

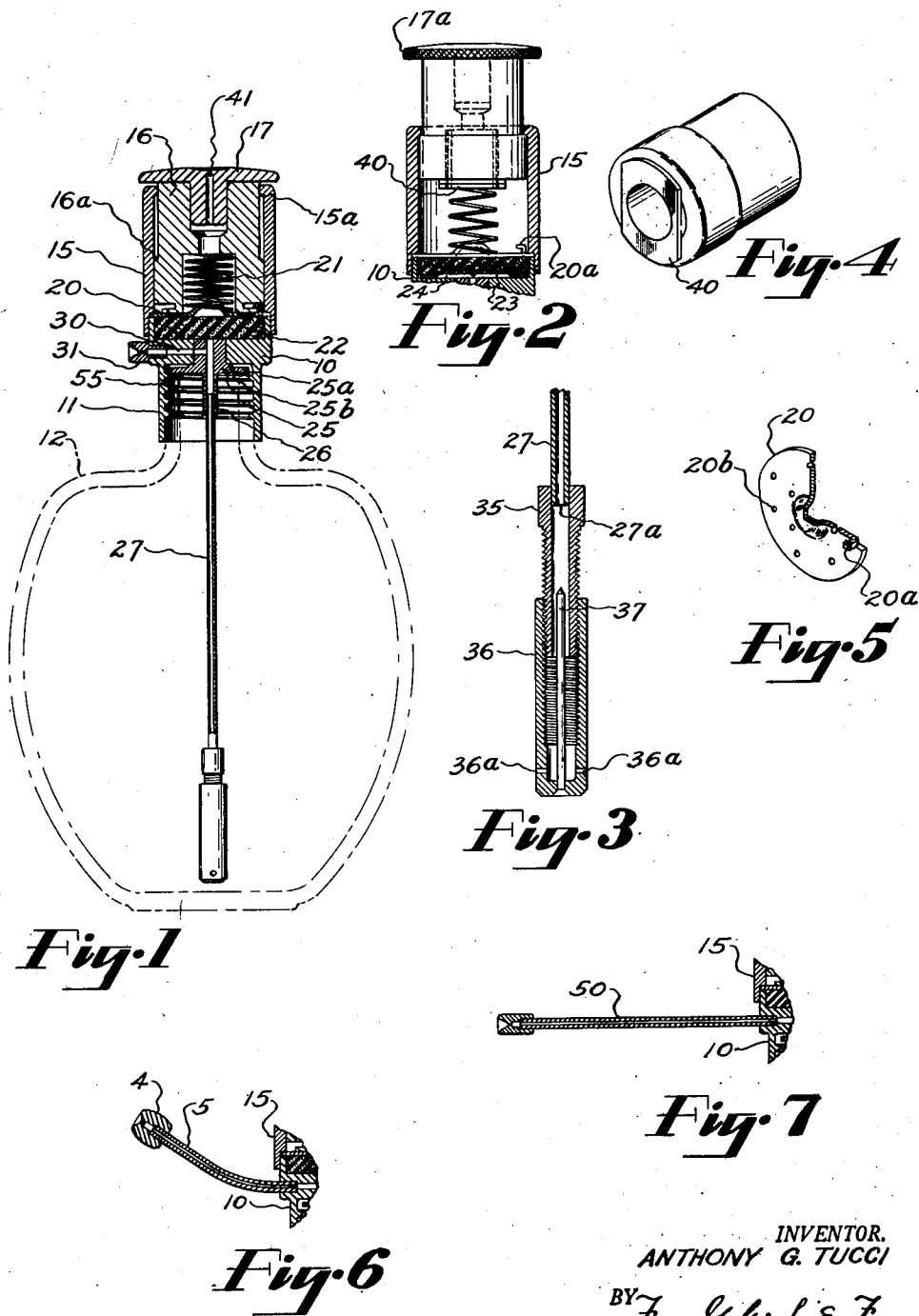
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ATOMIZER

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ATOMIZER

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This invention is directed to improvements in atomizers and has for its general object the provision of a digit operated atomizer which is adapted to the atomization of a variety of fluids of varying viscosity.

Another object of the invention is the provision of an atomizer of sturdy, non-corrosive construction throughout all of its parts and which is adaptable for use as a medicinal applicator to the nose and throat and as a perfume disperser.

A still further object of my invention is the provision of a digit operated plunger pump mechanism for bottle container types of atomizers in association with fluid flow regulating mechanism so constructed as to be non-clogging and non-deteriorating after having been out of use for long periods of time.

