United States Patent [19]

Gerth et al.

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[54] **DOSING DEVICE TO PROVIDE VAPORIZED MEDICAMENT TO THE LUNGS AS A FINE AEROSOL**

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[21] Appl. No.: **898,970**

[22] Filed: **Aug. 21, 1986**

[51] **Int. Cl.**[4] **A24K 47/00**

[52] **U.S. Cl.** **131/273;** 131/329; 128/203.17; 128/203.27; 128/204.17; 128/204.23

[58] **Field of Search** 131/273, 329, 330; 128/204.17, 203.17, 204.23, 203.27

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[57] **ABSTRACT**

A medicament dosing device capable of administering a vaporized medicament in the form of tiny aerosol particles to the mouth and lungs of the user at a substantially constant concentration level. In a particularly preferred embodiment the dosing device is used to provide nicotine to a cigarette smoker in a form and a dose that closely mimics a burning cigarette to satisfy the smoker's craving for nicotine, but without subjecting either the user or any non-users in the immediate vicinity to the tars and carbon monoxide of cigarette smoke. A preferred device comprises a battery powered resistance heater housed in a cigarette-shaped tube. A demand-operated switch is employed in the circuit so that as the user sucks air through the tube in a manner similar to puffing on a cigarette, energy is supplied to the resistance heater which vaporizes the nicotine. Because the system vaporizes the medicament being administered only upon activation of the demand-operated switch, the concentration of the medicament will be substantially constant each time the user sucks on the mouthpiece end of the cigarette-shaped tube, regardless of the length of the time intervals which pass between successive inhalations.

