A device for filtering second-hand smoke from a burning tobacco product includes a first chamber for receiving the lit end of the tobacco product. Users of the device can inhale smoke from the tobacco product through a first aperture in the first chamber, while a filter communicating with the first chamber filters smoke from the burning end of the tobacco product. A second chamber is configured to receive smoke and air exhaled by the user. The smoke is filtered by the second filter and the filtered air is passed through to the surrounding environment.
DEVICE FOR FILTERING SECOND-HAND SMOKE

FIELD OF THE INVENTION

[0001] The present invention relates generally to devices for smoking tobacco products, and more particularly to a device that filters second-hand smoke from a burning tobacco product.

BACKGROUND OF THE INVENTION

[0002] Second-hand smoke from cigarettes, cigars, or other tobacco products has been linked to several health problems and produces a smell that is offensive to many persons. Many devices have been proposed to reduce or eliminate second-hand smoke released into the surrounding atmosphere by smokers while smoking a tobacco product. While improvements have been made in the field, there are still problems to be solved. For example, one common problem with previous smoke filtering devices is that they do not allow users to replace the filters without needlessly replacing other components of the device. Other devices detract from smokers' enjoyment by requiring users to wear what is essentially a mask covering their nose and mouth. The most common problem with the prior art devices is that they utilize a single chamber to filter smoke from the burning tobacco product and smoke exhaled by the smoker. Exposing exhaled smoke to the tobacco product causes it, particularly a cigarette, to lose its flavor and in fact begin to taste bad. The smoking experience is thus less enjoyable to the smoker. Accordingly, there is a need for an improved smoke filtering device that will overcome these and other drawbacks of prior devices.

SUMMARY OF THE INVENTION

[0003] A device for filtering second-hand smoke in accordance with the principles of the present invention overcomes drawbacks of current smoke filtering devices, such as those discussed above. The device reduces a non-smoker's exposure to second-hand smoke through containment and filtering while maintaining the taste of a tobacco product and more closely mimicking conventional smoking than prior devices. To this end, a device for filtering second-hand smoke in accordance with the principles of the present invention includes a first chamber that surrounds at least the lit end of a tobacco product and which has a first filter to filter the smoke from the tobacco product. A second chamber has a second filter into which second-hand smoke is exhaled and filtered before being released into the air.

[0004] In another embodiment of a device for filtering second-hand smoke in accordance with the principles of the present invention, the first and second chambers are removably coupled such that the apparatus forms an integrated unit. A fan may be located after the filter in the first chamber so as to draw smoke out from the first chamber and maintain air circulation to keep the tobacco product lit.

[0005] The dual-chamber structure separates the tobacco product from exhaled smoke, which would otherwise cause the tobacco product to lose its taste. The filters may be removable and cleanable so that the apparatus may be reused. The first chamber, into which at least the lit end of the tobacco product is placed, may be transparent so that the user may see if the tobacco product is burning properly. These and other objects, advantages and features of the invention will become more readily apparent to those skilled in the art upon review of the following detailed description in conjunction with the accompanying drawings.

[0006] These and other features, objects and advantages of the invention will become more readily apparent to those skilled in the art in view of the following detailed description, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the general description of the invention given above, and the detailed description given below, serve to explain the principles of the invention.

[0008] FIG. 1 is a perspective view of a device for filtering second-hand smoke in accordance with the principles of the present invention.

[0009] FIG. 2 is a cross-sectional view of the device of FIG. 1.

[0010] FIG. 3 is a perspective view of a second embodiment of a device for filtering second-hand smoke in accordance with the principles of the present invention.

[0011] FIG. 4A is a cross-sectional view of a third embodiment of a device for filtering second-hand smoke in accordance with the principles of the present invention.

[0012] FIG. 4B is an exploded cross-sectional view of the device of FIG. 4A.

[0013] FIG. 5 is a partial cross-sectional view of a device similar to that shown in FIG. 4A, illustrating a fourth embodiment.

[0014] FIG. 6 is a partial cross-sectional view of a fifth embodiment of a device for filtering second-hand smoke in accordance with the principles of the present invention.

[0015] FIG. 7 is an elevational view of a sixth embodiment of a device for filtering second-hand smoke in accordance with the principles of the present invention.

