A wick assembly for, for example, a fragrance dispenser such as an air freshener comprises a conductive wick (8) that wicks the liquid (2) from a source (1). The liquid (2) is evaporated from the wick (8) when connected to a power source to heat the wick, and is conveyed from the source (1) to the wick between heating. The wick (8) is intermittently heated, preferably using a pulse circuit (5). The wick (8) is preferably connected to a capillary wick (3). The pulse circuit (5) may be connected to two separate liquid sources (1, 1a; figure 2). The heated wick (8) may be powered by batteries (4).
Figure 4
WICK ASSEMBLIES

The invention relates to wick assemblies and, in particular, wick assemblies for use in vapour dispensers such as air fresheners, insecticide dispensers and personal fragrance dispensers.

A known wick assembly for a vapour dispenser such as an air freshener comprises a wick for conveying a liquid from a source and a heated ceramic collar surrounding, but not in contact with, a portion of the wick remote from the liquid. The ceramic collar is connected to a source of power that heats the collar so heating the wick in turn by convection to evaporate liquid from the wick. It is a disadvantage of such an arrangement that the ceramic collar has significant thermal mass. In addition, the gap between the collar and the wick slows the transfer of heat from the collar to the wick. Accordingly, when power is supplied to the collar, there is a time delay before the liquid is evaporated. This can be disadvantageous since, for example, it is not apparent whether the device is working or not when it is first switched on. In addition, evaporation takes place only from that portion of the surface of the wick that is heated by the collar and this provides only a limited area for evaporation.

According to the invention, there is provided a heated wick assembly for dispersing a liquid comprising a wick for conveying a liquid from a source and a heater for heating the wick intermittently to disperse liquid from the wick, the heater being formed from a fibrous material including conductive fibres and the heater and the wick being such that during heating, all or most of the liquid in the wick is dispersed and when not being heated, the wick conveys liquid from the source.

The following is a more detailed description of some embodiments of the invention, by way of example, reference being made to the accompanying drawings in which:-
Figure 1 is a side elevation, partly in section, of an air freshener showing a fragrance container with a thin wick incorporating a resistive heater, a control circuit and battery power supply.

Figure 2 is a schematic view with an alternative form of the air freshener of Figure 1 with two fragrance containers.

Figure 3 is a diagram of a section of an air freshener as shown if Figures 1 and 2, showing an arrangement for connecting the heated wick to the capillary wick.

Figure 4 is a diagram of a drive circuit for any of the forms of air freshener shown in Figures 1 and 2.

Referring first to Figures 1, the air freshener includes a fragrance container 1. The container 1 is formed from any suitable material such as glass or plastics and has a fragrance-containing chamber leading to a neck 16 terminating in an outlet 17. The internal capillary wick 3, which may be formed from any suitable known wicking material, is held in the neck 16 and has a first end and a second end. The wick 3 depends downwardly so that the first end is in the fragrance 2, which may be of any known kind. The wick 3 may have a diameter of from 3mm to 13mm. The second end extends through the neck 16 and terminates at the outlet 17. The wick 3 may terminate substantially flush with the top surface of the neck of the container 1 so that the container 1 may be provided with a simple tear-off closure (not shown) covering the outlet 17 to prevent loss of fragrance during transport and sale of the air freshener. The closure may be attached to the container 1 by adhesive or welding.

The air freshener also includes a housing 9, which may be formed from any suitable material, such as a plastics material the housing is of generally cylindrical shape with an open end and a closed end. The housing 9 is mountable on the container 1 so that
the open end covers the outlet 17 (after removal of any closure) and the housing 9 is generally co-axial with the axis of the outlet 17. The housing 9 is provided with holes or slots for the easy flow of air into and out of the housing 9. The housing 9 has a mounting 7 at the closed end and the mounting 7 carries a first end of a heated wick 8.

