

March 15, 1966

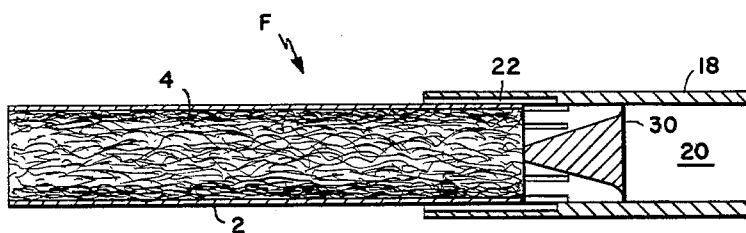
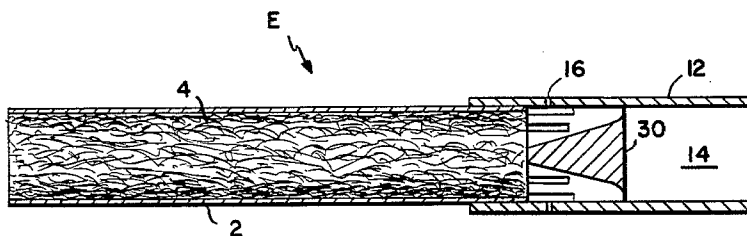
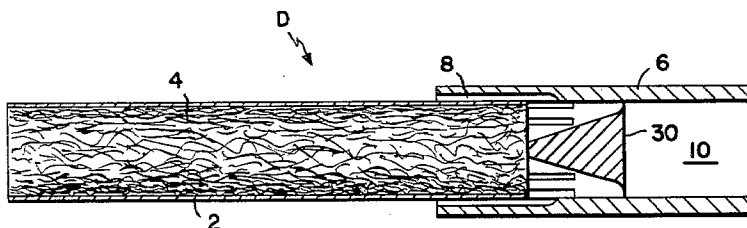
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3,240,213

CIGARETTE

Filed Jan. 25, 1962

2 Sheets-Sheet 1



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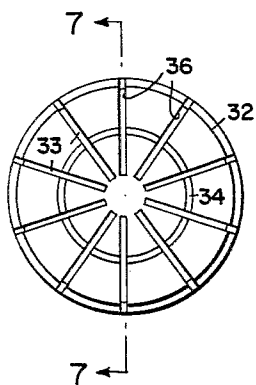


FIG. 5

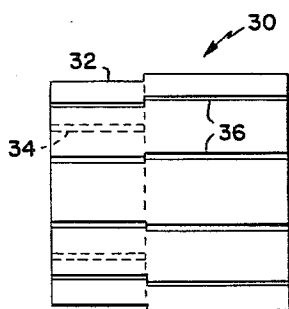


FIG. 4

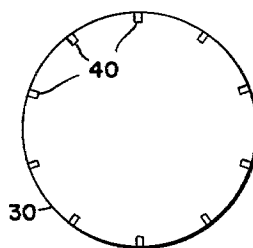


FIG. 6

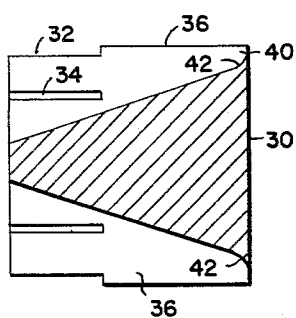


FIG. 7

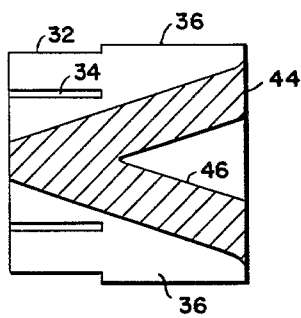


FIG. 8

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3,240,213
CIGARETTE

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Filed Jan. 25, 1962, Ser. No. 168,702
9 Claims. (Cl. 131-10)

This invention relates to a cigarette which is constructed and adapted for the purpose of minimizing the harmful health effects involved in the smoking of cigarettes.

The use of smoking tobacco is today both well known and widespread in spite of the fact that it is recognized by some authorities that smoking is injurious to the delicate membranes of the nose, throat and lungs of the smoker and is credited with inducing cancer of the lips, mouth, throat and lungs, and with inducing heart diseases.

