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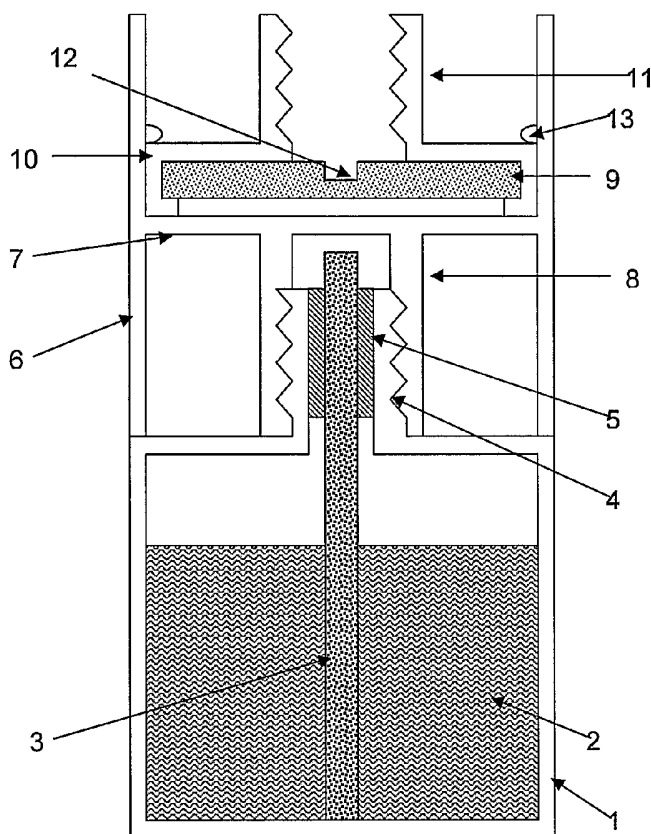
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(54) Title: VOLATILE LIQUID DISSEMINATOR



(57) Abstract: An apparatus adapted to disseminate into an atmosphere a volatile liquid whose presence is desired therein, the apparatus comprising a reservoir (1) of liquid (2) from which extends into the atmosphere a porous transport member (3), the transport member having mounted thereon in liquid transfer contact a large evaporation surface (9), the evaporation surface being mountable on the transport member when the apparatus is ready for use, the evaporation surface being located, prior to mounting on the transport member, completely within a compartment of a cap (6) that also separates the transport member from the atmosphere prior to the mounting, which compartment is separated from the transport member when the cap is in place on the apparatus, cap, evaporation surface and transport member being configured such that mounting is effected without personal contact with the evaporation surface. The apparatus is easy and cheap to manufacture, convenient to use and it gives a superior delivery of liquid into the atmosphere.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

VOLATILE LIQUID DISSEMINATOR

This invention relates to devices for the dissemination of volatile liquids into an atmosphere by evaporation from a surface.

Devices for the dissemination of volatile liquids, such as fragrances, insecticides and fungicides, into an atmosphere by evaporation from a surface are well known. Such a device typically comprises a reservoir of a volatile liquid from which reservoir protrudes a porous transport and evaporation member. This is typically a porous member whose lower end is immersed in the liquid and whose upper end is exposed to the atmosphere into which the liquid is to be disseminated. While this porous member can be any one of a variety of members, including dried plant stalks and cardboard, it is generally a cylindrical wick of porous material. These are commonly available and inexpensive. However they have the drawback that their evaporation surface is not particularly large and this places a limit on the rate of dissemination into an atmosphere, even when auxiliary means such as heating elements and fans are employed.

The obvious solution is to provide a larger evaporation surface, and larger, flat surfaces in liquid transfer contact with the wick are already known and used. However, there then arises the problem that, when a suitably large evaporation surface is provided, this can be a hindrance to the packaging of the device. For example, a large evaporation surface may necessitate a large sealing cap for transport, and this can be impractical. The alternative is to provide a separate evaporation surface, which can be attached to the wick when the device is to be used. This again can cause problems, for example, because the separate evaporation surface can be damaged in transit or mislaid, or because the attachment can be difficult or messy.

It has now been found that these problems can be overcome by a particular construction. The invention therefore provides a method of providing an increased rate of evaporation from an apparatus of a volatile liquid into an atmosphere in which the presence of the liquid in vapour form is desired, the apparatus comprising a reservoir of liquid from which extends into the atmosphere a porous transport member, comprising

- (i) the provision on the transport member of a large evaporation surface in liquid transfer contact with the transport member, and the provision on the apparatus of a cap that seals the transport member from the atmosphere until ready for use, the cap comprising on a side thereof remote from the transport member a detachable large evaporation surface adapted to achieve liquid transfer contact with the transport member;
- (ii) the removal of the cap to expose the transport member to the atmosphere;
- (iii) the bringing of the evaporation surface into liquid transfer contact with the transport member; and
- (iv) the release of the large evaporation surface from the cap.