Other objects and advantages of the invention will be apparent from the following detailed description of preferred forms of embodiment of the invention, reference being made to the accompanying drawings wherein—

In Fig. 1 I show an atomizer mechanism embodying the features of my invention as applied to a container, such as a perfume bottle;

Fig. 2 is a cross-sectional view of the pump plunger mechanism of the atomizer with the plunger in an upward position;

Fig. 3 is an enlarged cross-sectional view of the fluid flow regulating means attached to a riser tube of the atomizer mechanism;

Fig. 4 is a perspective view of the plunger;

Fig. 5 is a perspective fragmentary view of one of the elements comprising part of the plunger pump mechanism;

Fig. 6 is a detailed section showing the attachment of an applicator for spraying the nose; and

Fig. 7 is a view of a similar attachment for spraying the throat.

My atomizer mechanism, when attached to a bottle neck or other fluid container, operates on the measured fluid suction principle by use of a fluid riser duct having a flow regulating means associated with the lower end thereof and a fibrous fluid dispersion and temporary fluid retaining means located at the upper end of the riser duct in association with a digit operated plunger pump mechanism. The discharge conduit communicates with the riser duct at a position intermediate the upper and lower ends of the riser duct. Upon an upward stroke of the pump plunger the liquid is drawn upwardly in the riser tube and is trapped temporarily by the dispersion medium which is located at one

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end of the pump cylinder. Upon a downward stroke of the plunger or piston compressed air is forced through the dispersing medium and downwardly in the riser duct and outwardly through the discharge duct to an atomizing orifice member. The entire arrangement is such that all of the parts can be made out of non-corrosive metal or other suitable base materials.

In the drawings I have shown a head or body member 10, preferably formed out of metallic bar stock made on a screw machine, such as an aluminum alloy bar stock. This head 10 is provided with a depending skirt portion 11 internally threaded to fit the threads on the neck of the container or bottle 12. The head 10 has pressed or otherwise fixed thereon a cylinder member 15 in which is disposed a pump plunger or piston 16 provided with a knob or finger piece 17. The piston is provided with a shoulder 16a adapted to abut internal shoulder 15a formed on the cylinder member 15 adjacent the top end thereof to limit its outward stroke. A helical spring member 21 is disposed within a recess formed in the piston 16 and rests upon a partition member 20 in the form of a perforated disk or false end wall of the cylinder, the purpose of the perforations 20b thereof being to direct compressed air effected by inward operation of the plunger or piston through a number of dispersing points relative to a mass of sponge material or fibrous material interposed between the pump mechanism and the atomizer nozzle. A suction release opening 41 may be formed in the member 17 for partly relieving the suction action of the piston and decrease the required power of the spring member 21.

Thus the head member 10 is provided with an upper cavity which I fill preferably with a fibrous or other suitable material 22, such as fibre glass, having capillary attraction for the fluid to be dispersed. It will be seen (in Fig. 1) that the partition disk 20 rests upon the upper perimeter of the head member 10 and is held in place by the permanent fixing of the cylinder member 15 to the head 10, thus enclosing and retaining the material 22 in the head cavity at one end of the pump cylinder 15. For this material I prefer to use fibre glass since the same is inert to the actions of various oils, perfumes, etc., which it may be desired to dispense from the apparatus.

Leading to the cavity containing the fibrous material 22 is a main duct structure comprising a flanged and inserted core member 25 having a downwardly extending stem 26, into which is fitted the upper end of a riser tube 27. The

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core member may be threaded or press fitted in a suitable central bore formed in the head 10. A radially extending discharge duct 30 is formed in the head 10 and communicates with an atomizing nipple 31 slip-fitted into an enlargement of the outer end of the discharge duct 30.

Attached to the lower end of the riser tube 27 is a fluid flow regulating means comprising a body member or threaded sleeve 35 having a cap member 36 adjustably mounted thereon. This cap member 36 is provided with a valve needle 37 which may be adjusted relative to the lower port end 27a of the riser tube 27. The cap 36 is provided with radially extending inlet orifices 36a. The flow regulating means, as illustrated in Fig. 3, is in a downwardly extended non-operating position for the purpose of clarifying the illustration. When adjusted, the point of the needle member 37 is in proximity to the port 27a to the extent required.

I have provided a simple arrangement for maintaining the plunger or piston 16 in a downwardly located position, as shown in Fig. 2, which may comprise an upset lug 20a formed out of the body of the partition disk 20 (see Figs. 2 and 5), and the extension of the lug is disposed to engage ledges 40 formed on the bottom end of the plunger or piston. The ledges are formed by simply cutting a groove in the bottom portion of the cylindrical piston and by cutting off two parallel portions thereof, as shown in Fig. 4. The finger piece or knob 17 has the perimeter 17a thereof knurled as shown in Fig. 2 whereby the piston or plunger may be turned when held in depressed position to cause the upper inner surface of the ledge 40 to engage the fixed lug 20a and thus lock the piston in a depressed position. Also in Fig. 2 I show a dish shaped perforated disk member 23 the shape of which is such as to provide a shallow cavity 24 beneath the fibrous material 22. This arrangement serves to prevent any density increase of the material immediately over the upper duct end.

