

Jan. 20, 1970

J. S. OSMALOV ET AL

3,490,461

CIGARETTE VENTILATION

Filed April 20, 1967

2 Sheets-Sheet 1

FIG. 1

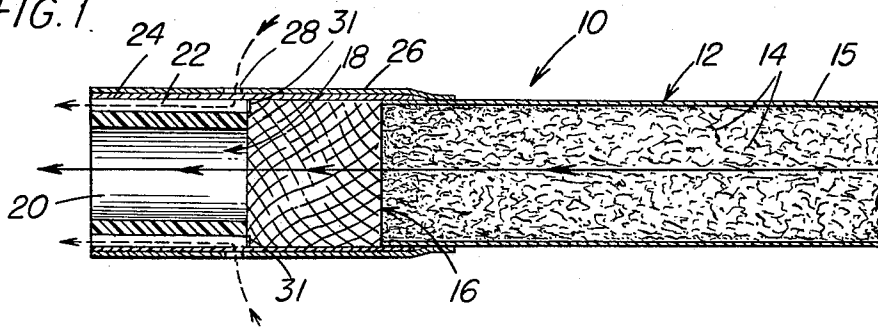


FIG. 2

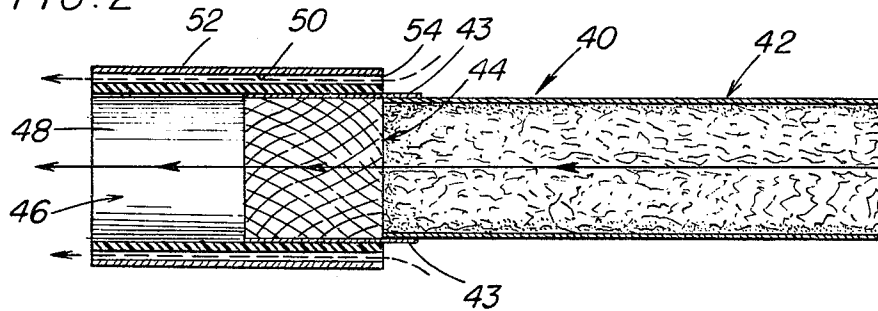


FIG. 5

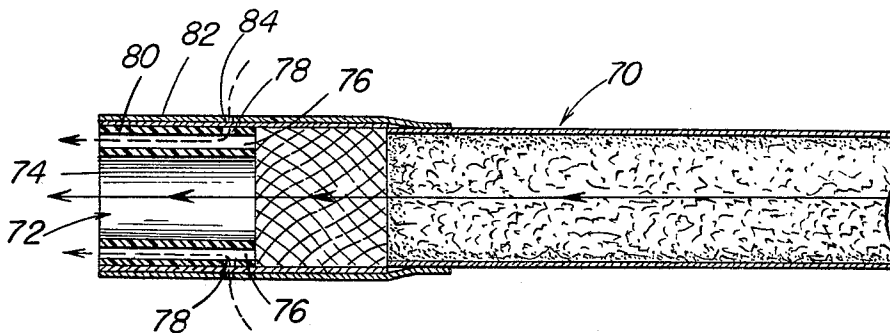


FIG. 6

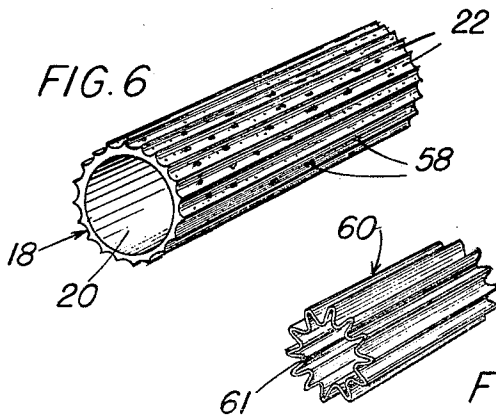


FIG. 7

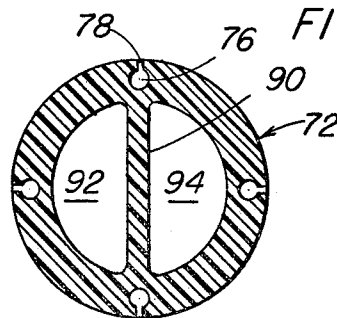


FIG. 8

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FIG. 3

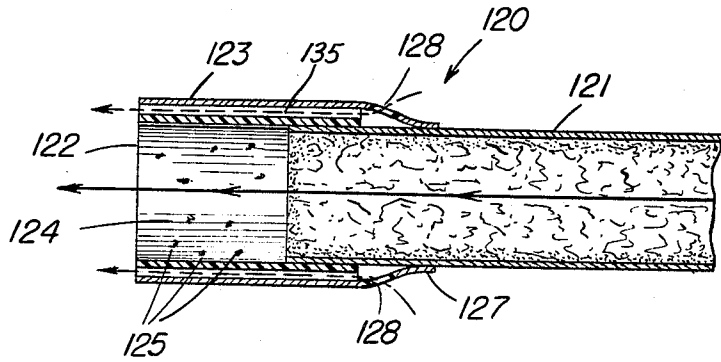


FIG. 4

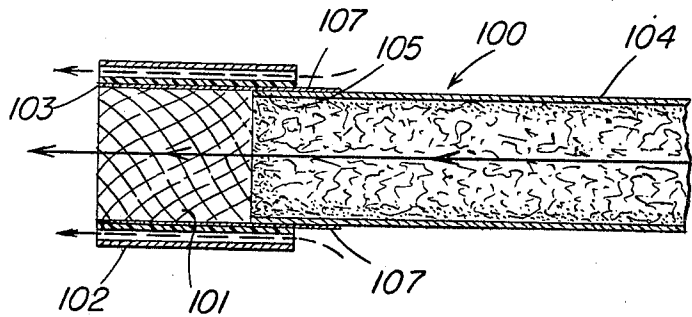


FIG. 1a

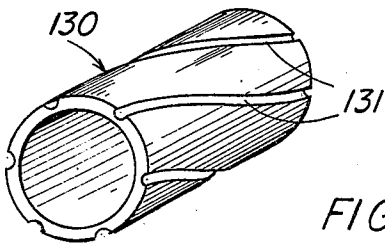
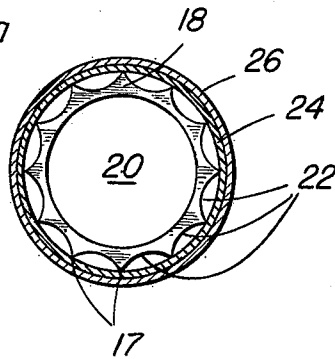


FIG. 9

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3,490,461

CIGARETTE VENTILATION

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U.S. Cl. 131—10.5

5 Claims

ABSTRACT OF THE DISCLOSURE

A cigarette in which the smoke drawn from the tobacco section is delivered to the smoker's mouth through a central passage in a mouthpiece arranged in alignment with the tobacco section and in fluid communication therewith, the mouthpiece being provided with one or more ventilation passages through which ventilating streams of air are drawn during smoking, the ventilation passages being segregated from the central passage in a manner which prevents commingling of the smoke stream and ventilating streams prior to the delivery of each to the smoker's mouth.

BACKGROUND OF THE INVENTION

It is known that certain advantages accrue from the introduction of ventilating air streams into a cigarette to dilute the smoke stream. The dilution of the smoke stream has the effect of reducing the quantity of smoke particulates and gas phase components delivered to the mouth in the course of each puff taken on the cigarette. Furthermore, the ventilating streams function to cool the smoke stream. Various means of introducing the air stream into the cigarette are known as for example, the tobacco cylinder wrapper can be a very porous paper which allows for aspiration of air therethrough and into the tobacco cylinder where it commingles