DETAILED DESCRIPTION

[0016] FIGS. 1 and 2 illustrate an exemplary device 10 for filtering second-hand smoke in accordance with the principles of the present invention. The device 10 includes a first chamber 12, a first filter 14, a second chamber 16, and a second filter 18. At least the lit end 20 of a tobacco product 22, such as a cigarette, is placed into the first chamber 12. The user may inhale smoke from the tobacco product 22. Smoke given off by the tobacco product 22 but not inhaled is filtered through the first filter 14. The user then exhales through a mouthpiece 24 into the second chamber 16. Smoke and air is forced through the second chamber 16 and the second filter 18. The second filter 18 filters the smoke exhaled by the user so that only the filtered air is released into the atmosphere.

[0017] In the embodiment shown, the first chamber 12 comprises at least a sidewall 26, a first end 28 and a second end 30 forming an enclosed structure. The first end 28 of the first chamber 12 includes a first filter 14 that filters smoke from the lit end 20 of the tobacco product 22 as the smoke exits the first chamber 12. The first chamber 12 also has at least one aperture 32 in the second end 30 through which at least the lit end 20 of a tobacco product 22 is placed into the first chamber 12. The unit end 34 of the tobacco product 22 extends through the aperture 32 so that a user can place the
tobacco product 22 between their lips to smoke the tobacco product 22 in a conventional manner. A collar 36 may be provided at the second end 30 of the first chamber 12 proximate the aperture 32 to support the unit end 34 of the tobacco product 22. In the embodiment shown, the collar 36 is integrated into the second end 30 of the first chamber 12 and helps to seal the first chamber 12 so that smoke and air may not escape the first chamber 12 except through the first filter 14. Alternatively, the collar 36 may be removably coupled to the first chamber 12, as described more fully below. In one aspect of the invention, the walls of the first chamber 12 may be transparent, or at least translucent, such that the user may see the tobacco product 22 therein to confirm, for instance, whether or not the tobacco product 22 is still lit.

[0018] The second chamber 16 comprises at least one sidewall 38, a first end 40, and a second end 42 forming an enclosed structure. The first end 40 of the second chamber 16 includes a second filter 18 that filters smoke as it exits the second chamber 16. A mouthpiece 24 has a first end 44 coupled to the second end 42 of the second chamber 16 and has a second end 46 adapted to fit the lips of a user. FIG. 2 further illustrates features of the mouthpiece 24. A passage 48 through the mouthpiece 24 communicates with the second chamber 16 whereby a user may exhale smoke and air through the mouthpiece 24 into the second chamber 16. The second filter 18 filters the exhaled smoke and air so that only filtered air is released into the atmosphere.

[0019] With continued reference to FIG. 2, first filter 14 is removably retained within the first end 28 of the housing 50 by the closure 52 to facilitate cleaning or replacing the filter 14. The first filter 14 is clamped between an end wall 54 of the closure 52 and a radially inwardly extending ledge 56 provided within the housing 50 proximate the open first end 28. An aperture 58 in the end wall 54 of the closure 52 is threadably engaged with the first end 28 of the housing 50. While only a single aperture 58 is depicted in FIG. 2, it will be recognized that closure 52 may alternately have more than one aperture therethrough, to clamp the first filter 14 within the first end 28 of the housing 50 while permitting the flow of air through the first filter 14. In the embodiment shown, closure 52 is removably coupled to the first end 28 of housing 50 by complimentary screw threads 60, 62 formed on the closure 52 and the first end 28 of housing 50. It will be recognized that various other methods or structure may be used to removably couple closure 52 to the first chamber 12.

[0020] FIG. 3, in which reference numerals refer to like features in FIG. 1, illustrates an embodiment similar to FIG. 1, but wherein the first and second chambers 12, 16 and other parts of the smoke-filtering device 10 are integrated within a single housing 64 to provide a convenient, single-piece construction. Even though the device 10a of FIG. 3 comprises a single housing 64, the first and second chambers 12, 16 and the first and second filters 14, 18 are used in the same manner described above with respect to the device 10 of FIG. 1, so that smoke exhaled by the user is not exposed to the tobacco product 22.

[0021] FIGS. 4A and 4B illustrate another embodiment of a device 10b for filtering second-hand smoke in accordance with the principles of the present invention. The device 10b is similar to the device 10 of FIGS. 1 and 2, and similar features have been similarly numbered. In the embodiment shown, the first chamber 12 comprises at least a sidewall 26, a first end 28 and a second end 30 forming an enclosed structure. The first end 28 of the first chamber 12 includes a first filter 14 that filters smoke from the lit end 20 of the tobacco product 22 as it exits the first chamber 12. The first chamber 12 also has at least one aperture 32 in the second end 30 through which at least the lit end 20 of a tobacco product 22 is placed into the first chamber 12. The unit end 34 of the tobacco product 22 extends through the aperture 32 so that a user can place the tobacco product 22 between their lips to smoke the tobacco product 22 in a conventional manner.

