Nov. 10, 1953 J. B. MONTENIER 2,658,797

UNITARY CONTAINER FOR ATOMIZING

Filed Nov. 20, 1948

Fig. 1.

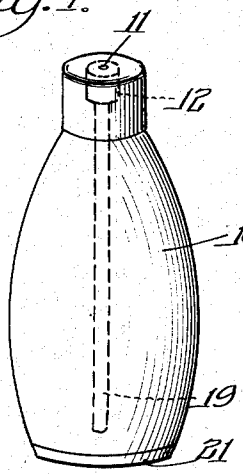


Fig. 2.

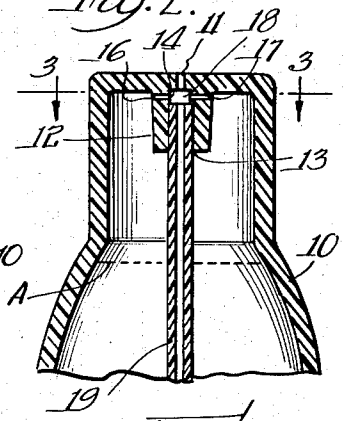


Fig. 4.

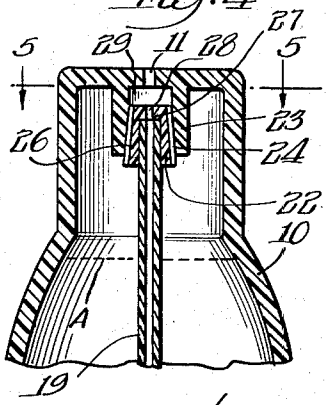


Fig. 3.

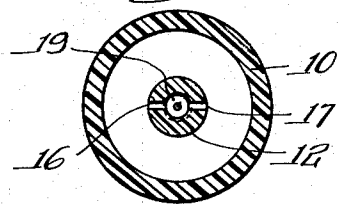


Fig. 5.

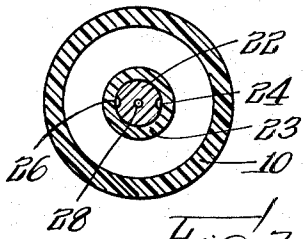


Fig. 6.

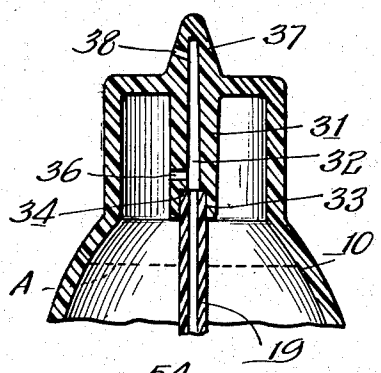


Fig. 8.

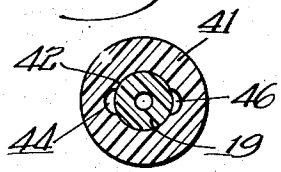


Fig. 7.

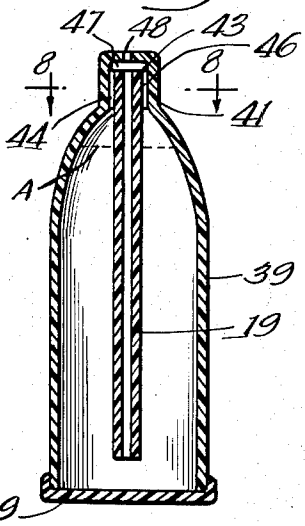
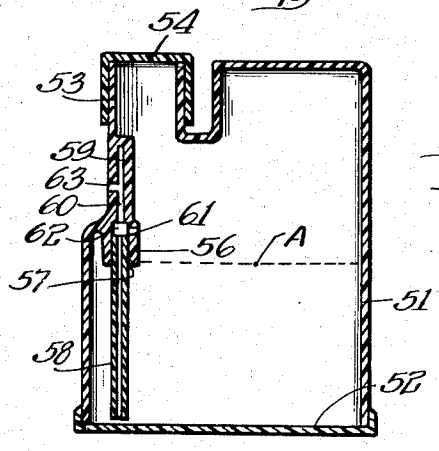


Fig. 9.



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UNITARY CONTAINER FOR ATOMIZING

Jules B. Montenier, Chicago, Ill.