with the smoke stream or, the tobacco cylinder wrapper may be perforated at locations along the length thereof which provides radial access ports to the tobacco cylinder through which ventilating air streams enter the cigarette. It is also known to perforate the filter section wrapper of a filter cigarette or otherwise provide it with ports communicating with the filter medium to admit the ventilating air streams directly to the filter section rather than to the tobacco cylinder.

The foregoing known ventilating means are effective to produce significant dilution of the smoke stream but provide that such dilution first occurs within the cigarette and not in the smoker's mouth. Also, when these means are employed with filter cigarettes, they each suffer from a common shortcoming in that not only the smoke stream, but the ventilating air streams are directed through at least a portion of the filter section. Thus the filter medium which is intended to remove smoke components from the smoke stream is not used to full advantage because the ventilating air streams tend to transit the filter section adjacent the point of entry of the air streams thereto and channel along defined paths in the filter medium to the exclusion of the smoke stream. Thus the available flow paths in the filter section for the smoke stream become lessened and, as a consequence, filtration efficiency of the filter section decreases particularly as the smoking progresses. On the other hand, if the ventilating streams be diverted in a manner segregating them from the smoke stream, it is possible for the filter medium to be utilized to maximum effect for filtration of smoke components. Furthermore, the provision of segregated smoke and air streams means that the first commingling of the smoke

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stream and ventilating air streams occurs in the smoker's mouth resulting in a better taste and increased flavor experience for the smoker. This phenomenon is no less apparent as applied to non-filter type cigarettes.