[0022] In the embodiment shown, the first chamber 12 is interconnected with a second chamber 66. The second chamber 66 comprises at least one sidewall 68, a first end 70, and a second end 72 forming an enclosed structure. At the first end 70 of the second chamber 66 is a second filter 74 which serves to filter the smoke exhaled by the user. An aperture 76 is formed through sidewall 68 of the second chamber 66 and communicates with a passage 78 extending along a conduit 80 that couples the second chamber 66 with a mouthpiece 24. A passage 48 through the mouthpiece 24 communicates with the passage 78 through conduit 80 whereby a user may exhale smoke and air through the mouthpiece 24, through the conduit 80, and into the second chamber 66. The exhaled smoke and air is then filtered by the second filter 74 so that only the filtered air is released into the atmosphere.

[0023] The device 10b shown in FIGS. 4A and 4B further includes a fan 82 to draw smoke and circulate air from the first chamber 12. The air circulation keeps the tobacco product 22 lit and draws air and smoke into the first filter 14 so that smoke does not build up within the first chamber 12. In one embodiment, aperture 32 may be sized to provide a clearance space between the tobacco product 22 and the aperture 32, so that the fan 82 draws air into first chamber 12 through the clearance space instead of through the tobacco product 22. Filtered air exits the device 10b through apertures 114 provided near the outlet side of fan 82. In the device shown, fan 82 is powered by a battery 84. It will be appreciated, however, that fan 82 may be powered in various other ways, such as by manual manipulation, to draw smoke and air into the first filter 12.

[0024] A collar 86 supports the tobacco product 22 extending through the aperture 32 with its lit end 20 in the first chamber 12. The aperture 32 includes an insert 88 formed from resilient seal material to further seal the first chamber 12 so that smoke and air do not escape without first being filtered. The unit end 34 of the tobacco product 22 extends through the collar 86 so that a user can place the tobacco product 22 between their lips to smoke the tobacco product 22 in a conventional manner. The collar 86 is flexibly coupled to the device 10b by a tether, such as a ball chain 90. The ball chain 90 is attached at a first end 92 to a grip 94 extended from the collar 86, making the collar 86 easier to hold. A tab 96 with an aperture 98 is located on a sidewall 26 of the first chamber 12. Aperture 98 receives the second end 100 of the ball chain 90. It will be recognized that there are various other ways to flexibly couple the collar 86 to the sidewall 26, and that the tether used may be attached to the device 10b at locations other than the sidewall 26.

[0025] FIG. 4B is an exploded view of the device 10b of FIG. 4A, illustrating how the components may be separable so as to allow for the replacement and/or cleaning of the first filter 14, the second filter 74, and the battery 84. The
separable components are arranged into a first end section 106, an intermediate end section 108, and a second end section 110. Each of these sections is described below. Conduit 80 is not shown removable from the first chamber 12. It will be recognized, however, that the conduit 80 may be removable from the device 10b using a coupling as known in the art. In addition, the mouthpiece 24 connected to the conduit 80 is shown as being not removable. Again, it will be recognized that the mouthpiece 24 may be removable from the device 10b using a coupling known in the art to facilitate cleaning and/or replacement.

[0026] The first end section 106 includes the collar 86, the ball chain, 90, the first chamber 12, and the first filter 14. The collar 86 is shown separated from the aperture 32 yet still coupled to the device 10b through the ball chain 90. With the collar 86 removed, the insert 88 of softer material is more easily seen. A radially inwardly extending ledge 102 projects inwardly from the outer wall 104 of the first chamber 12. Ledge 102 holds the first filter 14 in position at the first end 28 of the first chamber 12. In the embodiment shown, the first end section 106 is removable coupled to the intermediate section 108 of the device 10b by complimentary screw threads 103, 105 provided at the first end 28 of first chamber 12 and the mating portion of the intermediate section 108, respectively. It will be recognized that the first end section 106 and intermediate section 108 of the device 10b may be removably coupled in other manners, such as through a bayonet mount or other structure known in the art.