The operation of the mechanism is as follows. The fluid flow regulating means comprising members 35, 36 are first adjusted to predetermine the amount of opening of the port 27a in accordance with the viscosity of the fluid within the container 12 to be dispensed. It hardly need be stated that for heavier fluids, such as medicated oils applicable to nose or throat, port 27a will be adjusted to have greater passage than for thinner fluids, such as alcohol solvent perfumes. When the plunger is unlocked spring 21 forces the plunger or piston outwardly.

The entire apparatus, including the container or bottle, may be held in one hand and the plunger and piston 16 operated with a finger. An upward stroke of the piston causes the fluid in the container to be drawn through the orifices 36a upwardly along the valve needle 37 and through port 27a and up the riser tube 27 and into the cavity containing the fibrous material 22. This suction influence is greater than any suction losses which may occur through the atomizer nozzle during the plunger suction stroke when the speed of the stroke is fast. Only two or three strokes of the piston are required to thus effect the elevation of the fluid to the fibrous material 22, whereby part of it is temporarily held by capillary attraction. A downward compression stroke of the plunger then forces air through the various perforations 20b of the partition disk 20 so that the compressed air is introduced into the cavity containing the fibrous

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material 22 at a number of points. This compressed air travels through the fibrous material and picks up the partially dispersed fluid and carries it downwardly in the riser duct and then outwardly through the discharge duct 30 and through the orifice of the atomizing nipple 31.

While this described cycle of operation appears to be a seeming contradiction, nevertheless, I have found that very little, if any, air is forced all the way down through the bottom or intake end of the riser duct system and into the fluid in the container or bottle. In fact, the apparatus will operate without any air-tight seal between the stopper portion 11 and the top surface of the bottle neck. I have, however, made provision for any possible accumulation of compressed air in the container or bottle above the level of the fluid therein by having the flanged portion 25a of the core structure 25 spaced from the under wall surface of the body 10, and I provide a bleeder duct 25b in the flange which establishes communication between the interior of the bottle and the exterior threaded surface of the bottle neck whereby any compressed air which might have a tendency to accumulate in the top portion of the bottle can escape along the threaded engaging surfaces of the stopper portion 11 and the threaded bottle neck. This arrangement is particularly desirable should a sealing washer 55 be used between the flange 25a and the top surface of the bottle neck when it is desired to carry the atomizer in a traveling bag.

The atomizing nipple 31, shown in Fig. 1 in the drawings, is adaptable for the dispensing of perfume. When it is desired to utilize the apparatus as a nose spray, for example, the slip-fitting nipple member 31 may be removed and a nose applicator 45 attached, as shown in Fig. 6. With like facility I may attach a throat applicator 50, as shown in Fig. 7.

Should it be desired to pack the apparatus in a traveling bag, a resilient packing or washer could be attached to the under side of the locking flange 40 of the plunger and the spacings of the perforations 20b relative thereto may be such that the plunger could be locked in sealed relation to the top surface of the partition disk 20 to thereby seal the perforations. The structure of the disk 20 and locking lug 20b would be such as to be leak-proof under the above stated condition.

It will be seen that no resilient washers enter into the proper functioning of the apparatus I have herein disclosed. The sliding fit relation between the circumferential surface of the cylinder 15 and the piston 16 may be comparatively loose for I have found that by the use of a piston displacement such as is available in the proportioning disclosed the overall displacement of air is ample to prevent inefficient suction action in so far as pump efficiency is concerned, but yet is sufficient to force compressed air through the fibrous material 22 and cause the air, while fluid burdened, to be forced into the region of the riser duct and outwardly through the restricted discharge tube 30.

To those skilled in the art it will be understood that the cross-sectional area of the riser duct, the discharge duct and the orifice of the atomizer nozzle are coordinated as to size for the results sought. Also, it will be apparent that, after use, the fluid temporarily trapped in the fibrous mass will drain downwardly through the riser duct and back into the bottle.

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Having thus described my invention, I claim:

1. An atomizer of the bottle attachable type comprising a body structure the lower part of which comprises attaching means for the neck of a bottle the fluid content of which is to be atomizingly dispensed, and the upper part of which comprises a vertical cylinder, a disk formed of a temporary fluid retaining medium at the bottom end of said cylinder, a perforated metal disk provided with a compression spring locating formation, said disk being peripherally supported by the body structure above said fluid retaining medium, a digit operated piston extending out of the top of said cylinder, a compression spring disposed between said piston and said metal disk, said compression spring locating formation serving to position said spring, a liquid riser tube depending from said body structure and opening upwardly to said fluid retaining medium, said body structure being provided with a lateral atomizer outlet in communication with the passageway of said riser tube.

2. An atomizer of the character described in claim 1, in which said liquid riser tube is attached to the said body structure by means of a circum-

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ferentially flanged insert held in a central bore provided in the said body structure, said insert having channels opening from said riser tube to said fluid retaining medium and to said lateral outlet, and the flange of said insert being adapted to serve as a closure for a bottle mouth.

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