May 9, 1967 J. A. CURTIS, JR 3,318,312

CIGARETTE ASSEMBLY

Filed July 27, 1964

FIG. 1

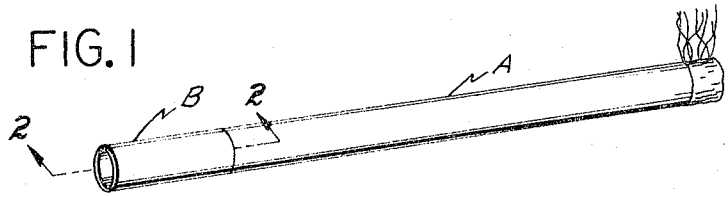


FIG. 2

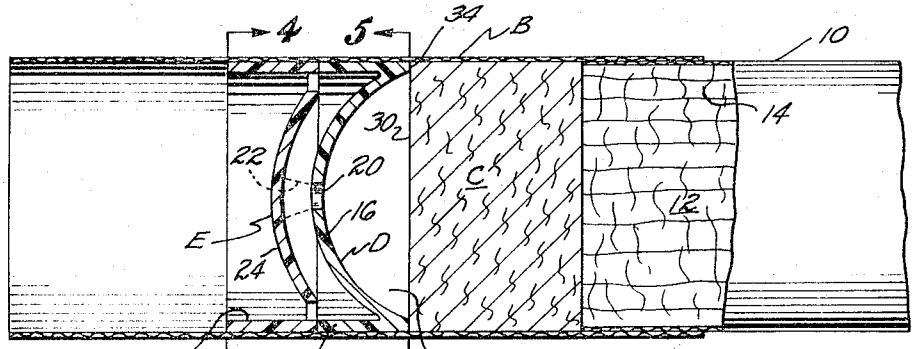


FIG. 3

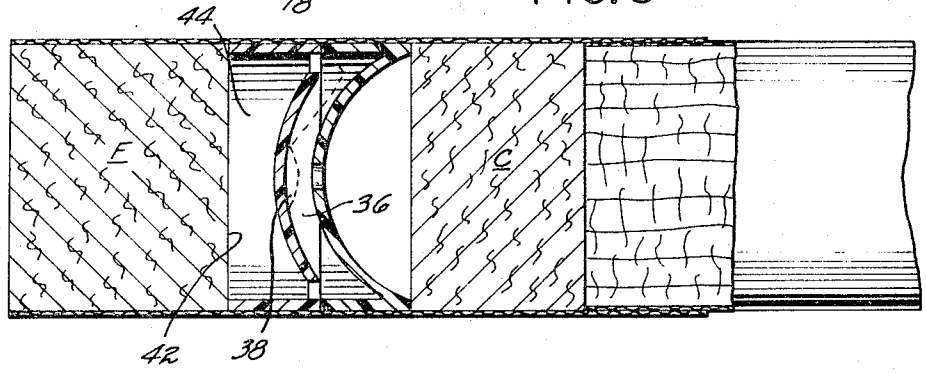


FIG. 4

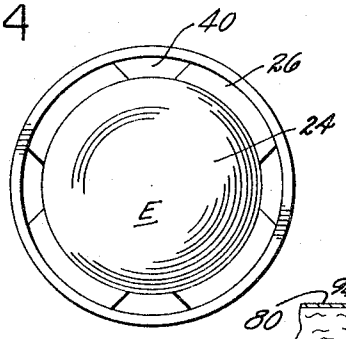
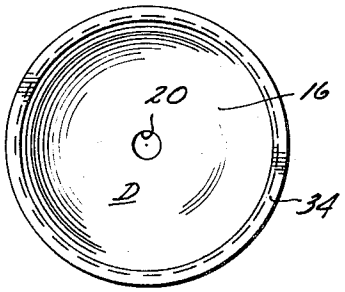


FIG. 5



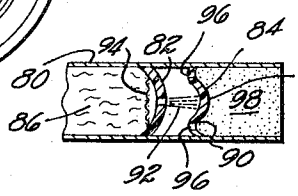


FIG. 6

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CIGARETTE ASSEMBLY

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7 Claims. (Cl. 131—10.5)

This application is a continuation in part of application Serial No. 326,119 entitled "Smoking Accessory" filed on Nov. 26, 1963, now Patent No. 3,269,394; the latter was a continuation in part of application Serial No. 203,678 filed June 1, 1962, now abandoned; which in turn was a continuation in part of application Serial No. 841,278 filed Sept. 21, 1959, and now abandoned.