The present invention achieves the foregoing desirable ends with a mouthpiece suited for use with both filter type and non-filter type cigarette and which allows delivery of the smoke stream to the smoker's mouth through a central passage in the mouthpiece while concurrently, ventilating air streams are introduced into the cigarette in flow paths completely segregated from the smoke stream. Thus in the case of a filter cigarette, only smoke transits the filter section and the smoke stream is first commingled with the ventilating air streams only upon delivery of each to the smoker's mouth.

SUMMARY OF THE INVENTION

The cigarette of the present invention is intended inter alia, to provide for maximum smoke filtration of a filter type cigarette yet embody means to take advantage of the effects of cigarette ventilation and also to provide a novel means for ventilating non-filter type cigarettes. According to the invention, a filter cigarette is provided with a tubular mouthpiece at the rear end of the filter section, the mouthpiece having at least one central passage there-through providing a flow path for the smoke stream so that the latter passes unimpeded from the filter section to the smoker's mouth. The mouthpiece is also provided with one or more separate ventilation passages formed in the body of the mouthpiece at or adjacent the periphery thereof the arrangement being such that the smoke passage and ventilation passages extend in the same general direction. The outlets of each ventilation passage communicate directly with the smoker's mouth so that the ventilating air stream and smoke stream are each delivered separately to the mouth, the ventilation passages also being provided with inlets in communication with the atmosphere. The ventilation passages may be provided in a number of ways. For example, the mouthpiece can be formed with longitudinal grooves in the outer periphery thereof, the grooves having a suitable shape such as being arcuate in section. A wrapper sheet can be employed to enclose the mouthpiece and connect it with the filter section, or with the filter and tobacco sections. Each groove thus provides a ventilation passage. The inlet to the respective grooves can be provided by perforating the wrapper sheet to establish communication to the atmosphere, or the mouthpiece can be made slightly larger than the filter section to allow insertion of the latter at least partly within the mouthpiece in which case the inlet ends of the passages communicate directly with atmosphere. It is also possible to form the ventilation passages in the structure of the mouthpiece intermediate the inner and outer surfaces thereof. In this embodiment, the ventilation passages are constituted by a series of longitudinal conduits in the body each having a radially directed inlet port which communicates with the atmosphere.

If the mouthpiece is used with a non-filter type cigarette, it can be connected with the tobacco cylinder with a wrapper sheet, or the mouthpiece can be made larger than the tobacco cylinder, and the latter inserted partly therein.

According to the invention, the mouthpiece can be provided with internal ribs extending the full length thereof and serving to strengthen the mouthpiece structure as well as giving it an attractive appearance. In this event, the ribs will function to sub-divide the smoke passage into two or more separate smoking passages.

The mouthpiece can be formed from various materials including thermoplastics, corrugated paper and metal foil. A further feature of the construction of the mouthpiece

is that cigarette flavoring substances such as menthol can be incorporated in one or more of the ventilation passages and smoke treating substances can be incorporated in the smoke passage.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWING

A fuller understanding of the nature and objects of the invention will be had from the following detailed description taken in conjunction with the accompanying drawing in which:

FIGURE 1 is a longitudinal sectional view of a ventilated cigarette made according to the present invention, the thickness dimensions being exaggerated for purposes of clarity.

FIGURE 1a is an end view of the cigarette shown in FIGURE 1 as viewed from the left side thereof.

FIGURE 2 is a view similar to FIGURE 1 showing a modification wherein the filter section of the cigarette extends within the mouthpiece.

FIGURE 3 is a view similar to FIGURE 2 except that it illustrates a non-filler type cigarette which is ventilated according to the teaching of the present invention.

FIGURE 4 is a view similar to FIGURE 2 except it shows a filter cigarette wherein both the filter medium and tobacco cylinder extend within the full length of the mouthpiece.

FIGURE 5 is a view similar to FIGURES 1 and 2 of a further modified form of the cigarette wherein the ventilation passages in the mouthpiece are formed radially inwardly a distance from the mouthpiece outer surface.