The heated wick 3 extends axially along the housing 9 and has a second end extending into the capillary wick 3 in a manner to be described below. The heated wick 8 is formed from one or more strands of fibres that have been treated to be electrically conductive. Such fibres can be obtained for example from Bekaert Advanced Materials and have a resistance when twisted or plaited of the final assembly between 0.2 and 5000 ohms.

A power supply comprises a number of dry-cell batteries 4 connected in series to a pulse circuit 5 that is, in turn, connected across the heated wick 8 by wires 16. The pulse circuit 5 will be described in more detail below. A heated wick 8 with a resistance in the range 2 to 100 ohms is particularly suitable for use with battery power supplies.

In use the heated wick 8 absorbs fragrance fluid from the capillary wick 3. The fragrance fluid flows along the heated wick 8. When power is supplied from batteries 4 through the pulse circuit 5 via connection wires 6 to the heated wick 8 the heated wick 8 heats up to vaporise the fragrance liquid absorbed by the heated wick 8. The liquid is heated fast enough to generate a small cloud of fragrance liquid droplets that is generally visible to the user. After a heating pulse from the pulse circuit 5, there is a no pulse period and so the heated, wick 8 is allowed to cool, and fragrance fluid 2 is transferred from the capillary wick 3 to the heated wick 8 to be vaporised by the next successive pulse from the circuit 5. The length of the heating pulses provided by the pulse circuit 5 depends on the dimensions and resistance of the heated wick 8 but is in the range 0.1 seconds to 20 seconds. In this mode, therefore, the heated wick 8 and the power supply may be chosen so that the length and power of the pulse is just
sufficient to disperse all, or substantially all, of the liquid drawn up by the wick 8 from the capillary wick 3. Between each pulse and the next successive pulse, the wick 8 draws-up further liquid from the capillary wick 3 which is then dispersed by the subsequent pulse. This allows the wick 8 to be much thinner than the capillary wick 3 and also allows a low power source, such as batteries, to be used for the power supply.

Figure 2 shows a dual fragrance system, allowing two different fragrances to be generated at different times. The concept for such a device is described in WO 2004096300. The system of Figure 2 has an air freshener of the kind described with reference to Figure 1 and a second such air freshener. The parts of the first air freshener are given the same reference numerals in Figure 2 and in Figure 1 and the second air freshener has those parts with the same reference numerals but with the suffix “a”. There is a single power supply 5 generally as described above with reference to Figure 1 but with connections 6a connecting a second output of the pulse circuit 5 across the second heated wick 8a. The power circuit 5 pulses the heated wicks 8, 8a independently at pre-programmed spaced time intervals to avoid olfactory fatigue. To reduce cost of manufacture, there may be a single housing 9 with the heated wicks 8, 8a formed from a continuous length of fibres with means to confine each fragrance to a respective part of the length of the fibres, such as a clamp or waxy deposit. A common electrode may contact the wick at this point to make electrical connection.

Since there is no space between a foil seal and the wick, there is no possibility of fragrance accumulating in this area so that there is no spillage of fragrance 2 when the foil is removed, prior to insertion into the housing 9.

Figure 3 shows an arrangement for making connection between the heated wick 8, 8a and the capillary wick 3, 3a. The heated wick 8, 8a needs to have good physical connection with the capillary wick 3, and this is achieved by capturing both ends of
the heated wick in a clamp 10 with a narrow profile 11 that allows the heated wick 8a, 8b to be inserted into the capillary wick 3, 3a. The clamp 10 holds the heated wick 8, 8a and allows flow of fragrance 2 from the capillary wick 3, 3a to the heated wick 8, 8a. When the fragrance 2 has all been evaporated it is a simple matter to disengage the container 1, 1a from the housing 9, 9a and replace it with a fresh container 1, after first having removed any closure.

Figure 4 shows a simple pulse circuit 5 for providing power to the heated wick 8, 8a. This circuit uses a pulse generator 13 to power a transistor 15 or other switching device. The transistor 15 is driven fully on by the pulse signal and so the maximum current is supplied to the heated wick 8, 8a. The pulse may be from 0.1 to 20 seconds long, and use a power of between 0.05 and 20 Watts. There may be means for preventing the heated wick 8, 8a exceeding a predetermined temperature.

