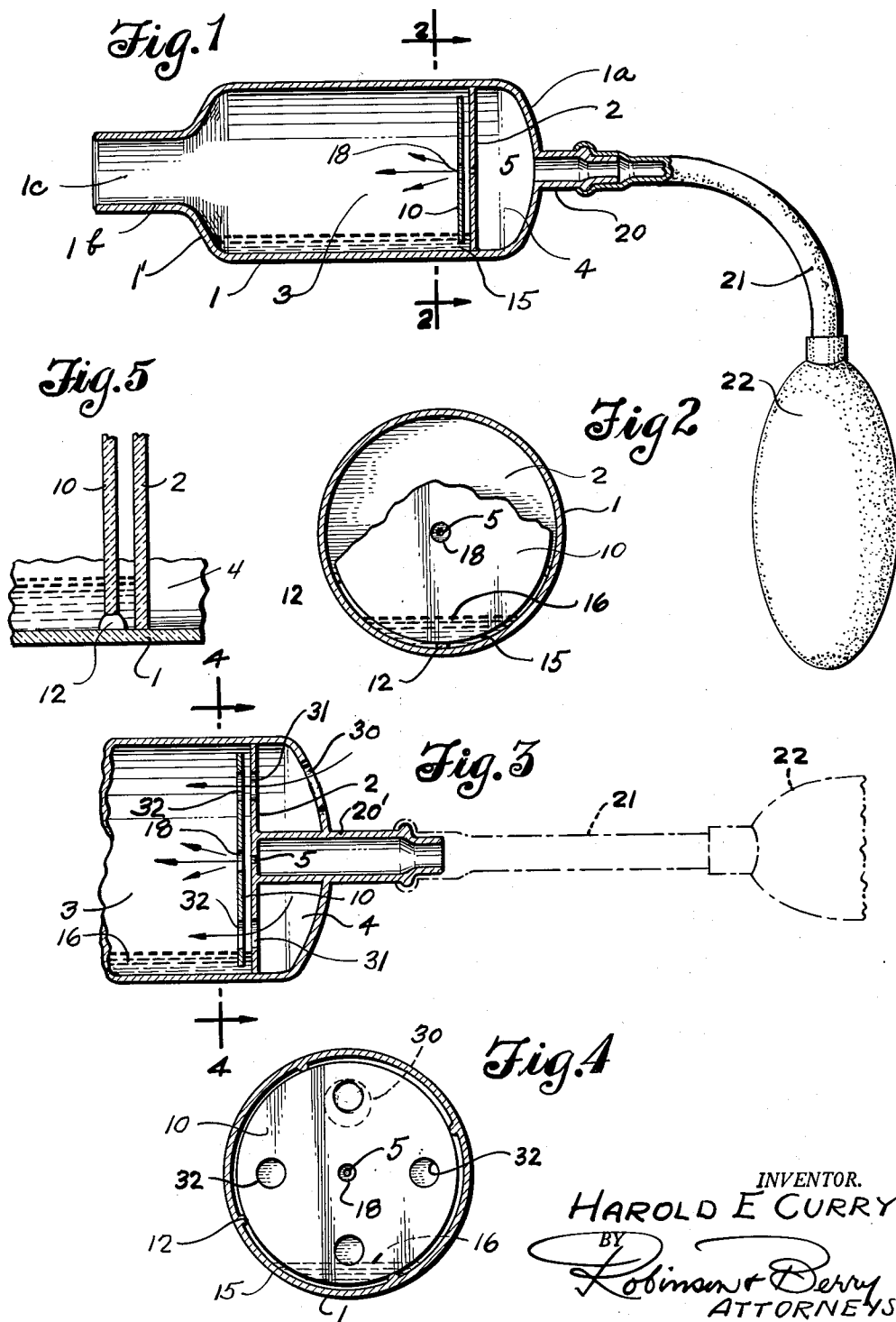
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ATOMIZER

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1

2,993,652
ATOMIZER

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This invention relates to improvements in those types of devices in which a liquid is fed into an air jet by disks or plates, or the like, that are so spaced as to provide between them what will herein be designated as "capillary passages"; the improvement of this invention applying more particularly to atomizers, although not specifically confined thereto, wherein the atomization of a liquid medicament is effected by use of an air or gas jet delivered through registering openings in said closely spaced disks or plates which have edges thereof engage with the liquid supply and which by reason of their spacing provide a capillary-like space between them through which liquid contacting the plates surfaces is drawn by capillary action into the air jet for atomization.