FIGURE 6 is a perspective view of a mouthpiece which can be used with the cigarettes illustrated in FIGURES 1 and 2.

FIGURE 7 is a transverse sectional view on enlarged scale of a mouthpiece of the type illustrated in FIGURE 5 showing an additional modification thereto in the form of a central supporting rib.

FIGURE 8 is a fragmentary perspective view of a mouthpiece which is formed from either corrugated paper or a foil of a metal.

FIGURE 9 is a perspective view of a further embodiment of mouthpiece in which the ventilation passages are formed so as to follow a spiral course.

Throughout the description like reference numbers are used to denote like parts in the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The cigarette of the present invention embodies means with which separate ventilating air streams can be delivered to the smoker's mouth concurrently with the smoke stream at which point the first commingling of the respective streams occurs. The cooling, diluting air streams are delivered through the agency of a mouthpiece representative constructional forms of which will be described shortly. The present invention provides that the mouthpiece can be used in conjunction with a filter cigarette or with a cylinder of tobacco alone to make use of the positive effects of cigarette ventilation.

As a preliminary, a brief discussion will be made of the advantages and attributes of cigarette ventilation. In general, ventilation involves introducing air into the smoke stream ultimately delivered to the smoker's mouth. The air serves, inter alia, as a coolant and also as a diluent for diluting the smoke thereby diminishing the smoke components present in the delivered smoke. The reduction of particulate matter and gas phase in the smoke which is delivered to the mouth is derived from better filtration (in filter types) of the smoke actually puffed and also

because a lesser volume of smoke is actually puffed although the total volume puffed by the smoker is substantially the same as that he would puff, if ventilation was not employed. In other words, for a given average puff volume, the ventilating fresh air stream volume will reduce the smoke stream volume accordingly. In this manner, less actual smoke is delivered to the smoker's mouth and hence less smoke solids. As those skilled in the art will perceive upon reading the present description, a lesser smoke draw during puffing will be accompanied by a decrease in smoke stream velocity, providing for a longer dwell of the smoke in the cigarette filter unit with consequent promotion of the effectiveness of smoke filtration.

Turning now to a consideration of the filter type cigarette 10 illustrated in FIGURE 1, it includes a tobacco section 12 comprised of a cylinder of tobacco 14 and a paper wrapper 15 therefor. Aligned with the tobacco cylinder 14 is a filter section 16 which comprises a suitable filter medium in contact with an end of the tobacco cylinder. The filter medium may be of various substances, as for example, a tow of cellulose acetate, a composite structure including a fiber and a granular filtrant such as charcoal, or any other form of filter medium suited for the intended purposes. As is a common practice in filter cigarette making, the filter section is formed as a cylindrical body having substantially the same diameter as the tobacco cylinder. Aligned with the filter section is a mouthpiece 18, the latter device having an inner passage 20 extending therethrough and providing a flow path for the smoke drawn through the filter section and delivered to the smoker's mouth during puffing. Mouthpiece 18 is conveniently formed as a generally cylindrical body with the wall thickness thereof being kept at a minimum in order to reduce the area thereof which confronts the end of the filter medium and thereby lessen the area of the filter medium which can not be used for filtration purposes. The outer surface of the mouthpiece 18 is formed in such manner that it will provide structure defining one or more ventilation passages in the mouthpiece. Thus it may be formed with one or more longitudinal grooves 22 as best seen in FIGURES 1a and 6. The grooves 22 may have the arcuate shape shown in which case the mouthpiece will have a fluted appearance. The number and dimensions of the grooves 22 may be varied depending on the measure of ventilation desired. It will be understood that the surface configuration of the mouthpiece may include grooves, channels, embossed structure or other surface formations which are suited to produce one or more unobstructed paths along which streams of ventilating air can flow in transit to the smoker's mouth, the essential requirement being that the ventilating air stream paths be segregated from the smoke stream flow path constituted by inner passage 20.