The principal products of tobacco smoke are carbon dioxide, water vapor, carbon monoxide, acid fumes, nicotine vapors, and tars. The first two of these products are not generally regarded as harmful to the smoker. The remainder of these products are generally considered harmful and even though only a small proportion of these products resulting from the combustion of the entire cigarette actually enter the smoker's system, that quantity is sufficient to be considered by some authorities as being harmful to the smoker.

Various means are employed to reduce the harmful effects of these products of combustion. Various chemicals have been employed in admixture with the tobacco in an endeavor to nullify the harmful ingredients of the smoke. Some of these chemicals, while apparently nullifying the harmful smoke ingredients, release upon combustion equally toxic substances or destroy or impair the aroma that is delighted in by tobacco smokers. Certain other neutralizing agents are unstable and, by the time the cigarette is consumed, these agents have decomposed and fail to accomplish their purpose. Other agents cause unpleasant taste or are for other reasons undesirably employed. Numerous types of mechanical filters have been devised. These filters generally add materially to the cost of manufacture of the cigarette and many of them are of little value.

It is the object of my invention to provide a cigarette construction which prevents the production of up to eighty percent of the harmful tobacco constituents during the smoking of a cigarette whereby cigarette smoking is made less harmful.

In my copending application Serial No. 154,533, filed November 24, 1961, there is disclosed a form of cigarette holder having passages therein for the introduction of outside air and discusses the beneficial effects particularly involved therein. Briefly, it has been found that when a holder of the type disclosed in said application is used, the amount of tars produced is markedly reduced, and this is believed to be attributable to a resultant lower burning temperature at which only the less harmful tars are produced. Also, due to the turbulent mixing of smoke with jets of air in the holder, various other effects improve the quality of the smoke.

In my copending application Serial No. 159,879, filed December 18, 1961, now abandoned, there is disclosed a cigarette having incorporated therein, in the course of its manufacture, a novel unit also providing for the introduction of outside air whereby the tar production is reduced. Briefly, this unit also includes a baffle arrangement including an orifice plate for effecting a precipitation and trapping of the small percentage of the tars produced.

In accordance with the present invention, the cigarette is constructed, during the course of its manufacture, with

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a hollow tip portion adjacent a tobacco-containing portion. The tip portion receives smoke flowing from the burning cigarette during smoking thereof and is provided with passageway means through which air from the outside of the cigarette may pass into the interior of the hollow tip in response to the smoker applying suction to the interior of the tip. Since suction in the tip draws air from the outside, the amount of air drawn through the burning portion of the cigarette is less than the amount that would be drawn if the entire suction were applied to the tobacco cylinder. Hence less oxygen is drawn into the burning portion of the cigarette so that the burning temperatures are less and generally will not be excessive. This lowering of the burning temperature causes a reduction in the production of harmful tars in the burning zone. Moreover, since there is lower temperature smoke passing through the tobacco, there will be less condensation of tobacco tars.

An alternate form of cigarette in accordance with this invention comprises a slotted cylinder which is mounted within the hollow tip portion adjacent the tobacco-containing portion of the cigarette. The cylindrical has a plurality of passageways adapted to receive smoke from the burning cigarette and outside air passing through the passageways in the tip portion. The passageways provided in the cylinder permit the outside air to enter and provide mixing chambers in which the outside air and smoke are thoroughly intermixed which results in cooling of the smoke to cause coagulation of the tars. The tars which enter the mixing chambers will tend to adhere to the walls thereof by reason of their sticky nature.

The cigarette in accordance with this invention, in addition to preventing the formation of tars, is easily and inexpensively manufactured and has a built-in tar collecting means so that there is no need to use a tar removing cigarette holder. Moreover, since tars are accumulated in the tip portion of the cigarette and/or the slotted cylinder, the cigarette in accordance with this invention eliminates the harmful effect of the tars while still providing a tobacco aroma which is pleasing to the smoker.

The above and other objects and advantages of the invention will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

FIGURE 1 is an axial section through a cigarette representing a first embodiment of the invention;

FIGURE 2 is an axial section through a cigarette representing another embodiment of the invention;

FIGURE 3 is an axial section through a cigarette representing another embodiment of the invention;

FIGURE 4 is a front view of a slotted cylinder in accordance with this invention;

FIGURE 5 is a left end view of the cylinder shown in FIGURE 4;

FIGURE 6 is a right end view of the cylinder shown in FIGURE 4;

FIGURE 7 is a section taken as indicated by lines 7-7 in FIGURE 5; and

FIGURE 8 is a sectional view of another form of cylinder in accordance with this invention.

