Abstract: A plug-in fragrancer (2) has at least three containers (8a, 8b, 8c) for fragrances, a wick (16) extending from each container (8a, 8b, 8c). A heating device for causing evaporation of fragrance from the wicks (16) comprises at least three heaters which are mounted spaced apart to provide a thermally insulating gap (29) between the heaters (28), each heater being associated with a respective container wick (16).
Plug-in Fragrancer

The present invention elates to a plug-in fragrancer and particularly to a fragrancer which delivers more than one fragrance to the ambient atmosphere.

Plug-in fragrancers are well known and typically comprise a liquid fragrance which is held in a container. A wick extends out of the container into close proximity with a heating element which is powered from mains electricity. Heat from the heating element causes accelerated evaporation of the fragrance from the wick to disperse the fragrance to the ambient atmosphere. One such device is seen in EP-A-451 331.

Devices delivering two or more different fragrances sequentially, or even simultaneously, have been developed to overcome the well known problem of habituation. Over time, a user becomes desensitised to an ambient fragrance and so no longer notices it. Thus, the fragrance is changed to provide a noticeable effect. US 6 487 367 describes plug-in fragrancer in which a heating element is formed from a single ceramic block having two apertures for wicks from respective containers. In US 6 563 091 separate heating elements are provided adjacent each aperture so as to preferentially heat only the wick in that aperture. This arrangement would not be adequate for a block with three apertures.

AU2005 101001 describes a triple fragrance system in which, in its commercial implementation, three ceramic heaters are embedded in respective cavities of a plastics moulding which has apertures or chimneys in which the wicks are received. The cavities are connected by bridges to from a unitary heating block. This arrangement enables heat to be focussed at individual wicks but there is still a problem with heat transfer via the moulding bridges.
Thus in a first aspect of our invention we provide a plug-in fragrancer having at least three containers for fragrances, a wick extending from each container, wherein a heating device for causing evaporation of fragrance from the wicks comprises three heaters which are mounted spaced apart to provide a gap between the heaters. The gap may be filled with a thermal insulator, preferably air. The heaters may be mounted on a common circuit board to facilitate manufacture and assembly of the device. The heaters may be of the ceramic type, preferably with an aperture through the heater body. In another form, each heater may be formed by a resistive heating element embedded in a thermally conductive plastics housing.

A control circuit may be provided to switch on each heater in turn. Preferably there is a time gap between switching off one heater and turning on another heater. A heater will maintain its temperature for some time and so it is desirable to let the heater cool to a temperature at which little fragrance is emitted, before switching on the next heater. This avoids substantial overlap of the release of two fragrances. In some situations, of course, it maybe desirable to have overlap.

The duty cycle of a heater may be varied to provide a greater or lesser amount of heat or higher or lower temperature, and so release higher or lower amounts of fragrance during the 'on' period of a heater and its subsequent cooling down period.

Each heater may be 'on' for a period of from 10 to 30 minutes and there may be a gap of from 15 to 35 minutes before another heater is switched on. A heater may be on for a period of 15 to 25 minutes, preferably about 20 minutes. A time gap of from 20 to 30 minutes may be provided before the next heater is switched on, preferably about 25 minutes. The control circuit may be adapted to switch randomly between the heaters or to cycle through them sequentially.

We have found that some condensation of the evaporated fragrance on the unit housing can occur. To reduce or avoid this, we prove a heated sleeve for the wick, which sleeve extends up to an upper surface of the housing.
To enable a user to determine whether a fragrance container is exhausted we provide a plug-in fragrancer in which the containers are transparent and are uncovered for a major proportion of the container height.

To provide for enhanced capacity without increasing the width of the device, and also a pleasing visual effect, the containers when assembled together may provide a generally semicircular outline in plan view. Preferably the containers are of identical shape. Three containers may be provided.

We provide containers having a generally truncated segment shape.

Preferably the containers are held together at one end to provide a refill unit, so that the multiple containers can be removed from the device and replaced as a single unit. To secure the containers in the device, it is necessary only to lock one container in position. Preferably this is done by means of a supporting bracket which engages the lower end of one container and clips into a housing.