The invention further provides an apparatus adapted to disseminate into an atmosphere a volatile liquid whose presence is desired therein, the apparatus comprising a reservoir of liquid from which extends into the atmosphere a porous transport member, the transport member having mounted thereon in liquid transfer contact a large evaporation surface, the evaporation surface being mountable on the transport member when the apparatus is ready for use, the evaporation surface being located, prior to mounting on the transport member, completely within a compartment of a cap that also separates the transport member from the atmosphere prior to the mounting, which compartment is separated from the transport member when the cap is in place on the apparatus, cap, evaporation surface and transport member being configured such that mounting is effected without personal contact with the evaporation surface.

The reservoir may be any suitable reservoir made of any suitable material in any suitable or desired shape or configuration. Materials include glass, plastics, metal and ceramics. The shape may be practical or decorative. The apparatus may form part of a larger apparatus, for example, a disseminator that utilises an electrically-powered fan or heater or both, and the nature and shape of the reservoir may be dictated by this requirement. However, the provision of any suitable reservoir is well within the skill of the art.

The reservoir provides an orifice through which the transport member passes, in order to convey the liquid from the reservoir to the atmosphere. This can be any suitable orifice, but it typically takes the form of a neck extending from the reservoir.

The transport member fits tightly into this orifice, either by itself or by means of a plug through which the transport member passes and which itself fits into the neck. The arrangement must have a means of pressure equalisation between interior of reservoir and atmosphere. This may be provided by any convenient means, typically by a small vent. When a plug is used, the vent is typically located therein. Again, the skilled person can easily provide any suitable arrangement.

The transport member may be any suitably porous member that can convey liquid from the reservoir to the atmosphere. It can be made of any suitable material and in any suitable form. However, preferably it is a cylindrical wick of the type well known to the art. The wick may be made of any suitable material, such as sintered ceramic or glass, but it is preferably a non-woven polymeric material, such as the commercial products obtained from manufacturers such as Porex Corp. and Micropore, Inc.

The apparatus comprises a cap, which has two functions, the sealing of the transport member from the atmosphere until it is ready for use, and the containing of a large evaporation member. The closing of the apparatus by the cap may be performed by any convenient means, such as snap fitting the cap on to the reservoir or on to the neck. Preferably it is achieved by providing the neck with a male screw thread on its exterior surface. This is adapted to mate with a female screw thread in the cap. As will be further described hereinunder, this embodiment is useful for mounting the large evaporation surface.

The large evaporation surface is any suitable surface that permits an increased evaporation rate, in comparison with the transport member alone. By "large" is simply meant large in evaporative surface area in comparison with that of the transport member alone, and it can be made as large as desirable or practicable, depending on the circumstances and the nature of the apparatus. It can also be made in any suitable shape, and can be collapsed in storage, such that it can be opened at a suitable point in time. However, in a preferred embodiment, it is flat and has a surface area and a peripheral shape similar to that of the cross-section of a cap closing the reservoir, such that it fits inside the cap. The material from which the evaporation surface is made may be any suitable material, typical example being non-

woven pads of cellulosic or synthetic materials, obtainable commercially from suppliers such as Baumgartner and Filtrona.

The evaporation surface is fitted detachably to the cap and on a side of the cap remote from the transport member, when the cap is in place on the apparatus, separating the transport member from the atmosphere, prior to use. By “fitted detachably” is meant that the evaporation surface is fitted to the cap such that it is held securely up to the point where it is to be detached. In a preferred embodiment, the evaporation surface is contained completely within a compartment of the cap that is separated from the transport member when the cap is in place. There are many ways of achieving this, but one useful method is to provide a cap with a hollow crown, into which the evaporation surface fits, the evaporation surface being held in place by any suitable means, such as a snap fitting. The snap fitting is configured so that it will hold the evaporation surface in place under normal circumstances, but under suitably elevated pressure will release the evaporation surface from its position in the cap.

When a relatively flexible evaporation surface, such as a non-woven pad of the type hereinabove described, is used, it is mounted in a holder, which encloses all but the actual surface from which evaporation takes place. Such a holder may be of any suitable material, but it is preferably of plastics material. Such a holder can be held in place with a suitably stiff snap fitting (to ensure that it remains in place during transport), yet it can be snapped out without damage to the evaporative surface. This particular embodiment thus allows the use of a wide variety of materials (including rigid materials, if desired).