[0027] The intermediate section 108 of device 10b includes fan 82 and battery 84. The blades 112 of fan 82 rotate and draw smoke and air from the first chamber 12 through the first filter 14 and push the filtered air out of the device 10b through apertures 114 extending radially through sidewall 116, as described above. The battery 84 is coupled to a connector 118 which connects to the fan 82 through a wire 120. When the device 10b is not separated into its component parts (i.e. in the configuration shown in FIG. 4A) the battery 84, connector 118, and the wire 120 fit inside the battery compartment 122. Compartment 122 includes radially extending tabs 124 which engage a battery compartment door 126 to hold the battery 84 in the battery compartment 122 in the assembled condition.

[0028] The second end section 110 includes the second chamber 66 and the second filter 74. The second end section 110 of the device 10b is shown as being configured for connection to the intermediate section 108 via a bayonet mount comprising slots 128 and pins 132. Slots 128 are provided on the exterior wall 130 of the intermediate section 108. Corresponding pins 132 are provided on an interior wall 134 of the second end section 110 to be received in slots 128 when the device 10b is assembled. It will be recognized that the sections 108, 110 may be coupled in various other manners suitable for removably coupling the second end section 110 to the intermediate section 108.

[0029] The second chamber 66 includes radially extending ribs 136 which clamp a second filter 74 into place between the ribs 136 and an end wall 70 of the closure 133. Ribs 136 are stepped with a first radial length 135 and a second radial length 137. The second radial length 137 is longer than the first radial length 135. This longer radial length 137 spaces the filter 74 from the end wall 72, allowing air to pass from passage 78 in conduit 80 to the second chamber 66 and through the second filter 74. An aperture 138 is located within the closure 133 to allow filtered air to be released from the second chamber 66 into the atmosphere.

[0030] FIG. 5 illustrates another embodiment of a smoke filtering device similar to the device described above with respect to FIGS. 4A-4B, wherein the ribs 136 within second chamber 66 in FIGS. 4A-4B are replaced with an intermediate wall 140 having apertures 142 formed therethrough. The intermediate wall 140 spaces the second filter 74 from the wall 144 of the second chamber 66 and the apertures 142 allow smoke and air exhaled through conduit 80 to pass through second filter 74.

[0031] FIG. 6 illustrates another embodiment of a device 10c for filtering second-hand smoke in accordance with the principles of the present invention. The device 10c is similar to the device 10 of FIG. 1, and like reference numerals refer to like features. In this embodiment, a single mouthpiece 146 is used to communicate with both the first chamber 12 and the passage 78 through conduit 80 to the second chamber (not shown). The mouthpiece 146 comprises a first end 148, an inlet passage 156, a second end 150, and a second section 155 adapted to fit the mouth of a user. The section 155 includes a smoke channel 152. The smoke channel 152 is in communication with an outlet passage 154 and the inlet passage 156. The outlet passage 154 connects the mouthpiece 146 to the passage 78 communicating with the second chamber (not shown). Located within the outlet passage 154 is a check valve 158, which regulates airflow while the user exhaltes so that the user’s breath is directed through the outlet passage 154 to the second chamber (not shown). The inlet passage 156 connects the smoke channel 152 to the first chamber 12. Located within the inlet passage 156 is another check valve 160, which regulates airflow while the user inhales, allowing air to pass such that the user may inhale smoke from the tobacco product 22. Tobacco product 22 is positioned with a lit end (not shown) located within the first chamber 12, as described above. The unlit end 34 of the tobacco product 22 is positioned within the inlet passage 156 between the check valve 160 and the first chamber 12. At the connection between the inlet passage 156 and the first chamber 12 is an insert 162 to help hold the tobacco product 22 in place, similar to insert 88 described above with respect to FIGS. 4A-4B.

[0032] FIG. 7 illustrates another embodiment of a device 10d for filtering second-hand smoke in accordance with the principles of the present invention. The device 10d is similar to the device 10 of FIG. 1, and like reference numerals refer to like features. In this embodiment, the user inhales and exhales smoke through a single mouthpiece 164. The mouthpiece 164 has a first end 166 adapted to fit the mouth of a user, a second end 168 opposite the first end 166, and a passage 170 between the first and second ends 166, 168. Passage 170 is in communication with a first end 172 of a conduit 174, which allows smoke and air to pass from the first chamber 12 to the mouthpiece 164 and the user and also from the user to the second chamber 176. Conduit 174 is in communication with an inlet passage 178 of the first chamber 12, and an outlet passage 180 of second chamber 176. A first check valve 177 is located within the inlet passage 178 and regulates airflow to allow a user to inhale smoke from a tobacco product 22 in the first chamber 12. A second check valve 179 is located within the inlet passage 180 and regulates airflow so that a user may exhale smoke into the second chamber 176. At an end 182 of the inlet passage 178,
a collar 184 is in communication with both the inlet passage 178 and the first chamber 12. The first chamber 12 and first filter 14 are housed within a first housing section 186.

