

E. B. HUNN ET AL
ATOMIZER

Filed Jan. 10, 1942

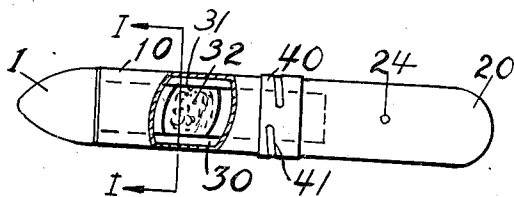


FIG.-1

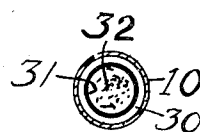


FIG.-2

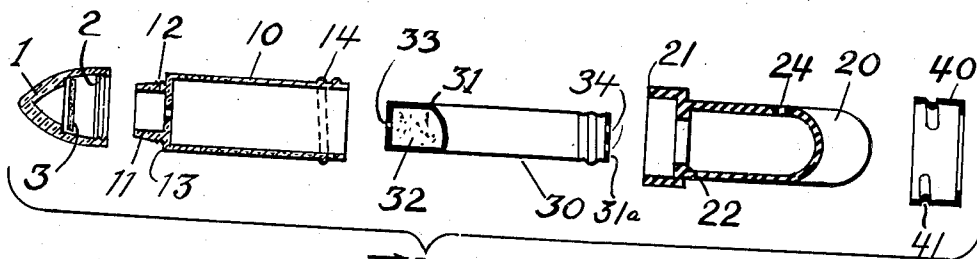


FIG.-III

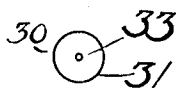


FIG.-IIIa

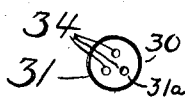


FIG-IIIb

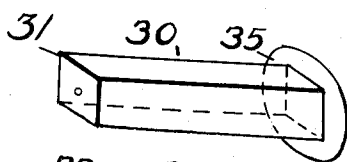


FIG. - IV

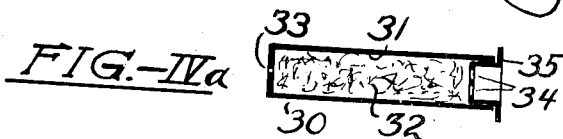


FIG.-IVa

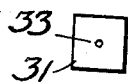


FIG-IVc

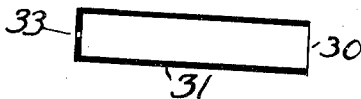


FIG-IVb

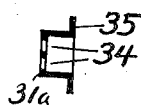


FIG. IVd

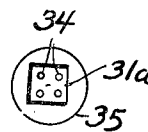


FIG-IVe

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UNITED STATES PATENT OFFICE

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ATOMIZER

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Application January 10, 1942, Serial No. 426,306

1 Claim. (Cl. 128—175)

This invention relates to a small compact atomizing device of a size and shape convenient for carrying about one's person and suited for dispensing liquids in a dense finely diffused spray from liquid impregnated materials contained therein. The invention relates particularly to a small pocket-size relatively inexpensive atomizer device for injecting medicinal liquids into the nasal and oral passages of the body in a relatively uniform, finely diffused spray from liquid impregnated materials supplied in cartridge form as required.

The invention may be fully understood from reading the following description and the illustrations afforded in the accompanying drawing of specific embodiments, the same numerals being given to similarly related parts.

Figure 1 is a vertical view of one form of the assembled atomizing device, partly in section, showing the five principal parts of the atomizer; (a) cap member 1; (b) body member 10; (c) compression member or pressure element 20; (d) refill cartridge 30; (e) sealing member 40.

Figure 2 is a cross-sectional view along line I—I of Figure 1.

Figure 3 is a vertical section through the unassembled atomizer device with the parts relatively arranged so as to indicate the manner of assembling; Figures 3a and 3b being end views respectively of the cylindrical refillable cartridge.

Figure 4 is a perspective view of a second and rectangular form of refill cartridge for the atomizing device; Figure 4a is a longitudinal cross sectional view of the cartridge, Figure 4b is the rectangular shell portion, Figure 4c is the closed end view of the shell portion, Figure 4d is the sectional view of the flanged cap and Figure 4e is the front view of the flanged cap.