Mouthpiece 18 is preferably formed so that its outside diameter is substantially equal to that of the filter section facilitating its joinder to the filter section by means of a wrapper sheet 24, the latter being commonly referred to in the art as a combining wrap. The wrapper sheet 24 encloses the outer surface of the mouthpiece and bears tightly against the peaks 17 formed by the intersecting surfaces of adjacent grooves 22 effectively making each groove 22 a separate ventilation passage which is segregated from each of the others and from inner passage 20, this feature being more readily apparent by reference to FIGURE 1a. The wrapper sheet 24 preferably is a porous paper which allows air to pass therethrough, preferably being one having a Greiner porosity of between 0.0 and 0.1. An outer wrapper 26 overlies the wrapper sheet 24 and is provided for the purpose of joining together the assembly of the mouthpiece, filter section and tobacco section. The outer wrapper 26 which is a type commonly referred to in the tobacco art as "tipping paper," is impervious to air flow but since ventilating air must be delivered through the mouthpiece ventilation passages, the outer wrapper 26 is provided

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with perforated openings 28 in the regions thereof adjacent the inlet ends of the ventilation passages. The perforated openings 28 may be arranged as one or more circles of openings extending around the mouthpiece. It is in this manner, that the ventilation passages are placed in communication with the atmosphere. It will be understood that wrapper sheet 24 also could be a type of paper that is substantially impervious to the passage of air therethrough. In this case, the wrapper sheet would also be provided with perforated openings similar to openings 28.

The flow patterns of the smoke stream and ventilating air streams may be noted in FIGURE 1. Thus, during puffing the smoke stream which is depicted by a single heavy line, is drawn from the tobacco section 12, through filter section 14 and unimpededly through the inner passage 20 of the mouthpiece being delivered directly to the smoker's mouth on exiting from passage 20. Accompanying the draw of the smoke stream, is the concurrent intake to the smoker's mouth of ventilating air streams in the pattern as shown in dashed lines. Thus, the ventilating air is drawn from the atmosphere through openings 28 in the outer wrapper 26, through the porous wrapper sheet 24 and into the inlet ends of each ventilation passage. The ventilation passages comprised by the grooves have outlets coincident with the plane in which lies the outlet end of inner passage 21 so that the ventilating air streams exit from the mouthpiece within the smoker's mouth not having theretofore commingled with the smoke stream. The ventilating air streams can enter the mouthpiece ventilation passages only through openings 28 as the outer wrapper 26 is air impervious and no outside air aspiration to the filter section 16 is possible. It is to be recognized however that the intake of air to the ventilation passages by way of openings 28 may in some instances, depending on the level of dilution involved, flow velocity of the ventilating air and other factors, tend to set up a "venturi effect" at the inlet ends of the ventilation passages promoting the intake of air to the ventilation passages from the filter section. This can be obviated by printing a thin coating of a smoke impervious material on the rear face of the filter medium as at 31.

The perforated openings 28 in the outer wrapper 26 can be formed therein various ways. One convenient method of effecting this is to needle-pierce the outer wrapper to form the openings therein before it is wrapped on the cigarette. The number and size of the openings in the outer wrap can be varied depending upon the level of dilution to be provided. In general, the dilution range may vary between 0% and 80% ventilating air in each puff, the actual dilution employed being determined by factors such as end point of acceptable taste, cigarette resistance to draw, etc. Obviously, if the dilution is low and the mouthpiece is made with a number of passages more than are required to achieve the necessary dilution, openings 28 will not be provided in the outer wrapper for each corresponding passage but only for as many as are associated with the particular dilution level.

The outer wrapper is not necessary on the form of cigarette shown in FIGURE 2. This cigarette 40 has a tobacco section 42, filter section 44 and a mouthpiece 46 similar to that already described in that the latter has a central or inner smoke passage 48 and a group of longitudinal grooves 50 formed circularly spaced around the outer surface of the mouthpiece. The latter grooves could for example comprise six in number and be arranged at a spacing of 60° intervals. The mouthpiece, however, is provided with an inside diameter just slightly larger than the outside diameter of filter section 44 thereby allowing the filter section to extend into the mouthpiece in the manner shown. For facilitating assembly of the cigarette, the tobacco cylinder 42 is joined to the filter section with a paper combining wrap 43. Advantages of this construction are that the full cross sectional area

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of the filter unit is available for filtration and the recessed location of the filter medium lessens the likelihood of the smoker contacting same with his tongue. A further important advantage of this construction is that the ventilating air transits the full length of the filter medium and contributes to a cooling of the filter with consequent improved smoke condensation in the latter. A wrapper sheet 52 encloses the outer surface of the mouthpiece and it can be an air impervious type since the inlets to the respective ventilation passages constituted by grooves 50 are open to the atmosphere directly as at 54. As in the previously described embodiment of FIGURE 1, the smoke stream and ventilating air streams flow paths are shown in solid heavy and dashed lines respectively.