[0033] In use, a tobacco product 22 is placed with at least a lit end 20 in the first chamber 12. The tobacco product 22 passes through the collar 184 such that its unlit end 34 is located in the inlet passage 178 between the check valve 177 and the first chamber 12. A first filter 14 filters smoke and air from the first chamber 12 so that only filtered air is released into the atmosphere. The outlet passage 180 is in communication with a second chamber 176 that contains a second filter 188. This second chamber 176 filters smoke and air exhaled from the user in a manner similar to that described above with respect to the device 10 of FIG. 1, so that smoke exhaled by the user is not exposed to the tobacco product 22. In this embodiment, the second chamber 176 and second filter 188 are housed within a second housing section 190.

While the present invention has been illustrated by the description of one or more embodiments thereof, and while the embodiments have been described in considerable detail, they are not intended to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. The invention in its broader aspects is therefore not limited to the specific details, representative apparatus and method and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the scope or spirit of the general inventive concept.

What is claimed is:

1. An apparatus for containing smoke from a burning tobacco product, the apparatus comprising:
   a first chamber for receiving at least a lit end of a tobacco product therein;
   an aperture communicating with said first chamber and through which a user can inhale smoke from the tobacco product;
   a first filter in communication with said first chamber, whereby smoke exiting said first chamber is removed by said first filter;
   a second chamber configured to receive smoke and air exhaled by a user of the apparatus; and
   a second filter in communication with said second chamber and operable to remove smoke from air exhaled from a user of the apparatus.

2. The apparatus of claim 1, further comprising a fan in communication with said first chamber and operable to draw air and smoke from said first chamber through said first filter.

3. The apparatus of claim 1, wherein said aperture supports a tobacco product with the lit end disposed within said first chamber, and an inhalation end of the tobacco product extending outside said first chamber.

4. The apparatus of claim 1, wherein at least part of said first chamber is transparent or translucent to facilitate viewing the tobacco product within said first chamber.

5. The apparatus of claim 2, further comprising a power source associated with said fan.

6. The apparatus of claim 5, wherein at least one of said filters and said power source are removable from the apparatus.

7. The apparatus of claim 1, wherein said first and second chambers are interconnected.

8. The apparatus of claim 1, further comprising a collar having a bore sized to receive the tobacco product, said collar cooperating with said aperture in said first chamber to support the lit end of the tobacco product within said first chamber.

9. The apparatus of claim 8, wherein said collar is tethered to the apparatus.

10. The apparatus of claim 1, further comprising a mouthpiece in fluid communication with at least one of said first and second chambers.

11. The apparatus of claim 10, wherein said mouthpiece is separate from said aperture communicating with said first chamber, said mouthpiece communicating with said second chamber to direct smoke and air exhaled by a user to said second chamber.

12. The apparatus of claim 10, wherein said mouthpiece comprises:
   a smoke channel adapted for engagement with the mouth of a user;
   an inlet passage communicating with said smoke channel and said first chamber;
   an outlet passage communicating with said smoke channel and said second chamber;
   a first check valve disposed in said inlet passage and adapted to pass smoke and air from said first chamber to said smoke channel when a user inhales through said mouthpiece; and
   a second check valve disposed in said outlet passage and adapted to pass smoke and air exhaled by the user through said smoke channel to said second chamber.

13. A method of filtering smoke from a tobacco product comprising:
   burning a tobacco product;
   filtering the smoke from the tobacco product through a first filter;
   inhaling the unfiltered smoke from the tobacco product;
   exhaling the smoke; and
   filtering the exhaled smoke through a second filter.

14. The method of claim 13 further comprising drawing smoke through the first filter with a fan.

15. The method of claim 13 further comprising removing at least one filter for cleaning or replacement.

16. The method of claim 14 wherein said fan includes a motor coupled to a power source, further comprising replacing the power supply for the fan.

17. A method of filtering second-hand smoke from a tobacco product using at least a first chamber, a support collar coupled to the first chamber, and at least first and second filters, wherein the method comprises:
   supporting the tobacco product with the collar;
   burning the tobacco product;
   filtering the smoke from the tobacco product through a first filter;
   inhaling the unfiltered smoke from the tobacco product;
   exhaling the smoke; and
   filtering the exhaled smoke through a second filter.

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