The present invention relates particularly to improvements in those types of devices that are illustrated, described and claimed in my co-pending U.S. application, filed on September 25, 1956, under Serial No. 611,834, now Patent No. 2,906,463.

It is the principal object of this invention to provide an improved form of atomizer, or the like, that is characterized by its use of the present invention and in the fact that it is free of the usual air jet device of a convergent, tubular character, and utilizes means which does not cause or lend itself to plugging or stoppage of the air jet.

Yet another object of the invention is to so position the air jet as formed by the means disclosed in this invention, that it will more readily position itself with respect to the surface of the liquid to be atomized and economically permit the use of more than one air jet. Furthermore, it is an object of the invention to so supply air under pressure to the device that the air jet will be more uniform and will more effectively serve to produce the desired atomization and mixing of the liquid particles with the air stream.

Still further objects and advantages of the invention reside in the novel and specific forms given certain parts of the device, and in their relationship, coaction and mode of use, as will hereinafter be fully described.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIG. 1 is a longitudinal sectional view of one form of atomizer embodying the improvements of the present invention therein.

FIG. 2 is a cross-sectional view of the atomizer, taken on line 2—2 in FIG. 1, with a portion of the near plate, forming one side of the capillary passage, broken away for explanatory purposes.

FIG. 3 is a longitudinal, sectional view of a portion of an atomizer of a modified form, also embodying the present invention therein.

FIG. 4 is a cross-section taken on line 4—4 in FIG. 3.

FIG. 5 is a sectional detail illustrating the relationship and means for or manner of mounting of the capillary plates in the bulbous body of the atomizer.

Referring more in detail to the drawings:

In FIG. 1, I have illustrated an atomizer which is typical of those types of devices that are quite suited for use therein of the presently disclosed liquid feeding and atomizing means.

The atomizer herein shown comprises a glass or clear plastic flask 1, with bulbous body which might be of the substantially cylindrical form shown, or of a spherical form. This body is closed at one end by an outwardly

2

and spherically rounded end wall 1a and is equipped at its other end with a closing wall 1' equipped with an outwardly projecting tubular neck portion 1b of substantial diameter in order to permit an easy outflow of air and vapor mixture from the flask as will presently be understood.

Between its end, the bulbous body 1 is divided by a partitioning wall 2 which is disposed in a plane that is perpendicular to the axial line of the flask, relatively close to the closing end wall 1a. This wall so divides the flask as to provide a relatively large mixing chamber 3 within one end thereof which is in open communication with the neck passage 1c and an air pressure chamber 4 at its other end.

The partitioning wall 2 has a liquid and air tight peripheral connection with the cylindrical body wall of the flask and it is formed at its center with an air jet opening 5 of small diameter, for a purpose presently explained.

Mounted in the mixing chamber 3 of the flask 1, parallel with an quite close to the partitioning wall 2, is a thin flat plate or disk 10; this being of slightly lesser diameter than the inside diameter of the disk, as has been well shown in FIG. 2. Disk 10 is coaxially centered in the flask and is secured in a predetermined spaced relationship to the partition wall 2 by a plurality of glass buttons or other suitable supports as shown at 12 in FIGS. 2 and 5. The spacing of the peripheral edge of the plate 10 from the wall 2 of the mixing chamber is such as to provide an annular liquid supply passage, as shown at 15, in FIGS. 1 and 2, through which liquid is allowed to enter into the very narrow space between the wall 2 and plate 10 from a supply of liquid, stored in the flask as at 16. This liquid will maintain this position in the base of the mixing chamber 3 regardless of the axial turning of the flask so long as held substantially horizontal.