Application November 20, 1948, Serial No. 61,207

1 Claim. (Cl. 299—89)

1

My invention relates to a combination package or container and atomizer for liquids, particularly liquid cosmetics such as perfumes, lotions, and astringent or antiperspirant solutions, but may be utilized for a wide variety of other liquids such as medicines, insecticides, and the like.

Such atomizers as have heretofore been known in the art, generally speaking, have comprised a suitable chamber or receptacle of a flexible or deformable material such as rubber or thin sheet metal for housing the liquid to be atomized in combination with means for causing a spray. In at least most cases, the atomizing means has protruded from the container proper, a fact which has made it difficult or cumbersome to ship or store the container and atomizing means as a unit.

In accordance with my invention, particularly in the preferred embodiments thereof, the combination package or container and atomizer may be made to present the outward appearance of an ordinary bottle or tube, there being no protuberances so far as the atomizer mechanism is concerned, and said package serves as the article which is purchased by the consumer with the contents and the atomizing means previously formed or arranged therein by the manufacturer. The package, in its particularly preferred embodiments, is made of a flexible, transparent or translucent synthetic plastic, for example, of the vinyl, methacrylate, polystyrene, or polyethylene type, particularly the latter, and, as previously pointed out, may and preferably does have the outward appearance of an ordinary bottle or tube and may be packaged, handled and stored as such. It may, if desired, be made so as to be non-refillable after atomization of its contents, the atomizing aperture or opening, in such case, being made so small that liquid could not, for all practical purposes, be passed therethrough to refill the container.

The present invention also has the important advantage that combination containers and atomizers may be made by simple molding operations as unitary or single piece devices or, in certain instances, may be made in two sections which are subsequently united by heat, solvents or by other suitable procedures. As formed, the combination container and atomizer is open at the bottom. After filling the same, as in the manner of filling tooth paste tubes and the like, the bottom may be closed by crimping and sealing, or by means of a plug or cap or other form of closure which may be screwed on, welded, friction-fitted or otherwise suitably affixed to the resilient container.

2

The invention is illustrated in the accompanying drawings wherein

Fig. 1 is a perspective view of a device representing one embodiment of my invention;

Fig. 2 is a central vertical section, in enlarged form, of the upper portion of the embodiment of Fig. 1;

Fig. 3 is a horizontal section taken along the line 3—3 of Fig. 2;

Fig. 4 is a central vertical sectional view, in enlarged form, of the upper portion of a device representing another embodiment of my invention;

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 4;

Fig. 6 is a central vertical section, in enlarged form, of the upper portion of a device representing still another embodiment of my invention.

Fig. 7 is a central vertical section showing yet another embodiment of my invention.

Fig. 8 is a horizontal section, in enlarged form, taken along the line 8—8 of Fig. 7; and

Fig. 9 is a central vertical sectional view of still another embodiment of my invention.

Considering, first, the embodiment shown in Figs. 1, 2 and 3, the device comprises a self-sustaining and form-retaining bottle or container 10, which is made of a flexible synthetic plastic, particularly of transparent or translucent character, polyethylene being quite satisfactory as a general rule. The exact shape of the container 10 is not critical and it may assume the form or shape of conventional bottles or tubes, such as shaving cream or tooth paste tubes. An aperture 11, which may be arranged so that its axis is vertical or at an angle, in the top of the container leads to the atmosphere. Integral with the container 10 and depending preferably centrally from the top portion is a plug 12 having an aperture or bore or socket 13 preferably circular in cross section and provided with a shoulder 14 near the upper part thereof. The plug 12 has oppositely disposed radially arranged air slots or channels 16 and 17 which lead to a mixing chamber 18. While I have shown the preferred form of the air slot arrangement, it should be understood that only one air slot may be utilized or more than two air slots may be employed and such air slots may be radially, tangentially or otherwise arranged in the plug 12. Communicating with the socket 13 is a tube 19, which is preferably made of a transparent or translucent flexible synthetic plastic. The tube 19 is held frictionally in the socket 13 and may be made to rest against the shoulder 14, and it extends to adjacent the bottom of the container.

It is especially desirable that the container 10 and plug 12 with its associated socket, air slots, etc. be molded as an integral body from the selected synthetic plastic material. Thus, the entire structure, except the bottom closure and the tube 19, may be formed in a single molding operation, resulting in high speed of production and low costs. The tube 19 is then inserted in the socket 13, the container is filled from the bottom with the desired liquid, and then the bottom is closed by means of a member 21 or in any suitable manner as disclosed above. A closure cap which may have a suitable insert or gasket, not shown, may be placed over the neck of the container to prevent any possible leakage through the aperture 11, when the device is not in use, should the device be tipped on its side or the like.