The release of the cap and its placing in liquid transfer contact (i.e., contact such that liquid passing through the transport member can pass into the evaporative surface) with the transport member may be achieved by any convenient means, but it is preferably achieved without direct manual manipulation of the evaporation surface. This may be achieved by any convenient means. In one preferred means, the evaporation surface is provided with an attaching means that mates with a corresponding attaching means in the vicinity of the transport member, such that the evaporation surface is held in liquid transfer contact with the transport member. Avoidance of direct manipulation of the evaporative surface can be

achieved by having the evaporative surface within a holder as hereinabove defined. In a further embodiment, the evaporative surface is mounted in the cap in such a manner that only the cap need be manipulated. Such an embodiment can be used in conjunction with an evaporative surface in a holder.

One way of achieving this is to provide the evaporative surface with a hollow tubular neck adapted to fit concentrically on a neck surrounding the transport member where it emerges from the reservoir into the atmosphere. The two necks are held together by any convenient means, such as snap fitting (of a stronger nature than any such fitting securing the evaporative surface within the cap) or corresponding screw threads. In a preferred embodiment, the neck surrounding the transport member is the same one to which the cap is attached. Thus, a suitable cap may have the form of a hollow cylinder split into two open-ended compartments by a transverse wall, from which wall extends axially an internally screw-threaded hollow cylinder, adapted to secure the cap to the reservoir by interaction with corresponding screw threads thereon, and thus covering the transport member. The evaporation surface will have a similar or identical internally threaded cylinder, such that it can be attached to the screw threads on the reservoir.

In operation of such an embodiment, the cap is unscrewed from the reservoir, inverted, screwed on to the reservoir neck by means of the hollow tubular neck attached to the large expansion surface, until liquid transfer contact is established with the transport member, and then snapped off, leaving the large evaporation surface exposed to the atmosphere. The only physical contact has been with the cap.

Depending on the nature of the material of the large evaporative surface, it is possible to provide the large evaporative surface directly with a neck. In the case in which the large evaporative surface is within a holder, the neck preferably forms part of this holder.

The invention allows superior dissemination of volatile liquids into atmospheres, along with security of transport and easy putting into operation. The components can be made from commonly-available materials using standard methods.

The invention is now further described with reference to the drawings, which depict a preferred embodiment and are not to be construed as limiting the invention in any way.

Figure 1 depicts a vertical cross-section through a device according to the invention.

Figure 2 depicts the putting into operation of the device of Figure 1.

A reservoir 1 contains a volatile liquid 2 for evaporation into an atmosphere. There extends from the liquid 2 into the atmosphere a cylindrical porous wick 3. The wick passes into the atmosphere via a neck 4 in the reservoir and is held in place by a liquid-tight plug 5. The neck 4 comprises on its outer surface a male screw thread.

Secured to the reservoir by this screw thread is a cap 6. This cap has the form of a hollow cylinder divided transversely by a barrier 7, to give two sections, one towards the wick, the other away from the wick. From that side of the barrier 7 towards the wick depends downwardly a neck 8, this neck bearing a female screw thread corresponding to that of the upwardly-projecting reservoir neck 4.

On the side of the barrier 7 away from the wick is located a large evaporation surface unit. This comprises a large evaporation surface 9 of porous material, contained within a plastics holder 10, the holder being dimensioned so that it fits within the cap. From the holder 10 there projects upwardly a hollow, cylindrical neck 11 that has on its interior surface a female screw thread that is capable of mating with the male screw thread of neck 4. The dimensions of the necks 4 and 11 are such that, when one is screwed on to the other, the top of the wick 3 will fit into a recess 12 in the evaporation surface 9, sufficiently closely for liquid in the wick 3 to flow into the evaporation surface. The evaporating surface is held in place in the cap by inwardly-projecting prongs 13.

To put the apparatus into operation, the cap 6 is unscrewed from the reservoir neck 4. It is then inverted and the neck 11 is screwed on to the neck 4, making liquid transfer contact between wick 3 and evaporation surface 9 via the recess 12. The cap is then pulled away

from the reservoir in the direction of the arrow A in Figure 2. The prongs 13 are such that the holder 10 can be easily snapped past them, thus leaving the evaporating surface 9 exposed to the atmosphere.