The cigarette 100 shown in FIGURE 4 is the same as that shown in FIGURE 2 except that the filter section 101 therein extends fully within the mouthpiece 102, the rearmost end of each being aligned as at 103. Also, the mouthpiece extends over a portion of the tobacco section 104 as at 105. As with the cigarette of FIGURE 2, the cigarette 100 can include a combining wrap 107 for joining the tobacco cylinder with the filter medium. Cooling of the filter medium 101 by the ventilating air occurs in the same manner and with the advantages described for cigarette 40.

The mouthpiece structure used in the cigarette embodiments of FIGURES 1 and 2 may be made from a variety of materials and formed in a number of ways. For example, the mouthpiece 18 shown in FIGURE 6 is made by extruding a tubular body of thermoplastic material of continuous length and then sectioning same to provide individual mouthpieces. Suitable mouthpiece materials can include thermosetting resins such as phenolics. Foamed polyurethane also could be used provided an air impervious film was applied to the external surfaces thereof, or the mouthpiece could be made from an extruded bonded fiber. The dimensions of the mouthpiece can of course be varied with respect to length. For example, mouthpieces with lengths between 10 and 30 mm. or more and a circumference of 25 mm. are readily adapted for use on existing cigarette making machines. It is also possible to make the mouthpiece from paper or a foil of a metal such as aluminum provided same is sufficiently rigid to be shaped into and retain the structural form of the mouthpiece. Thus, a sheet of corrugated paper or metal foil can be rolled to form a tubular fluted structure 60 such as that shown in FIGURE 8, the respective longitudinal margins being connected together in abutment or overlapped relation to form a seam as at 61, the rolled sheet thereafter being cut into individual mouthpiece lengths. The mouthpiece 130 shown in FIGURE 9 is formed as a generally cylindrical body. As will be noted though, the ventilation passages 131 therein are formed to transit a spiral course in the direction of the major axis of the mouthpiece. This mouthpiece is intended to be used wherein the filter section extends within the mouthpiece and advantage can be taken of the longer passage of air along the passages 131 to cool the filter medium and thereby derive the benefits already mentioned in the description of the cigarettes of FIGURES 2 and 4.

The mouthpiece structure of the present invention not only serves as the means by which separate smoke stream and ventilating air streams delivery can be made to the smoker's mouth, but it provides a convenient means of incorporating flavoring substances in the cigarettes. Thus as shown in FIGURE 6, particles 58 of a menthol, sprayed on film of anethole or other suitable tobacco flavoring substance can be disposed in the ventilation passages. It is also possible to impregnate the mouthpiece with a solution of the flavoring substance if the mouthpiece material is of a character which lends itself to that end, as for example, the paper mouthpiece of FIGURE 8.

Another form of mouthpiece is used in the cigarette 70 shown in FIGURE 5. The cigarette 70 is very similar

to the cigarette of FIGURE 1 except the mouthpiece 72 itself is of somewhat different construction. Mouthpiece 72 is of generally cylindrical shape having a central smoke passage 74. The ventilation passages however, are not formed at the outer surface of the mouthpiece. Instead, they are formed as a circle of longitudinal conduits 76 in the structure of the mouthpiece intermediate its inner and outer surfaces. The conduits 76 can extend end to end of the mouthpiece body with each conduit having an inlet port 78 extending radially outwardly to the outer surface of the mouthpiece. A porous wrapper sheet 80 and an outer wrapper 82 can be provided with the outer wrapper 82 having perforated openings 84 therein associated with each ventilating passage for the purpose of placing the inlet of the ventilating passage in communication with the atmosphere. The smoke stream and ventilating air stream flow paths having been illustrated for cigarette 70 in the same manner as previously described.

FIGURE 7 shows a modification to the mouthpiece 72 of cigarette 70. The modification provides for including a stiffening rib 90 in the mouthpiece structure. The rib 90 preferably is formed integral with the structure as shown and extends end to end thereof. The rib effectively sub-divides the central smoke passage into two separate smoke passages 92, 94. While the confrontation of the rib with the filter media serves to reduce the area of the latter which is available for filtration, the rib nevertheless serves to rigidize the mouthpiece structure where the shell thickness of the latter is very small. The rib also serves as a decorative function and is not limited to being a single rib. For example, the rib could be of cruciform section.