In use, the closure cap, if one is used, is removed and the container 10 is deformed by pressing on the walls thereof with one hand. This causes the liquid to be forced through the tube 19 into mixing chamber 18. Simultaneously, the air in the container 10 above the liquid level A is forced through conduits 16 and 17 into mixing chamber 18. The air and liquid streams impinge upon each other in the mixing chamber 18 to form a fine spray which then issues through aperture 11.

Over and above the advantages in the device of Figs. 1, 2 and 3 from the standpoint of its simplicity and its ease and low cost of manufacture, it also affords great flexibility in achieving the exact type of spray desired. The diameter of the socket in the tube 19; the diameter, arrangement and number of air slots 16 and 17; and the diameter and length of the aperture 11 all have an influence on the character of the spray which issues from the aperture 11, and they may be varied, as desired, depending upon the nature and viscosity of the liquid to be sprayed and the character of spray sought. Excellent results in the average case are obtained by using a tube 19 in which the socket has a diameter ranging from about 0.025 to about 0.06 inch, in which the two radially arranged air slots 16 and 17 have a diameter of 0.015 to 0.05 inch, and in which the diameter of the aperture 11 is from 0.008 to 0.014 inch and its length is from 0.025 to 0.1 inch. It may be pointed out, further, that if a long spray is desired the air slots or channels are inclined toward the aperture 11 whereas, if a short spray is sought, the air slots or channels should be horizontal or substantially so or, in other words, at or substantially at right angles to the direction of movement of the liquid.

In the embodiment shown in Figs. 4 and 5, a separate plug 22, preferably made of a synthetic plastic such as those described above, having an external conical shape fits into a socket in an annular member 23 which depends from the top of the container, said socket having a slight conical shape to conform with that of the plug 22. The plug 22 is provided with one or more vertical air slots or channels, two, denoted by numbers 24 and 26, being shown in diametrically opposed relation. Near the top of the plug 22 an inner shoulder 27 is formed against which the top of the tube 19 is adapted to rest when said tube is inserted into the central bore in the plug 22. An aperture 28 leads from the top of the plug 22 to a mixing chamber 29 where the liquid passing through aperture 28 commingles with the air which is forced through slots or channels 24 and 26 and the resulting air-liquid mixture issues through aperture 11. In this embodiment, all parts except the plug 22, the tube 19 and the bottom are most desirably molded as a unitary structure and the parts assembled by inserting the tube 19 into plug 22 and the latter into the socket in the annular member 23 after which the container is filled and the bottom closed. The character of the spray may be adjusted as desired by varying the dimensions of the pertinent parts of the structure. Thus, for example, if a short spray is desired, the aperture 11 may be 0.03 inch or somewhat shorter in length whereas, if a longer spray is sought, the length of the aperture 11 may be 0.06 or 0.09 inch. It will be understood, of course, that the dimensions of the liquid and air passages should be properly correlated to get the best results.

In the embodiment of Fig. 6, depending from the top is a cylindrical member 31 having an elongated bore or chamber 32 which connects with a socket 33 of larger diameter separated from the chamber 32 by a shoulder 34, the tube 19 fitting into said socket 33 and adapted to rest against the shoulder 34. One or more air channels or air slots 36 is formed in the member 31 above the shoulder 34 and communicates with the chamber 32. The top of the container 10 is formed with a conical protuberance 37 into which the chamber 32 extends, and slightly below the top of said conical protuberance and said chamber 32, for example, about $\frac{1}{32}$ inch, is the outlet aperture 38 which is preferably arranged at an oblique angle. As in the previously described embodiments of the invention, all parts described other than tube 19 and the bottom are most advantageously molded as a unitary structure, and the tube 19 is then inserted in the socket 33, the container 10 is filled, and the bottom is then attached. The embodiment of Fig. 6 enables the characteristics of the spray to be modified in several different ways, namely, by changing the dimensions of the tube 19, the chamber 32, the air channel 36, and the outlet aperture 38. A cap or closure, not shown, may be utilized to seal the aperture 38 against leakage.