Other aspects and preferred features of the invention will be apparent from the following description and the accompanying claims.

The invention will be further described by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a plug-in fragrancer in accordance with the invention;

Figure 1a is a perspective view of the fragrancer of Figure 1 with a front cover removed;

Figure 2 is an exploded view of the fragrancer of Figure 1;

Figure 3 is a cross-section on line III-III of Figure 1;

Figure 4 shows a refill unit for the fragrancer of Figure 1;
Figures 5a and 5b show a fragrance container for the fragrancer of Figure 1;

Figures 6a and 6b show front and rear perspective views of a refill unit, and

Figures 7a to 7d show a method of insertion of a refill unit.

Referring to Figure 1, a plug-in fragrancer 2 in accordance with the invention comprise a top cover 4 having three apertures 6 through which fragrance is released. Three transparent containers or bottles 8a, 8b, 8c having a generally truncated sector shaped cross-section are held together to provide an arcuate cylindrical outer surface 66. An outer cover 10 covers the container outlets and wicks and associated heaters as will be described hereinafter. An electrical switch 12 controls the rate of fragrance release.

Referring to Figure 2, each container 8a, 8b, 8c has a neck 14 in which a wick 16 is held by a plastic collar 18. A cap, not shown, is screwed onto the threaded neck 14, covering the wick 16, to seal the container and is removed prior to the insertion of the container into the fragrancer. A collar 20 is a snap fit onto the upper ends of the containers to hold the containers together so that they can be handled as single unit. A bracket or tray 22 is a snap fit onto a base 24 of the central container 8b only. The wick 16 extends down into fragrance 17 in the container and fragrance is ducted up to the upper wick portion 16a.

A printed circuit board 26 carries electronic control circuitry (not illustrated), three heaters 28, switch 12 and LEDs 30. The PCB 26 is held between a back cover 32 and a chassis 34. The PCB is electrically connected with two plug pins (not shown) which extend through apertures 35 in the back cover 32. In Figure 3, the safety or earth pin 33 of a UK style electrical plug, is shown moulded integrally with the back cover 32.

The PCB 26 is sandwiched between the chassis 34 and back cover 32, top cover 4 is mounted on the chassis and front cover 10 is snap fit onto the back cover 32 to hold the assembled unit together. The electrical circuitry is thus isolated from the user by the chassis 34.
Heaters 28 may take various forms as known in the art but we presently prefer a resistive heater which is embedded or potted in a ceramic holder or a resistive heater embedded or housed in a thermally conductive plastics such as polybutylene terephthalate. The heater 28 has a body 38 which has a through aperture 40 which receives the upper end 16a of the wick 16. As seen in Figure 1a, the heaters 28 are separated, that is spaced apart on the PCB, with a thermally insulating air gap 29 between them. Another thermal insulator may replace or fill in the air gap 29. The heaters 28 are mounted on the PCB by electrically conductive wires 36. The heaters are positioned above a plate 78 on the chassis 34. Plate 78 has apertures 80 which are aligned with the apertures 40 in the heater bodies 38 (refer to Figure 3).

The LEDs 30 are positioned near a thin wall region 42 of the back cover (they are not shown in Figure 1a). An LED is associated with a respective heater 28. The LED may be illuminated when the heater is 'on', i.e. when voltage is being applied to the heater, or during the full cycle of the heater, that is the 'on' period and the subsequent cool down period before the next heater is switched on. The illuminated LED 30 will be seen through the wall portion 42.

A collar 38a on the heater body 38 extends up to be level with the upper surface of the cover 4, to provide a heated path for the fragrance as it leaves the plug-in fragrancer unit 2.

Referring to Figure 4, a refill unit 50 (with container caps removed) comprises three containers 8a, 8b, 8c held together by collar 20 which is snap fit onto the upper ends of the containers. Tray 22 is a snap fit onto the bottom end of the centre container 8b only and has a tongue 56 which engages with a recess or detent 58 in the chassis 34 to hold the refill unit in place. A skirt 22a passes around the front of the side containers 8a, 8c for aesthetic effect.