Referring to FIGURE 1, there is shown a cigarette, generally designated D, being made up partly of a tobacco-containing portion including the usual paper wrapper 2 which contains a tobacco filler 4. The other portion of the cigarette D consists of a tubular member 6 preferably made of paper stock and having an internal diameter approximating the outer diameter of the wrapper 2 so that the tobacco cylinder fits snugly within the tubular member 6. The portion of the wrapper 2 extending within the tubular member 6 is suitably secured, as by adhesive, to the inner wall of member 6 so that the tobacco cylinder and member 6 are held together as a unit.

The tubular member 6 forms the bit of the cigarette D and is provided with passageway means providing communication between the exterior of the cigarette and the cylindrical chamber 10 with the bit. The passageway means disclosed in the form of the invention shown in FIGURE 1 comprises eight grooves 8 in the inner wall of member 6 extending longitudinally thereof. Grooves 8 are circumferentially equidistantly spaced and extend a distance beyond the end of the tobacco-containing portion of the cigarette as shown in FIGURE 1.

It has been found that the total cross-sectional area of the passages preferably is of the order of 0.0020 square inch, although satisfactory results may be obtained within the range of from 0.0010 to 0.0025 square inch. This area, of course, is a function of the number, dimensions and configurations of the air passages. These dimensions apply to the cigarettes to be described hereafter.

Referring to FIGURE 2, there is shown a cigarette, generally designated E, which comprises a tobacco-containing portion similar to that disclosed in the FIGURE 1 embodiment of the invention so that like reference numerals have been applied thereto. This form of the invention comprises a modified form of bit which comprises a tubular member 12 constructed and arranged to receive the tobacco-containing portion in the same manner as the FIGURE 1 form of the invention. Member 12 defines a cylindrical chamber 14 therein and has a passageway means comprising a plurality of radially extending, circumferentially spaced openings 16, eight such openings being shown in the illustrated embodiment of the invention.

Referring to FIGURE 3, there is shown a cigarette F having the usual tobacco-containing portion comprising wrapper 2 and tobacco filling 4. This embodiment of the invention comprises another form of bit which consists of a tubular member 18 constructed and arranged to receive the tobacco cylinder in the same manner as the embodiment shown in FIGURE 1. Tubular member 18 defines a cylindrical chamber 20 therein adjacent the tobacco cylinder and has a passageway means for the flow of air to this chamber 20 from the exterior of the cigarette. The passageway means is formed by crimping the inner surface of the tubular member 18 so as to provide a plurality of longitudinally extending passageways 22 having a corrugated cross-section. The passageways 22 extend beyond the end of the tobacco cylinder in order to provide communication between the chamber 20 and the exterior of the cigarette C.

The cigarette shown in FIGURE 1, is also provided a cylindrical member 30 which is mounted within chamber 10 in abutting relation with the enclosed end of the tobacco cylinder as shown in FIGURE 1. Cylinder 30 has an outer diameter substantially the same as the inner diameter of tubular member 6 so as to fit snugly therein and is secured to member 6 by suitable means such as adhesive.

Referring now more particularly to FIGURES 4 to 8, the detailed construction of the cylinder 30 will now be described. At the end to be positioned adjacent the tobacco cylinder, which may be designated the upstream end, the cylinder 30 is provided with a pair of annular grooves 32 and 34. Groove 32 is located at the periphery of the cylinder 30 and groove 34 is spaced radially inwardly from groove 32 as is best shown in FIGURE 5. The periphery of groove 32 is spaced from the inner wall of tip 6 and provides a passageway for the entrance of outside air from the slots 8. Cylinder 30 is also provided with a plurality of axially extending slots 36 which are located in radial planes of the cylinder 30 (as is best shown in FIGURE 5). Referring more particularly to FIGURE 7, the slots 36 are tapered to converge from the upstream to the downstream end of the cylinder 30. Slots 36 provide relatively large inlet ports 38 at the upstream end of cylinder 30 and relatively small outlet ports 40 at the downstream end thereof. Slots 36 are outwardly rounded adjacent the outlet ports as indicated at 42.