In Figs. 7 and 8, still another embodiment of my invention is disclosed. Here, the container 39 is provided in its neck portion 41 with a generally cylindrical socket 42 into which the tube 19 is adapted to fit and to rest against the shoulder 43. The wall in the neck 41 in which the cylindrical socket is formed is provided with opposed channeled members 44, 46 which serve as air slots or air passages. When the container 39 is squeezed, the liquid passing through the tube 19 and the air passing through the channels 44 and 46 commingle in the mixing chamber 47 and issue in the form of a fine spray through the outlet aperture 48. As in the case of the previously described embodiments, except for the tube 19 and bottom 49, the remainder of the structure is most advantageously molded as an integral one-piece structure.

Fig. 9 is still another embodiment of my invention which is readily adapted to be carried in one's pocket. It comprises a generally rectangular container 51 having a bottom 52 and a top opening 53 through which the container may be filled, a removable closure cap 54 being provided. The spray mechanism is arranged along one side of the container. Integral with a side wall of the container is a boss 56 having a socket 57 into which the tube 58 frictionally fits. Extending upwardly from said boss 56 and

integrally formed therewith is a wall member 59 within which is formed the passageway 60. In the wall of the boss 56 is an air passage of slot 61, there being a mixing chamber 62 in the boss 56. The outlet aperture 63 communicates with the passageway 60. In assembling the embodiment of Fig. 9, the container 51 and the boss 56 and wall member 59 with the socket and apertures 57, 60, 61, 62 and 63 are initially formed, the tube 58 is then inserted and the bottom 52 sealed or otherwise suitably placed into position. Thereupon the container 51 is filled through opening 53 to the level A with the liquid to be sprayed and the closure cap 54 is then applied to close said opening 53. In use, when the walls of the container 51 are squeezed in the hand, the liquid passing through tube 58 and the air passing through the slot 61 commingle in the mixing chamber 62, pass through passageway 60, and then issue in the form of a fine spray through aperture 63.

In the light of the foregoing description, it will be seen that my invention, as shown by the illustrative embodiments described above, is sharply distinguishable, for example, between the usual bulb atomizers which work on the suction principle and usually have a large valve to replenish the air supply. It is also sharply distinguishable from other heretofore known vaporizers in various constructional features as well as in the ease and simplicity of manufacture. My invention embodies, among other things, what may be characterized as a self-contained atomizer in a permanent spray bottle or container of flexible, deformable material where the fine, misty liquid or spray is produced not by suction created by air pressure but, on the contrary, by the pressure of air already in the bottle on the liquid and simultaneous thorough dispersion of the said air with the liquid to be atomized. The air supply is replenished through the same small opening or aperture through which the spray issues and this is accomplished rapidly without valves or complicated devices and without adverse effect on the leakproofness of the container.

Where the containers are made of a transparent or translucent synthetic plastic, the walls may be marked with suitable indicia whereby the volume of the contents ejected from the container may be measured. This is of particular advantage where medicinals or the like are utilized and it is desired to measure dosages thereof.

Although the invention is particularly concerned with spray containers for the spraying of liquids, it may be noted that the spray containers of the present invention may also be utilized to form fine mists or sprays of finely powdered solids such as face powders, etc. When used for spraying fine powders, it is unnecessary to utilize such tubes as the tube 19 and the latter may be eliminated from the structure.

Where the synthetic plastic material used in forming the container is of such character that it is unduly deformed adjacent the spray outlet by the pressure of a closure cap or the like, the area adjacent said spray outlet may, if desired, be fortified with a material less subject to

deformation. In the usual case, employing such synthetic plastics as polyethylene, vinyl resins, and the like, no problems of this character will arise.

While the invention has been described in detail, the scope thereof is not to be limited except as required by the state of the art and the limitations set out in the claim.

What I claim as new and desire to protect by Letters Patent of the United States is:

A container and atomizer for liquids comprising a molded integral one piece member, made from a flexible plastic, and including a container body open at its bottom and closed at its top except for a spray outlet aperture provided therein and means within said container body providing a socket adjacent said closed top and extending downwardly a short distance therefrom, a downwardly extending liquid carrying tube received and frictionally held in said socket, means associated with said socket forming at least one air passageway communicating with the interior of the container body, a mixing chamber for air and liquid formed adjacent said spray outlet aperture when said liquid carrying tube is received in said socket and communicating with said liquid carrying tube and air passageway whereby liquid issuing from said liquid carrying tube and air passing through said air passageway commingle prior to being ejected through said spray outlet aperture, said container body being fillable with liquid through its open bottom, and a closure member secured to the open bottom of the container body, after filling with liquid, for closing said open bottom.

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