The cap member 1 is simply a dust cap made of any suitable rigid material not acted upon or corroded by materials used in the atomizer. Materials such as glass, molded cellulose and metals are generally considered suitable. The cap is made to fit over the nozzle 11 of the body member 10 either by a friction fit or preferably by means of screw threads 2 (or slots) adjusted to move upon the screw threads 12 (or lugs) on the nozzle 11 of the body member 10. The cap is usually between 1/2 inch and 3/4 inch long and of conical or hemispherical external shape. The cap may or may not be fitted with a gasket 3.

The body member 10 is a tubular element open at both ends with a nozzle portion 11. The tubular element may be externally either of circular or polygonal cross section and internally of

either circular or rectangular cross section. It may be made of any suitable rigid material not acted upon or corroded by the liquids to be used in the atomizer; such materials are glass, metal, etc., but preferably molded plastic or metal. The tubular element is usually between 1 1/2 inches and 1 3/4 inches long and of minimum wall thickness consistent with rigidity of construction as determined by the nature of the material of construction. Thus, when plastic materials are employed, the thickness will be greater than when metallic materials are employed. The nozzle 11 is usually fitted with threads 12 (or lugs) for engagement with the screw threads 2 (or slots) on the cap 1. The junction of the nozzle 11 with the main body member forms the shoulder 13. The other end of the body member is threaded as indicated by numeral 14. The body member 10 is connected to the compression member 20 by compressing the member 20 against the body member and sealing by screwing the sealing member 40 over the threads 14. Sealing in this manner insures an airtight, fluid-tight connection.

The compression member or pressure element 20 consists of a cylindrical piece of rubber or other resilient material open at one end. When the liquid to be atomized is an oil it is preferable to have this compression member made of neoprene or other synthetic rubber which is not affected by contact with oils. The open end has a forwardly directed annular enlargement 21 carrying an inwardly directed flange 22. It is usual in the compression member to have an airhole 24 of about 1/16 inch in diameter in the side of the bulb over which the thumb in the use of the atomizing device is to be placed during the compression stroke.

The refill cartridge is a sealed shell 31 of plastic or other suitable material filled with an absorbent packing 32 which is saturated with the liquid to be atomized. The shell 31 is of minimum thickness consistent with strength and rigidity to maintain its shape while in service. About 0.025 inch thickness is considered the maximum. One end of this shell or casing is pierced with a small hole 33 of diameter about half of the thickness of the casing, that is approximately 0.0125 inch, through which the liquid is atomized when sufficient air is forced through the liquid saturated packing. This end rests against the shoulder 13 of the body member 10. The other end of the shell or casing is closed by a sealing member 31a having one or more larger holes 34 through which air is

forced when the refill cartridge is fitted into the body member 10 and the compression member 20 is compressed. This end of the cartridge fits into the recess formed by the annular enlargement 21 and the inwardly directed flange 22 of the compression member 20 forming a seal due to the pressure exerted when the unit is assembled which prevents air from being forced around the outside of the shell 31 of the cartridge when the bulb is compressed. The preferred construction of this refill cartridge 30 is to have the shell made of rectangular or square, thin opaque plastic material such as of cellulose acetate which is not affected by contact with the liquids usually employed in the atomizer device. Into the shell 31 is inserted the packing material 32 which consists preferably of felt or other suitable material in one piece and of such shape that it completely fills the shell 31. In sealing the shell 31 with the member 31a the absorbent packing must be compressed slightly so that it presses firmly against the small hole 33 which serves as the nozzle. An alternative construction of the refill cartridge is shown in Figure 4 which has for a sealing member 31a, a flanged cap of construction shown in Figures 4d and 4e. The flange 35 of this cap closely contacts the inner surface of the body member 10 near the open end threaded with the threads 14. In this form of construction this end of the refill cartridge fits so snugly into the recess formed by the annular enlargement 21 and the inwardly directed flange 22 and against the body member 10 that all the air from the compression member 20 passes through the openings 34 and through the absorbent packing.

