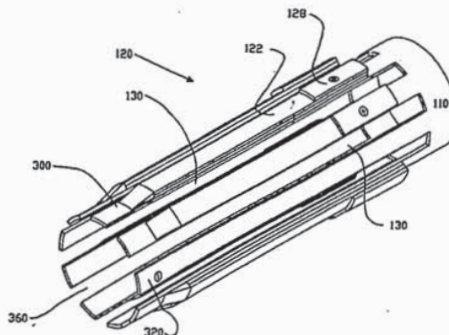




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| <p>(21) International Application Number: PCT/US95/04343 (22) International Filing Date: 6 April 1995 (06.04.95) (30) Priority Data: 08/224,848 8 April 1994 (08.04.94) US 08/370,125 9 January 1995 (09.01.95) US (71) Applicant: PHILIP MORRIS PRODUCTS INC. [US/US]; 3601 Commerce Road, Richmond, VA 23234 (US).</p> | <p>(72) Inventors: HAJALIGOL, Mohammad, R.; Apartment H, 3322 Old Courthouse Road, Richmond, VA 23236 (US). FLEIS-CHHAUER, Grier, S.; 1004 Lady Jean Court, Midlothian, VA 23313 (US). DEEVI, Seetharama, C.; 129 High Point Lane, Oak Ridge, TN 37830 (US). HIGGINS, Charles, T.; 30 Glenbrooke Circle, Richmond, VA 23229 (US). HAYES, Patrick, H.; 4540 Forrestal Road, Chester, VA 23831 (US). HERMAN, Herbert; 30 Waterview Drive, Port Jefferson, NY 11777 (US). GANSERT, Robert, V.; Apartment 2D, 20 Williams Boulevard, Lake Grove, NY 11755 (US). COLLINS, Alfred, L.; 2058 Hancock Road, Powhatan, VA 23139 (US). KEEN, Billy, J., Jr.; 12911 Blue Stack Court, Chesterfield, VA 23832 (US). LAROY, Bernard, C.; 12821 Bailey Bridge Road, Richmond, VA 23112 (US). LILLY, A., Clinton, Jr.; 9641 Waterfowl Flyway, Chesterfield, VA 23832 (US). (74) Agents: MAGNONE, Joseph, R. et al.; Burns, Doane, Swecker & Mathis, Washington and Prince Streets, P.O. Box 1404, Alexandria, VA 22313-1404 (US). (81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published With international search report.</p> | |

(54) Title: TUBULAR HEATER FOR USE IN AN ELECTRICAL SMOKING ARTICLE



(57) Abstract

A cylindrical tube (300) is provided of a mechanically strong and flexible electrical conductor such as a metal and has a plurality of separated regions. An electrically insulating layer (310) such as a ceramic is applied on the outer surface except for one exposed portion (110). Electrically resistive heaters (122) are then applied to the insulated regions and are electrically connected at one end to the underlying electrical conducting region. The electrical conductor is connected to the negative terminal of a power source. The other end of all the heaters are adapted to be connected to the positive terminal of the source. Accordingly, an electrically resistive heating circuit is formed wherein the tube serves as a common for all of the heating elements. The tubular heater can comprise an exposed end hub with a plurality of blades extending therefrom. Each blade can have an individual heater deposited thereon. Alternatively, every other blade can have a heater deposited thereon. The blades having no heaters function as barriers to minimize outward escape of generated vapors. These barrier blades also function as heat sinks for the heaters on adjacent blades.

RAI Strategic Holdings, Inc.
Exhibit 2023
Philip Morris Products, S.A. v. RAI Strategic Holdings, Inc.
IPR2020-00919

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TUBULAR HEATER FOR
USE IN AN ELECTRICAL SMOKING ARTICLE

Technical Field of the Invention

The present invention relates generally to heaters for use in an electrical smoking article and more particularly to a tubular heater for use in an electrical smoking article.

Discussion of the Related Art

Previously known conventional smoking devices deliver flavor and aroma to the user as a result of combustion of tobacco. A mass of combustible material, primarily tobacco, is oxidized as the result of applied heat with typical combustion temperatures in a conventional cigarette being in excess of 800° C during puffing. Heat is drawn through an adjacent mass of tobacco by drawing on the mouth end. During this heating, inefficient oxidation of the combustible material takes place and yields various distillation and pyrolysis products. As these products are drawn through the body of the smoking device toward the mouth of the user, they cool and condense to form an aerosol or vapor which gives the consumer the flavor and aroma associated with smoking.

Conventional cigarettes have various perceived drawbacks associated with them. Among them is the production of sidestream smoke during smoldering between puffs, which may be objectionable to some non-smokers. Also, once lit, they must be fully consumed or be discarded. Relighting a conventional cigarette is possible but is usually an

unattractive prospect for subjective reasons (flavor, taste, odor) to a discerning smoker.

Prior alternatives to the more conventional cigarettes include those in which the combustible material itself does not directly provide the flavorants to the aerosol inhaled by the smoker. In these smoking articles, a combustible heating element, typically carbonaceous in nature, is combusted to heat air as it is drawn over the heating element and through a zone which contains heatactivated elements that release a flavored aerosol. While this type of smoking device produces little or no sidestream smoke, it still generates products of combustion, and once lit it is not adapted to be snuffed for future use in the conventional sense.

In both the more conventional and carbon element heated smoking devices described above combustion takes place during their use. This process naturally gives rise to many by-products as the combusted material breaks down and interacts with the surrounding atmosphere.

Commonly assigned U.S. Patent Nos. 5,093,894; 5,225,498; 5,060,671 and 5,095,921 disclose various electrical resistive heating elements and flavor generating articles which significantly reduce sidestream smoke while permitting the smoker to selectively suspend and reinitiate smoking. However, the cigarette articles disclosed in these patents are not very durable and may collapse, tear or break from extended or heavy handling. In certain circumstances, these prior cigarette articles may crush as they are inserted into the electric lighters. Once they are

smoked, they are even weaker and may tear or break as they are removed from the lighter.

International patent application WO 94/06314, describes an electrical smoking system including a novel electrically powered lighter and novel cigarette that is adapted to cooperate with the lighter. The preferred embodiment of the lighter includes a plurality of metallic sinusoidal heaters disposed in a configuration that slidably receives a tobacco rod portion of the cigarette.

The preferred embodiment of the cigarette of WO 94/06314 preferably comprises a tobacco-laden tubular carrier, cigarette paper overwrapped about the tubular carrier, an arrangement of flow-through filter plugs at a mouthpiece end of the carrier and a filter plug at the opposite (distal) end of the carrier, which preferably limits air flow axially through the cigarette. The cigarette and the lighter are configured such that when the cigarette is inserted into the lighter, and as individual heaters are activated for each puff, localized charring occurs at spots about the cigarette in the locality where each heater was bearing against the cigarette. Once all the heaters have been activated, these charred spots are closely spaced from one another and encircle a central portion of the carrier portion of the cigarette. Depending on the maximum temperatures and total energies delivered at the heaters, the charred spots manifest more than mere discolorations of the cigarette paper. In most applications, the charring will create at least minute breaks in the cigarette paper and the underlying carrier material, which breaks tends to mechanically weaken the cigarette. For the cigarette to be withdrawn from the lighter, the charred spots must be at

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