20 Claims, 3 Drawing Sheets

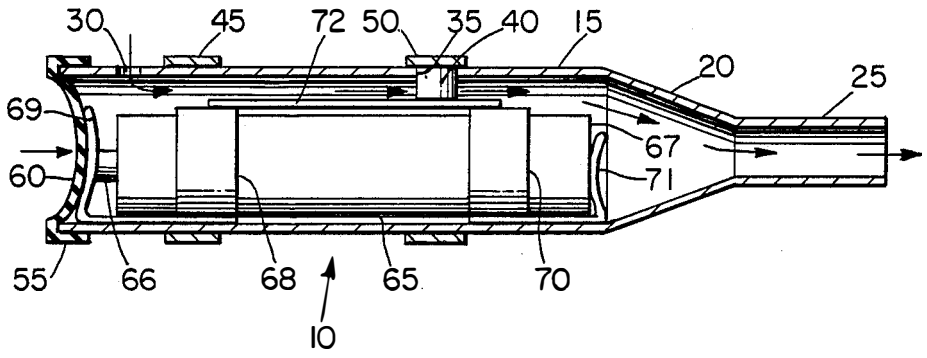


Fig. 1

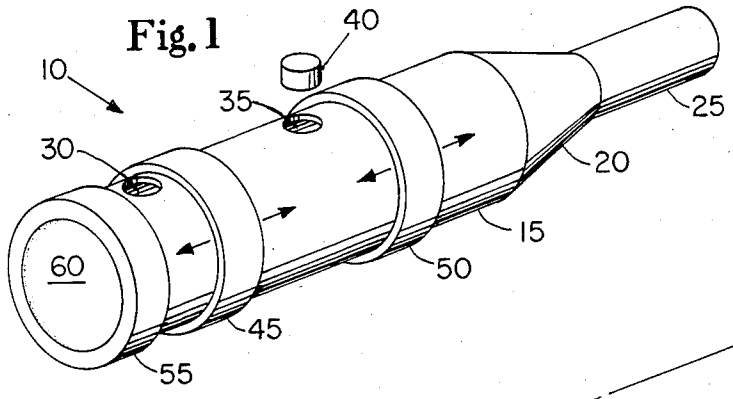


Fig. 2

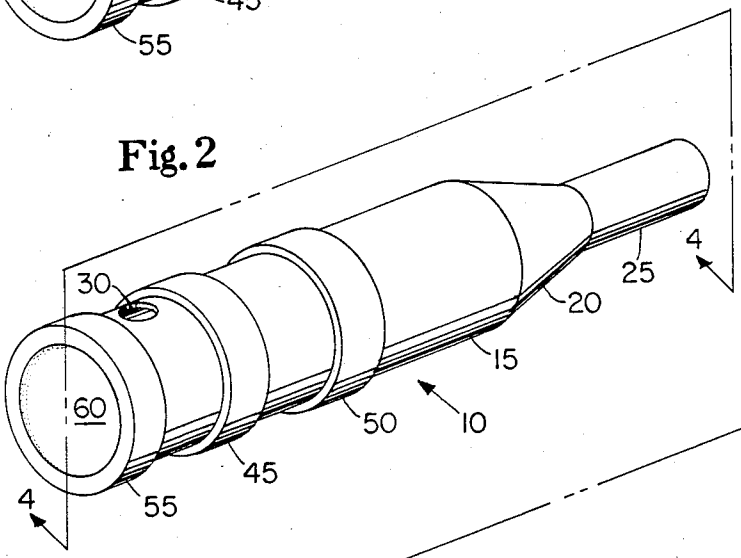


Fig. 3

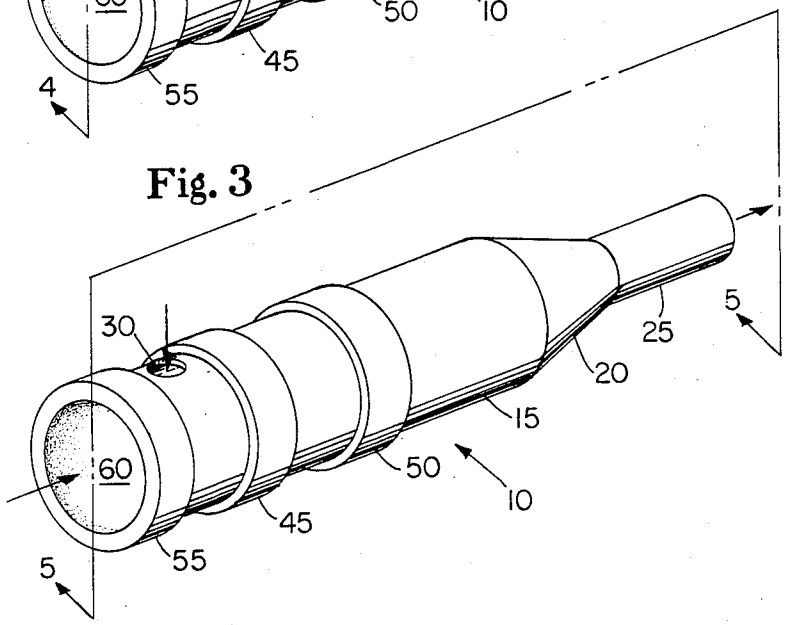


Fig. 4

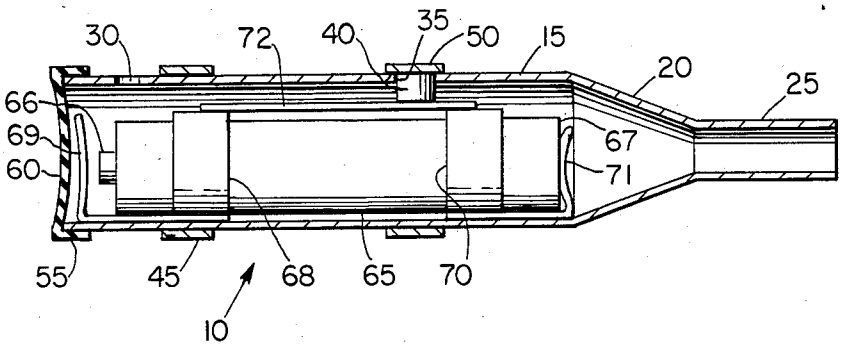


Fig. 5

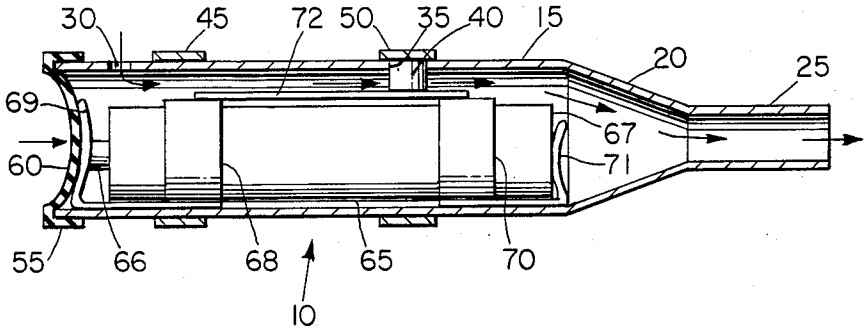
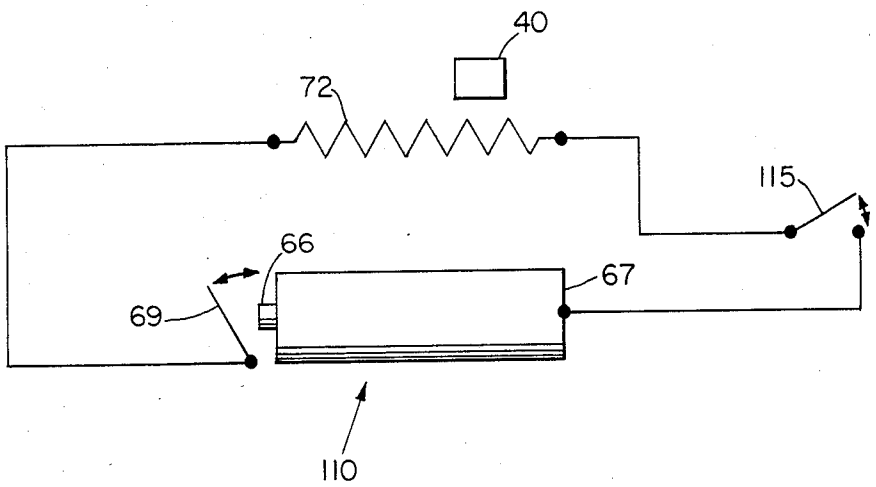


Fig. 6



DOSING DEVICE TO PROVIDE VAPORIZED MEDICAMENT TO THE LUNGS AS A FINE AEROSOL

TECHNICAL FIELD

The present invention relates to a medicament dosing device capable of adminstering a vaporized medicament to the lungs of the user at a substantially constant concentration level.

The present invention further relates to such a dosing device which will provide nicotine to a cigarette smoker in a form and a dose that closely mimics a burning cigarette to satisfy the smoker's craving for nicotine, but without subjecting either the user or any non-users in the immediate vicinity to the tars and carbon monoxide of cigarette smoke.

The present invention has further relation to such a device to supply other vaporizable medicaments, such as menthol, to the lungs of the user in a very fine aerosal form at a substantially constant concentration level.

The present invention has still further relation to such a dosing device wherein the medicament being administered is vaporized only on demand in response to the user drawing a stream of cool air through the device, thereby causing the vaporized medicament to condense in a very fine aerosal with particles which are small enough to be dispersed throughout the user's lungs.

The present invention has still further relation to a self-contained, battery operated medicament dosing device which is approximately the size of a conventional cigarette, but which can be automatically actuated to vaporize the medicament without combustion by sucking on the mouthpiece end of the device.

BACKGROUND OF THE INVENTION

Inhalation devices for dosing various medicaments, including nicotine, are generally known in the art.

U.S. Pat. No. 3,258,015 issued to Ellis et al. on June 28, 1966 discloses a number of embodiments for a smoking device intended to provide dosing of nicotine without the inhalation of products of combustion normally encountered when smoking cigarettes. In most of the disclosed embodiments, an outer wrap of tobacco or similar combustible material is utilized to vaporize nicotine contained within a continuous passageway extending from the outermost end of the cigarette-like device to the mouthpiece end.