The sealing member 40 consists of a band or ferrule made of metal or other suitable material which may be threaded as indicated by numeral 41 so as to engage upon the threads 14 of the body member 10. As alternatives to the screw and thread any other suitable means may be employed for the engagement of the sealing member with the body member, such as bayonet type lugs on one member and slots on the other. The preferred form of this sealing member is a thin metal ferrule or band.

The completed device as indicated in Figure 1 functions as an atomizer when the compression member 20 is compressed and its air content is forced through the liquid impregnated absorbent packing 32 in the refill cartridge 30. The passage of relatively large volume of air from the compression member through the liquid saturated absorbent material 32 slightly compressed against the very fine hole 33 in the cartridge 30 produces a very fine spray. This fine spray emerges through the opening in the nozzle 11 when the cap 1 is removed. The construction of the nozzle 11 whereby the area of smallest interior cross-section is some distance from the end is highly advantageous when the device is employed as an atomizer for the nasal passages in preventing mucous being drawn into the atomizer when the pressure on the bulb is released.

The presence of the hole 24 in the compression member 20 when the packing material completely fills the cartridge is advantageous in the functioning of the device. When the body member 10 is completely filled with liquid saturated absorbent material no liquid is withdrawn during the release stroke into the compression member 20 and the subsequent deposition of liquid on

its inner surfaces is thereby avoided. Also no air is drawn through the nozzle opening and hole 33 on the release stroke, thus eliminating one of the main causes of clogging of the opening due to mucous being drawn in and extremely difficult to remove because of the smallness of the hole 33 and the nature of mucous material. Furthermore, without the hole 24 it is impossible to utilize a large portion of the liquid contained in the cartridge. Apparently this is because the liquid is pushed back from the nozzle opening by air upon the release stroke. With the hole 24 all the air which goes through the packing in the cartridge is outward and tends to force the liquid toward the nozzle. This makes for more complete utilization of the medicament contained in the refill cartridge.

Embodiments

The general nature of this embodiment is given in Figure 1. The cap member 1 and the body member 10 are made of molded plastic material of about 0.025 inch thickness. The cap member is of conical shape of $\frac{10}{16}$ inch size. The cap is inwardly threaded to engage upon the threaded nozzle portion 11 of the body member 10 of $1\frac{1}{4}$ inches on to which there is fitted an elongated bulb 20 with an airhole 24. In the body member 10 is fitted the refill cartridge 30 which is a rectangular prism having sides of $\frac{3}{4}$ inch and is $1\frac{1}{2}$ inches long. The hole 33 in the refill cartridge is approximately 0.0125 inch in diameter. The unit is assembled by compressing the compression member 20 over the head of the refill cartridge 30 which fits snugly into the recess formed in the compression member 20 by the annular enlargement 21 and inwardly directed flange 22. When the cartridge is suitably impregnated with medicinal liquid the device provides a simple and effective means of forming a finely dense spray of the medicinal liquid.

Although the invention has been disclosed with reference to the specific embodiments thereof, it is not intended that any limitation shall be implied thereby. The novelty and scope of the invention is duly set forth in the following claim.

What is claimed is:

1. An atomizer device for injecting medicinal liquids into the nasal and oral passages of the body, which comprises a tubular body member open at its inlet end and provided with a nozzle at its discharge end adapted for insertion into said passages; a septum across the body member at the base of the nozzle and provided with a small atomizing hole of about $\frac{1}{80}$ inch in diameter; a compression bulb engaging the inlet end of the tubular body member in airtight, fluid-tight relation, the bulb having an air hole to permit direct inflation with air; a cartridge of thin material in the body member having a small atomizer hole in the discharge end of the cartridge adjoining the septum and in alignment with the hole in the septum, the cartridge having relatively large openings at its inlet end adjacent the bulb, the cartridge containing absorbent material, the cartridge being compressed between the septum and the bulb by a flange protruding inwardly from the bulb, and a cap removably affixed to the nozzle carrying a gasket adapted to provide a fluid seal against the discharge end of the nozzle.

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