Referring to Figures 5a and 5b these show a container 8a, 8b, 8c which is moulded of glass, for example. The containers 8a, 8b, 8c are identical, but typically will be filled with different fragrances. The container has bottom portion 24 which has a groove 58 to receive a nibs 59 on radial ribs 60 and a back rib 61 of a central portion of tray 22.
(see Figure 2) so that the tray 22 is a snap fit onto the central container 8b. The container upper portions 62 also have recesses 64 formed therein to receive nibs formed on the collar 20 which serves to secure the three containers 8a, 8b, 8c together. The containers have an arcuate outer wall 68, side walls 70 which are formed on a radius of the arcuate outer wall 68, and a flat rear wall 72.

It will be appreciated that the collar 20 and or tray 22 may be glued in place. Also the container 8a, 8b, 8c may be glued together.

Referring to Figures 6a, 6b, it can be seen that the three containers 8a, 8b, 8c combine to provide an external surface 66 of semi-circular cross section.

Referring to Figure 6b, the collar 20 and the rear walls 72 of the three containers 8a, 8b, 8c form a recess 90 and the tongue 56 extends upwards and carries teeth 72 on a flexible portion 74 to engage the detent 58 in the chassis 34.

Referring to Figures 7a to 7d, the cover 10 and chassis form a cavity 80. A saddle 82 is provided on the chassis 34 and corresponds to the recess 70. To insert the refill, the refill is offered up to the chassis, below the cavity 80, the saddle 82 facing the recess 90 at the level of the collar 20 (Figure 7b). The unit is then slid upwards (Figure 7c), the tongue 56 sliding in a recess 96 in the chassis 34, until the teeth 92 engage in the detent 58 to lock the refill in place (Figure 7d). The refill can be removed by pulling firmly downwards so that teeth 92 ride out of the detent 58. It will be appreciated that a fragrancer is typically provided with a refill unit 50 on the initial sale, and so strictly speaking it is not a refill unit at that time, but subsequent units, refill units, are purchased to replace the used unit 50.
CLAIMS:

1. A plug-in fragrancer having at least three containers for fragrances, a wick extending from each container, wherein a heating device for causing evaporation of fragrance from the wicks comprises at least three heaters which are mounted spaced apart to provide a gap between the heaters, each heater being associated with a respective container wick.

2. A fragrancer as claimed in claim 1, wherein the gap between the heaters is an air gap.

3. A fragrancer as claimed in claim 1 or 2, wherein heaters are mounted on a common circuit board.

4. A fragrancer as claimed in claim 1, 2 or 3, wherein the heaters are ceramic body heaters.

5. A fragrancer as claimed in claim 1, 2 or 3, wherein each heater may be formed by a resistive heating element embedded in a thermally conductive plastics housing.

6. A fragrancer as claimed in any one of claims 1 to 5, wherein each heater comprise a heater body having an aperture therethrough for receiving the wick.

7. A fragrance as claimed in any one of claims 1 to 6, having a control circuit to switch on each heater in turn.

8. A fragrancer as claimed in claim 7, wherein there is a time gap between switching off one heater and turning on another heater.

9. A fragrancer as claimed in claim 7 or 8, wherein the duty cycle of the voltage supply to a heater is varied to provide a greater or lesser amount of heat.
10. A fragrancer as claimed in claim 7, 8 or 9, wherein the control circuit controls the heater so that each heater is 'on' for a period of from 10 to 30 minutes and there is a time gap of from 15 to 35 minutes before another heater is switched on.

11. A fragrancer as claimed in any one of claims 1 to 10, in which the heater includes a heated sleeve which sleeve extends up to an upper surface of the housing.

12. A plug-in fragrancer having a plurality of containers for fragrances, a wick extending from each container, and a heating device for causing evaporation of fragrance from the wicks, wherein the containers when assembled together provide a generally semicircular outline in plan view.

13. A fragrancer as claimed in claim 12, wherein the containers are of identical shape.

14. A fragrancer as claimed in claim 13, wherein the containers having a generally truncated segment shape.

15. A refill unit for a plug-in fragrancer, comprising a plurality fragrance containers and a collar at one end of the containers which holds the containers together, and a bracket mounted on one of the containers for engaging a housing of the fragrancer to hold the refill unit in place.