Most of the disclosed embodiments, while not requiring inhalation of smoke by the user, do require combustion of the outer wrap to provide the heat needed to vaporize the nicotine. However, the FIG. 9 embodiment of Ellis et al. discloses a smoking device utilizing a centrally located heating material comprised of pyrophorous material such as finely divided iron, nickel, zinc or lead of moderate activity. The centrally located tubular member is sealed to the atmosphere until such time as the user desires to operate the device. At this point a plug 64 is removed to expose the pyrophorous material to the atmosphere, thereby generating heat sufficient to vaporize nicotine contained in a nicotine releasable material 60 disposed outside the tubular member 61. The innermost end of the pyrophorous material containing tube is sealed by an impermeable disc 63 to prevent inhalation, while the user is allowed to draw the nicotine containing vapor from the concentric overwrap through the permeable disc 66 located near the mouthpiece end of the device. Once the heating process has been initiated with the device as disclosed in the U.S. Pat. No. 3,258,015 Ellis et al. patent, the nicotine will continue to be vaporized whether or not the user is drawing air through the passageway containing the nicotine. If the user allows long periods of time to elapse between successive inhalations, the concentration of nicotine vapor in the passageway can build up substantially. Thus the medicament concentration level encountered by the user with devices of the type described in the U.S. Pat. No. 3,258,015 Ellis et al. patent will vary greatly from one inhalation to the next, depending upon the time intervals between successive inhalations.

U.S. Pat. No. 3,356,094 issued to Ellis et al. on Dec. 5, 1967 discloses smoking devices somewhat similar to those disclosed in the U.S. Pat. No. 3,258,015 Ellis et al. patent. However, the devices disclosed in the U.S. Pat. No. 3,356,094 Ellis et al. patent require that a portion of the by-products of combustion which result from burning the tobacco surrounding the nicotine-containing passageway be drawn into the user's lungs. The devices shown in the U.S. Pat. No. 3,356,094 Ellis et al. patent differ from those disclosed in the U.S. Pat. No. 3,258,015 Ellis et al. patent in that they allow the user to better control the concentration level of the nicotine, i.e. drawing air through the tobacco containing portion of the device will accelerate its rate of combustion and hence the rate of vaporization of the nicotine in the central passageway. However, even the device disclosed in the U.S. Pat. No. 3,356,094 Ellis et al. patent does not give the user complete, on demand control over the concentration of vaporized nicotine developed in the interior pasageway. Furthermore, it suffers the disadvantage that it requires the user to inhale some of the harmful products of combustion in order to influence the rate of vaporization of the nicotine. This would certainly be undesirable in situations where the medicament in question is being administered to a person suffering from respiratory difficulties.

U.S. Pat. No. 3,200,819 issued to Gilbert on Aug. 17, 1965 discloses a smokeless, non-tobacco cigarette wherein a heating element, characterized as a vacuum tube, is energized by a small battery so as to heat flavored air as it passes from a flavor-containing cartridge 20 located at the outermost tip of the device to its mouthpiece end. However, the flavor-containing cartridge is not heated by the heating element and no means are provided for energizing and de-energizing the heat source on demand. Therefore the device disclosed in the patent to Gilbert would not function to administer a substantially constant concentration of a medicament which must be vaporized by the addition of heat.

U.S. Pat. No. 1,968,509 issued to Tiffany on July 31, 1934 and U.S. Pat. No. 2,057,353 issued to Whittemore, Jr. on Oct. 13, 1936 both disclose vaporizing units for liquid medicaments. These devices employ a resistance wire heating element energized by a battery which is activated by a manual switch. The device disclosed by Whittemore, Jr. further shows a wicking means to deliver the liquid medicament to the resistance heating wire. Neither of these device appears to be well suited for use in the user's mouth in the manner of a cigarette. In essence, they are portable vaporizing units powered by flashlight batteries which are controlled by manually operated "on/off" switches. Accordingly, the concentration of medicament vapor for any given inhalation by

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