It will be evident that the cylinder 30 may be constructed with various dimensions and may have a different number of grooves and slots. However, one satisfactory design is that shown in the drawings in which there are provided ten slots 36 and two grooves 32 and 34. In this form of the invention, the cylinder is one-quarter of an inch in length, with the ten slots 36 being 0.012 of an inch wide and tapered to provide outlet ports of 0.020 of an inch in radial length, and with the grooves 32 and 34 being 0.012 of an inch wide and 0.090 of an inch deep. The radius of the curved portion 42 is five-sixteenths of an inch. The cylinder 30 may be made of various materials, such as metal (preferably aluminum), paper or plastic.

Another form of cylinder which may be used is shown in FIGURE 8. The cylinder 44 shown in this figure is essentially the same as the cylinder 30, the only difference being that there is provided a conical cavity 46 in the downstream end of the cylinder 44. The purpose of this cavity 46 is to provide better heat dissipation by the cylinder.

The cigarette shown in FIGURE 2 is also provided with a cylinder 30 mounted in the upstream end of chamber 14 in abutting relation with the tobacco cylinder in the same manner as the cylinder 30 employed in the cigarette D.

The cigarette shown in FIGURE 3 is provided with a cylinder 30 mounted in the upstream end of the chamber 20 in abutting relation with the tobacco cylinder. The cylinder 30 may be secured, as by adhesive, to the bit 18 so as to be held in this portion adjacent the tobacco cylinder, as in the case of cigarette D.

It will be apparent that the cigarettes D, E and F will all function similarly during the smoking thereof, wherefore there will follow only a detailed discussion of the function of the cigarette D. The only essential difference between the cigarettes D, E and F is that there is a different type of air flow through each of the passageway means employed by these cigarettes.

During the smoking of a lighted cigarette D, the smoker applies suction to the bit of the cigarette to produce thereby a partial vacuum or negative pressure in the chamber 10, the resulting pressure in chamber 10 being lower than atmospheric. Accordingly, smoke is drawn from the tobacco cylinder directly into slots 36 through the inlet ports 38 and indirectly into the slots 36 by way of grooves 32 and 34. At the same time, outside air is drawn through the passageways provided by the slots 8 into the annular groove 32 from which the air enters the slots 36. Since the gases drawn into the tip to fill the vacuum are partly composed of outside air, there is a lowering of the cigarette burning temperature and a reduction in tar formation as previously discussed. The cylinder 30 effects a rather intimate and complete mixture of the outside air and smoke in the slots 36, which may be considered to be mixing chambers. This effective mixture results from the turbulent flow produced by the jets of outside air entering the slots and grooves of the cylinder, the air and smoke tending to swirl about the grooves. The entrance and the mixture of the air with the smoke will reduce the temperature of the combustion products passing from the tobacco-containing portion of the cigarette whereby the tars coagulate. The cylinder 30 additionally aids this temperature reduction of the smoke by the dissipation of heat. Cylinder 30 has a substantial heat dissipating area which may be increased by the construction shown in FIGURE 8.

The cylinder 30 also serves to capture a large portion of the tars which are formed, these tars adhering to the surface of the cylinder defining the slots and grooves by reason of the sticky nature of the tars. It will be evident that the cylinder 30 provides a considerable surface area for capturing the tars by reason of its construction.

The cylinder 30 is not easily clogged by reason of the multiple groove and slot arrangement. Even if portions of one or more of the slots were clogged by bits of

tobacco or tars, the smoke and air can take any number of alternate paths around the blocked portion.

The tar-reduced smoke will pass out of the slots or mixing chambers 36 by way of the outlet ports 40 into the downstream end of the chamber 10. From the chamber 10 the tar-reduced smoke passes to the smoker's mouth. The slots 36 of cylinder 30 also have a flow controlling effect on the air drawn through the burning cone of the cigarette which affects the smoke that passes through the cigarette. The slots 36, in effect, serve as flow restricting passageways for controlling the amount of smoke that can pass through the cigarette.

The use of the cylinder 30 also eliminates the need for any filter adjacent the end of the tobacco cylinder for preventing the passage of bits of tobacco through the cigarette. The cylinder 30 also performs this function.