The dispensers described above with reference to the drawings can be used for other purposes such as dispersal of insecticide or other evaporable substances required in low concentrations inside buildings. Another application is for personal fragrance dispensers, where a perfume or similar substance is dispersed in a cloud of droplets from a dispenser close to the skin. The dispenser may be made in a small portable form if required, and hung from clothing, attached to the skin with a temporary adhesive or hung on a chain as an adornment if required.
CLAIMS

1. A heated wick assembly for dispersing a liquid comprising a wick for conveying a liquid from a source and a heater for heating the wick intermittently to disperse liquid from the wick, the heater being formed from a fibrous material including conductive fibres and the heater and the wick being such that during heating, all or most of the liquid in the wick is dispersed and when not being heated, the wick conveys liquid from the source.

2. An assembly according to claim 1 wherein the fibrous material is formed from one or more continuous lengths of fibre.

3. An assembly according to claim 2 wherein the fibrous material is in the form of a narrow wick made by twisting.

4. An assembly according to claim 2 wherein the fibrous material is in the form of a narrow wick made by plaiting.

5. An assembly according to claim 3 or 4 wherein the wick is between 5mm and 300mm in length

6. An assembly according to claim 3 or 4 wherein the resistance of the wick is between 0.2 and 5000 Ohms.

7. An assembly according to claim 6 wherein the conductive fibres are formed from non-conductive fibres coated or plated with a conductive material

8. An assembly according to claims 1 to 7 wherein said wick is held in a housing provided with apertures for the passage of air through the housing
9. An assembly according to claim 8 wherein the housing includes means for supplying electrical power to the wick.

10. An assembly according to claim 9 wherein the power is supplied in timed pulses from a control circuit

11. An assembly according to claim 10 wherein the power is applied for a period between 0.1 seconds and 20 seconds

12. An assembly according to any one of claims 8 to 11 wherein the housing defines an air flow path across the wick.

13. An assembly according to any one of claims 8 to 12 in combination with at least one container for a liquid, the container including an internal capillary wick being carried by the container and the container being connected to the housing and the capillary wick being connected to the wick in the housing.

14. An assembly according to claim 13 wherein the container and the internal capillary wick are separable from the housing to allow replacement of the container and the internal capillary wick.

15. An assembly according to any one of claims 8 to 14 wherein two containers are provided, each container connecting to a wick that is separately controlled

16. An assembly according to any preceding claim including means to prevent the temperature of the wick exceeding a predetermined temperature.
17. An assembly according to any preceding claim in which the heater is power heated by applied by a primary or secondary battery source

18. An assembly according to claim 13 in which the top of the internal capillary wick is arranged to be substantially level with the top of the neck of the fragrance container and the bottle is supplied with a tear-off closure that attaches to the surface by adhesive or by welding.

19. An assembly substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.

20. An air freshener incorporating a wick assembly according to any one of claims 1 to 19.

21. A vapour dispenser incorporating a wick assembly according to any one of claims 1 to 19.

22. An insecticide dispenser incorporating a wick assembly according to any one of claims 1 to 19.

23. A personal fragrance dispenser incorporating a wick assembly according to any one of claims 1 to 19.
Application No: GB0518866.9
Claims searched: 1-23

Examiner: Dr Steven Chadwell
Date of search: 14 March 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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<tr>
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<th>Identity of document and passage or figure of particular relevance</th>
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<tbody>
<tr>
<td>X</td>
<td>1, 2, 8-18 &amp; 20-23</td>
<td>GB 2421436 A (CARBONATE) see whole document, especially page 3 line 7 to page 6 line 23 and figure 5</td>
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<tr>
<td>A</td>
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<td>WO 2004/093929 A2 (PROCTER &amp; GAMBLE)</td>
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A01M; A61L

The following online and other databases have been used in the preparation of this search report:

WPI, EPODOC