A number of important advantages result from the ventilated cigarette of the present invention, the obvious prime advantage being that dilution of the smoke thereof with ventilating air streams reduces the tobacco solids and smoke organic gas phase delivered to the smoker's mouth and this whether the cigarette be a filter type or non-filter type. In the case of the filter type cigarette the reduction of particulate matter delivery is further enhanced by the better filtration possible with dilution by reason of a longer dwell of the smoke within the filter medium as will appear from the example to be given below. An unexpected advantage to the smoker is the provision of increased smoke flavor and taste possible with the cigarette of this invention. This is believed attributable to the fact that the first smoke dilution occurs in the smoker's mouth as a consequence of separate delivery of the smoke stream and ventilating streams thereto. This first taste "impact" was found to provide more pleasurable taste response to the smoker than ventilated cigarettes in which first dilution occurs without the mouth. A further advantage of the cigarette of the present invention lies in the fact that the ventilating air stream passage and smoke stream passage are segregated from each other and lacking communication with each other it is impossible for backup of smoke to occur through the ventilation inlets. Thus the smoker experiences no staining or odorizing of his fingers from smoke as can occur with other types of ventilated cigarettes wherein the smoke passage communicates with the ventilation passage.

The effectiveness of the principles of cigarette ventilation of the present invention as embodied in a filter type cigarette will be apparent from the following example. A number of cigarettes of the construction shown in FIGURE 1 were made. The tobacco cylinders were sized to be 63 mm. long and the tobacco cylinders alone had an average resistance-to-draw (RTD) of 2.0 in. of water. The filter sections were made 10 mm. long and were comprised of cellulose acetate, the filters having on an average, a RTD of 2.8 in. of water. A number of mouthpieces as shown in FIGURE 6 of 15 mm. length were formed with 24 grooves therein, each groove being about 0.040 in. wide and 0.011 in. deep at the center, the mouthpiece being joined to the filter sections and tobacco cylinder

with combining wrappers and tipping paper. The total RTD of the cigarettes measured prior to smoking was an average of 2.3 in. of water. The dilution as measured during smoking averaged 55%. A number of cigarettes also were made in which the mouthpieces had eight grooves each approximately 0.050 in. wide and 0.011 in. deep at the center. The cigarettes prior to smoking had an average total RTD of 2.7 in. The dilution as measured during smoking averaged 47%. The tipping paper used for both types of cigarettes was provided with 48 holes approximately 0.030 sq. mm. in area. When the cigarettes with the 24 groove mouthpieces were smoked on a cigarette testing machine, they delivered an average of 10 mg. of TPM (total particulate matter) and 3.1 mg. of OGP (organic gas phase); corresponding unventilated (i.e., not fitted with mouthpieces) cigarettes delivered 20 mg. of TPM and 4.2 mg. of OGP. It will be seen then that the ventilation accounted for a notable reduction in TPM and OGP delivered to the smoker.

The principles of cigarette ventilation according to the present invention also can be applied to non-filter type cigarettes as may be seen by reference to FIGURE 3, which depicts a cigarette 120 which has a tobacco section 121 extending partly into a mouthpiece 122 of the construction shown in FIGURE 6, the mouthpiece being enclosed with a non-porous wrapper sheet 123 which is employed to join the tobacco section to the mouthpiece. When the smoker draws on the cigarette 120, the smoke is delivered to the mouth by way of mouthpiece central passage 124 whereas a concurrent flow of ventilating air is delivered to the mouth through the ventilating passages 135 in the mouthpiece entering the latter through perforated openings 128 in wrapper sheet 123, the course of the air being shown by means of dashed lines. It is also possible to provide communication between the inlets of the respective ventilating passages 125 and atmosphere by securing wrapper sheet 123 to the wrapper of tobacco section 121 with a non-continuous circle of adhesive as at 127, the spaces between succeeding adhered segments of the wrapper sheet on the circle providing breathing ports to admit air. The mouthpiece 122 is shown in FIGURE 3 as being slightly greater in diameter than the tobacco cylinder so as to receive the latter. It will be apparent that the diameter of these two structures also could be made substantially equal. The following example will serve to illustrate the positive achievements of ventilating non-filter type cigarettes. 15 mm. plastic mouthpieces of the type shown in FIGURE 6 were attached to 85 mm. tobacco cylinders, being joined together with a conventional tipping paper. The tipping paper was perforated with two circular rows of openings adjacent the inlet of the respective ventilating passages. Control cigarettes comprising each a 85 mm. length tobacco cylinder joined to a 15 mm. length paper mouthpiece without ventilating passages were provided. The cigarettes were then smoked and the following representative parameters were noted.