The disk or plate 10 is provided centrally with an air jet opening 18 which is coaxially aligned with the jet opening 5 in plate 2. The opening 18 is somewhat greater in diameter than opening 5; their relative diameters being based somewhat on the spacing of wall 2 and disk 12, and also should be such that there will be no interference by the periphery of the larger passage to the air jet as discharged from the smaller opening 5 and together they should operate to induce to the most satisfactory degree, the upward feeding of liquid from liquid supply 16, to the air jet; this feeding being supplemented by the air jet itself.

For ordinary atomizers, the spacing of plate 10 from wall 2 will be quite close or so adjusted so as to produce the best capillary action and this distance might vary in accordance with the weight or kind of liquid used, its viscosity and the pressure of air used in forming the air jet.

To provide the necessary air supply and pressure, the end wall 1a is provided centrally with an outwardly extended tubular neck 20 to which a flexible rubber discharge tube 21 leading from a valve equipped air bulb 22 of usual form, is applied. By hand squeezing of the bulb 22 in the usual manner, air will be forced under pressure into the air chamber 4, and from it will be discharged through the jet opening 5, thence through plate opening 18 thus by suction induced toward the jet the upward feeding of liquid by capillary action through the space between wall 2 and plate 10 is augmented. The air jet impinges the liquid as it flows to orifice 5 and operates in the usual way to atomize and deliver it with the jet air stream through orifice 18 into the mixing chamber 3 to flow out through the neck passage 1c for use in the prescribed manner.

The alternative form of device that I have illustrated in FIG. 3 is similar in its general arrangement of parts to the device of FIG. 1 and like reference numerals have

been applied. However, in this, the neck 20' to which the air delivery tube 21 of the air bulb 22 is attached is extended into the pressure chamber 4 and is joined to wall 2. The wall 1a of the pressure chamber 4 has an outside opening at 30 of substantial diameter, and the partition wall 2 has a plurality of relatively large openings 31 formed therein in alignment with similar openings 32 formed in disk 10. The air jets 5 and 18 are arranged in wall 2 and plate 10 in the same relationship as previously described. Thus, when the air jet is discharged through ports 5 and 18 of this alternative device into chamber 3, there will be an easy inflow of outside air to the mixing chamber entering through the end wall opening 30 and the partitioning wall and plate passages 31-32 which will facilitate the outflow of the atomized mixture from the chamber 3 and neck passage 1c.

The important features of the devices shown in FIGS. 1 and 3, reside in the absence of any tapered jet passage that is apt to become clogged by an foreign object wedging in it, and in the provision of a more even and uniform air jet pressure to facilitate a better and more uniform atomization.

The simplified construction featured by this invention eliminates the tedious adjustment, of air jet and capillary tubes, formerly necessary. The two necessary holes of this atomizing mechanism can be drilled or molded concentrically and more than one pair may be used to produce the desired volume of spray.

What I claim as new is:

1. An atomizer comprising a cylindrical flask, a chamber within said flask, a partitioning wall transversely dividing said chamber into a sealed air chamber and a liquid chamber, an air supply tube secured to and opening into said flask at the end thereof adjacent said air chamber, said air supply tube terminating at the exterior wall of said air chamber so that the air supply tube does not project into said air chamber, a plate in said liquid chamber supported in spaced, parallel relationship to said partitioning wall, said partitioning wall and said plate having air openings therethrough in axial alignment, said air openings through said plate and partitioning wall having straight, uniform bores and a discharge neck extending from said liquid chamber.

2. An atomizer as in claim 1 wherein the opening through said plate is larger than the opening through said wall.

3. The device of claim 1 wherein the edges of said plate are spaced from the flask to provide for entry of liquid to the space between the plate and wall.

References Cited in the file of this patent

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