Claims:

1. A method of providing an increased rate of evaporation from an apparatus of a volatile liquid into an atmosphere in which the presence of the liquid in vapour form is desired, the apparatus comprising a reservoir (1) of liquid (2) from which extends into the atmosphere a porous transport member (3), comprising
 - (i) the provision on the transport member of a large evaporation surface (9) in liquid transfer contact with the transport member, and the provision on the apparatus of a cap (6) that seals the transport member from the atmosphere until ready for use, the cap comprising on a side thereof remote from the transport member a detachable large evaporation surface adapted to achieve liquid transfer contact with the transport member;
 - (ii) the removal of the cap to expose the transport member to the atmosphere;
 - (iii) the bringing of the evaporation surface into liquid transfer contact with the transport member; and
 - (iv) the release of the large evaporation surface from the cap.
2. A method according to claim 1, in which the reservoir provides an orifice through which the transport member passes, this orifice taking the form of a neck (4) extending from the reservoir.
3. A method according to claim 2, in which the neck (4) carries on its exterior surface a male screw thread, which is adapted to mate with a female screw thread in the cap, which closes the apparatus and prevents evaporation until it is ready for use.
4. A method according to claim 1, in which the large evaporation surface is, in storage, in a collapsed form and capable of being opened at a suitable point in time.
5. A method according to claim 1, in which the large evaporation surface is flat and fits within the cap closing the reservoir.
6. An apparatus adapted to disseminate into an atmosphere a volatile liquid whose presence is desired therein, the apparatus comprising a reservoir (1) of liquid (2)

from which extends into the atmosphere a porous transport member (3), the transport member having mounted thereon in liquid transfer contact a large evaporation surface (9), the evaporation surface being mountable on the transport member when the apparatus is ready for use, the evaporation surface being located, prior to mounting on the transport member, completely within a compartment of a cap (6) that also separates the transport member from the atmosphere prior to the mounting, which compartment is separated from the transport member when the cap is in place on the apparatus, cap, evaporation surface and transport member being configured such that mounting is effected without personal contact with the evaporation surface.

7. An apparatus according to claim 6, in which the reservoir (1) provides an orifice through which the transport member passes, this orifice taking the form of a neck (4) extending from the reservoir.
8. An apparatus according to claim 7, in which the neck carries on its exterior surface a male screw thread, which is adapted to mate with a female screw thread in the cap, which closes the apparatus and prevents evaporation until it is ready for use.
9. An apparatus according to claim 6, in which the large evaporation surface is, in storage, in a collapsed form and capable of being opened at a suitable point in time.
10. An apparatus according to claim 6, in which the large evaporation surface is flat and fits within the cap closing the reservoir.

Figure 1:

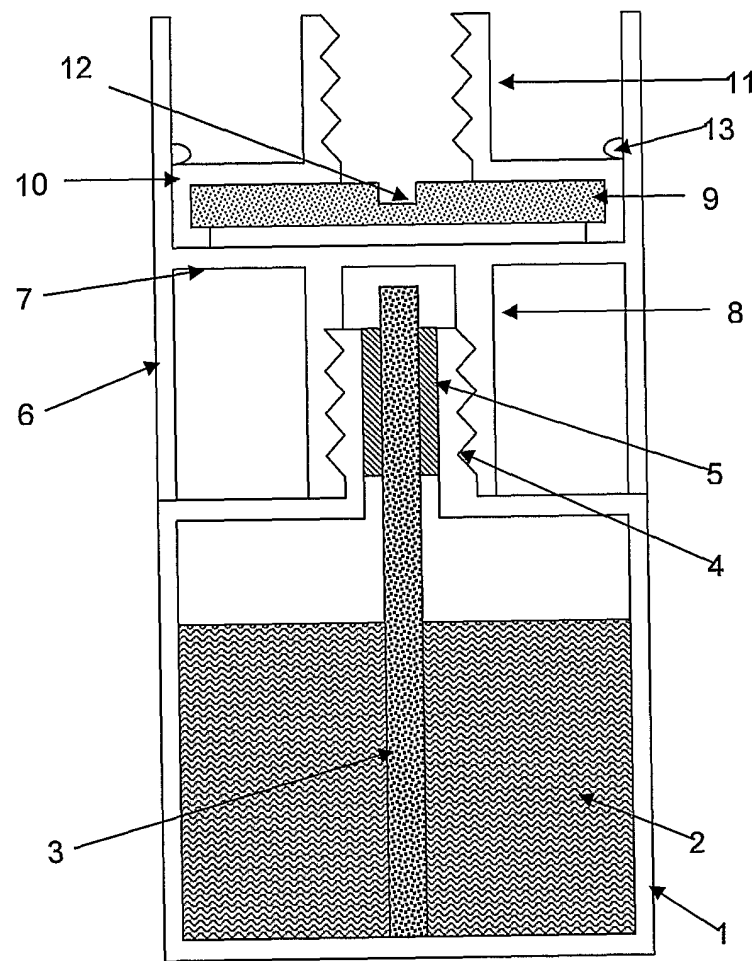
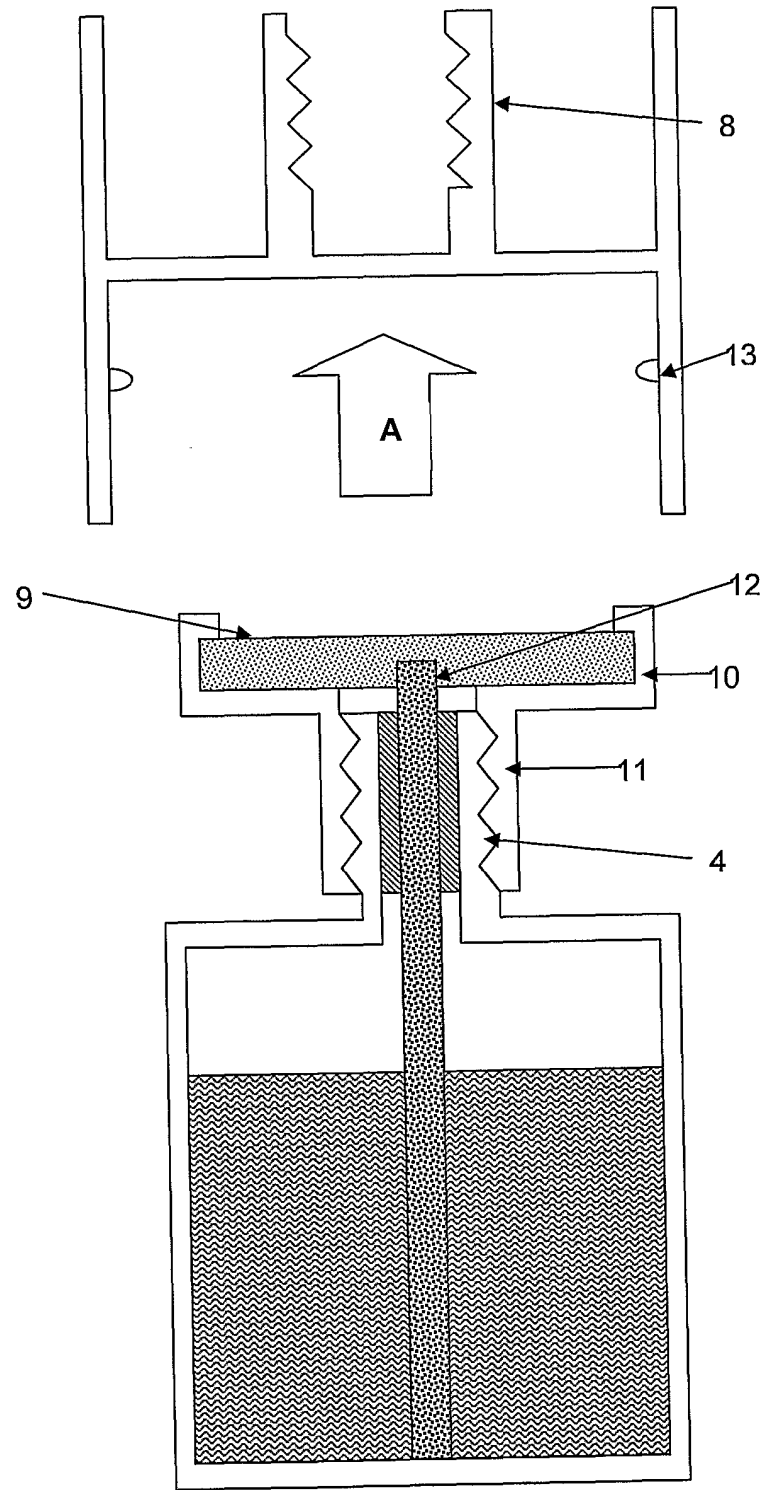


Figure 2



INTERNATIONAL SEARCH REPORT

International application No

PCT/CH2006/000082

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61L9/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 4 621 768 A (LHOSTE ET AL) 11 November 1986 (1986-11-11) column 1, line 63 - column 2, line 18; figure 3	1-10
A	EP 0 669 137 A (SARA LEE/DE N.V.) 30 August 1995 (1995-08-30) column 4, line 53 - column 5, line 18; figure 3	1-10
A	US 2004/217188 A1 (MCEWEN CHARLES NEHEMIAH) 4 November 2004 (2004-11-04) the whole document	1-10



Further documents are listed in the continuation of Box C.



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INTERNATIONAL SEARCH REPORT

Information on patent family members

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