	Ventilated cigarette	Non-ventilated cigarette
Dilution (average), percent.....	64	0
Cigt. RTD, in. H ₂ O.....	1.2	3.3
TPM, mg./cigt. to 30 mm. butt length.....	19.0	45.0
Puff count.....	12.5	11.1

From the above it will be noted that the resistance to draw of ventilated cigarettes was greatly lessened proving that the ventilated cigarette is easily smoked. Most significantly, a reduction of total particulate matter in excess of 100% was achieved in the ventilated as compared with the nonventilated cigarette.

As was previously mentioned in this description, the ventilation passages in the mouthpiece provide a means

for incorporating flavorants in the cigarette. However, these flavorants also could be incorporated in the smoke passage as well. Thus for example as seen in FIGURE 3 particles of methol 125 could be incorporated in the smoke passage 124. The smoke passage also provides a convenient place for incorporating smoke treating substances such as charcoal which is used to reduce the smoke OGP. In the latter instance, the charcoal could be fused to the surfaces of passage 124. It is also possible to utilize the smoke passage 124 as the place where both a flavorant and tobacco-treating material can be incorporated in the cigarette. For example, a charcoal serving as a flavor transfer agent for a flavorant such as menthol contained in the charcoal could be disposed in the passage 124.

From the foregoing description, it will be appreciated that the ventilated cigarette of the present invention offers important advantages. It is known that a reduction in smoke flow through a filter media is accompanied by an increase in the efficiency of particulate filtration of the media. The introduction of ventilating air streams as provided by the present invention, produces such a reduction in smoke flow and does it without having the fresh air invest the filter media which action would otherwise reduce the available area of the media filtering the smoke. Thus, the full area of the media serves to filter the smoke and it does so under conditions of reduced smoke flow with consequent greater overall removal of smoke particulates.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a filter cigarette including a tobacco section comprised of tobacco enclosed with a paper wrapper, a filter element at one end of said tobacco section, and a ventilation mouthpiece connected with said filter element and embodying ventilation passages through which dilution air is drawn directly from the atmosphere to the smoker's mouth without admixture of the same with smoke drawn from the tobacco section through said filter element when the cigarette is puffed, the improvement of said mouthpiece comprising a thin-walled tubular body of extruded thermoplastic material having a central passage of circular section through which the smoke drawn during puffing passes, said body having a plurality of grooves formed in the outer surface thereof and extending longitudinally of said body, said grooves being circularly spaced around said body, said body being joined to said filter element with a wrapping of porous paper, each groove being spaced from adjacent grooves by an intervening portion of the outer surface of said body which is engaged tightly by said porous paper thereby to isolate each groove from the grooves adjacent thereto,

said filter element and said mouthpiece being joined with said tobacco cylinder by a wrapping of tipping paper overlaying said porous wrapping, said tipping paper having a circle of perforations therein communicating at least some of said grooves with atmosphere.

2. The cigarette of claim 1 wherein said grooves are uniformly circularly spaced around said body and are of arcuate section shape, the intervening portion of the outer surface of said body between adjacent grooves being in the form of peaks formed in said body outer surface by the intersection of the arcuate surfaces of adjacent grooves, said porous paper tightly engaging said peaks.

3. The cigarette of claim 2 wherein said filter element is a plug of cellulose acetate.

4. In a filter cigarette including a tobacco section comprised of tobacco enclosed with a paper wrapper, a filter element at one end of said tobacco section, and a ventilation mouthpiece connected with said filter element and embodying ventilation passages through which dilution air is drawn directly from the atmosphere to the smoker's mouth without admixture of the same with smoke drawn from the tobacco section through said filter element when the cigarette is puffed, the improvement of said mouthpiece comprising

a thin-walled tubular body of thermoplastic material having a central passage through which the smoke drawn during puffing passes, said body having a plurality of passages formed in the outer surface thereof and extending longitudinally of said body, and being joined to said filter element with a porous wrapping paper pervious to air passage therethrough, said filter element and said mouthpiece being joined with said tobacco cylinder by a wrapping of tipping paper overlaying said porous wrapping, said tipping paper having a circle of perforations therein communicating at least some of said passages through said porous wrapping with atmosphere.

5. The cigarette of claim 4 wherein said passages comprise grooves uniformly circularly spaced around said body, the intervening portion of the outer surface of said body between adjacent grooves being in the form of peaks formed in said body outer surface by the intersection of the adjacent grooves, said porous paper tightly engaging said peaks.

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