A cigarette constructed in a manner such as cigarettes D, E and F will effectively prevent the formation of about 60-80 percent of the tars with or without the use of a trap for the tars. By the addition of the cylinder 30, it is possible to trap substantially all of the tars which are formed. Moreover, since most of the low amount of the tars which are formed are collected on the various surface areas of the cylinder, the tobacco aroma provided thereby, which aroma is pleasing to the smoker, will be retained.

It will be understood that various departures from the specifically described forms of the invention may be made without departing from the scope thereof, wherefore it is not desired to be limited except as required by the following claims.

What is claimed is:

1. A cigarette or the like comprising a cylindrical tobacco-containing portion, a tubular bit portion, said portions being mounted together in coaxial relation with said bit portion providing a smoke passage extending from and in continuation of the tobacco, and a cylindrical member within said bit portion adjacent the tobacco cylinder, said cylindrical member having a plurality of spaced slots extending longitudinally through said cylindrical member, said slots providing spaced inlet ports in the end of said cylinder adjacent said tobacco cylinder and spaced outlet ports at the opposite end of said cylindrical member, passageway means in said bit communicating at one end with the exterior of said cigarette and at the other end with said slots whereby said slots provide mixing chambers for outside air and the smoke flowing from said tobacco cylinder, said passageway means having a fixed predetermined cross-sectional area for controlling the amount of outside air drawn into the smoke passage when the smoker draws on the cigarette.

2. A cigarette as claimed in claim 1 wherein said slots are in the periphery of said cylindrical member and are tapered to converge in the direction of flow through said cigarette.

3. A cigarette as claimed in claim 1 wherein said cylindrical member has an annular groove in the periphery thereof and in the upstream end thereof communicating with said slots.

4. A cigarette as claimed in claim 1 wherein said cylindrical member has a plurality of radially spaced annular grooves in the upstream end thereof communicating with said slots, one of said annular grooves being in the periphery of said member.

5. A cigarette as claimed in claim 4 wherein said cylindrical member has a cavity extending longitudinally into said cylindrical member from the downstream end thereof.

6. A cigarette or the like comprising a cylindrical tobacco-containing portion, a tubular bit portion, said portions being mounted together in coaxial relation with said tobacco cylinder extending within one end of said bit portion and with said bit portion providing a smoke passage extending from and in continuation of the tobacco, said bit portion having passageway means therein providing communication between the exterior of said bit portion and said smoke passage, said passageway means being arranged to deliver outside air into said smoke passage at a location adjacent said downstream end of said tobacco cylinder, said passageway means comprising a plurality of grooves in the inner wall of the bit portion extending longitudinally from the end of said bit containing said tobacco cylinder to a location downstream of the contained end of said tobacco cylinder, said grooves being circumferentially spaced about the circumference of said bit portion and having a predetermined cross-sectional area for providing a substantial flow resistance and for accurately controlling the amount of air drawn into the smoke passage when the smoker draws on the cigarette, and a cylindrical member within said bit portion adjacent the tobacco cylinder, said cylindrical member having a plurality of spaced, longitudinally extending slots extending axially through said cylindrical member, said slots providing spaced inlet ports in the end of said cylinder adjacent said tobacco cylinder and spaced outlet ports at the opposite end of said cylindrical member, said passageway means in said bit communicating at one end with the exterior of said cigarette and at the other end with said slots whereby said slots provide mixing chambers for outside air and the smoke flowing from said tobacco cylinder.

7. A cigarette or the like according to claim 6 wherein said slots in said cylindrical member are in the periphery thereof and are tapered to converge in the direction of flow through said cigarette, and said cylindrical member has a plurality of radially spaced annular grooves in the in the upstream end thereof communicating with said slots, one of said annular grooves being in the periphery of said cylindrical members.

8. A cigarette as claimed in claim 1 wherein said passageway means comprises means defining a plurality of passageways extending longitudinally from the end of said bit adjacent said tobacco cylinder to said smoke passage, said plurality of passageways being provided by elongated corrugations in the inner wall of said bit portion.

9. A cigarette as claimed in claim 1 wherein said passageway means includes means defining a plurality of circumferentially spaced and radially extending openings in said bit portion.

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