The present invention relates generally to the field of accessories for use with cigarettes, and more particularly to an assembly that may be incorporated in the mouthpiece thereof to remove deleterious products of combustion prior to being drawn into a smoker's mouth.

During the past few months the results of comprehensive experimental work done on cigarette smoking have been made available to the general public, which indicate that certain components in cigarette smoke have a detrimental effect on a cigarette smoker over a period of time. Such components or by-products are believed to include various coal tar compounds that are formed during the combustion of the tobacco, and are considered to be deleterious to the well-being of a cigarette smoker.

A major object of the present invention is to provide an assembly of extremely simple structure that can be incorporated in the mouthpiece of a cigarette at a relatively low cost, and which tends to overcome the detrimental effect of tobacco smoking by removing a substantial quantity of the deleterious products of combustion before the smoke is drawn into a smoker's mouth.

Another object of the invention is to provide a smoking assembly that does not appreciably reduce the normal enjoyment derived from cigarette smoking, or increase the effort required in drawing smoke therefrom.

A still further object of the present invention is to provide a smoking assembly that can be used with either a plain cigarette or in conjunction with a cigarette provided with a fibrous filter to substantially reduce the quantity of products of combustion drawn into a smoker's mouth.

These and other objects of a first and an alternate form of the invention will become apparent from the following description thereof, and from the accompanying drawing illustrating the same, in which:

FIGURE 1 is a perspective view of a cigarette in the tip of which the present invention is concealed;

FIGURE 2 is an enlarged fragmentary, longitudinal cross-sectional view of the invention mounted in a cigarette, showing a plug of filter material disposed forwardly thereof, taken on the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged transverse cross-sectional view of the tip of a cigarette showing the invention intermediately positioned between two plugs of filter material;

FIGURE 4 is a front elevational view of a first part of the assembly that defines a partition in which an orifice is formed;

FIGURE 5 is a rear elevational view of a second part of the assembly that defines a baffle on which a jet of smoke from an orifice impinges, which baffle serves to alter the direction of smoke to permit it to pass rearwardly through a plurality of openings located in the peripheral portion of the second part of the assembly; and

FIGURE 6 is a longitudinal cross-sectional view of an alternate form of the invention mounted in the mouthpiece portion of a cigarette.

With continued reference to the drawing for the general arrangement of the invention, a cigarette A is shown in

FIGURE 1 that is defined by a paper cylindrical tube **10**, the major portion of the length of which is filled with tobacco **12**. A first end **14** of the tube **10** is provided with a cylindrical tip B extending rearwardly therefrom. The forward portion of the tip B preferably houses a cylindrical plug C of filter material, as can best be seen in FIGURE 2.

The present invention comprises an assembly which includes first and second parts D and E, which are arranged in abutting contact with the confines of the tip B, as best seen in FIGURE 2. The first part D of the invention includes a concave-convex web **16**, from the forward end of which a cylindrical flange **18** extends rearwardly. The flange **18** serves a three-fold purpose; first to adhere the first part D of the assembly to the interior surface of the tip B; secondly, serves as a spacer to longitudinally position the first part D of the assembly relative to the second part E thereof; and thirdly, to dispose the forward plug C at a desired longitudinal distance relative to the web **16**.

The web **16** has an orifice **20** formed in the central portion thereof through which smoke is drawn rearwardly as a high velocity jet **22** that impinges on the second part E of the assembly. The dimensions of the orifice **20** are critical, and from experience it has been found that the most desirable results achieved in removing deleterious by-products from the smoke prior to the smoke leaving the cigarette A is attained when the orifice is circular and of a diameter of substantially .028 inch. When the diameter of the orifice is .028 inch the assembly removes a very substantial quantity of the deleterious compounds from the tobacco smoke passing therethrough, without appreciably increasing the effort required to draw smoke from the cigarette A.

Also from experience it has been found that the transverse cross section of the orifice **20**, rather than the shape thereof, is the critical element in the removal of deleterious products from smoke as it passes through the assembly. Hence, the shape of the orifice **20** need not necessarily be circular, but can be square, rectangular, triangular, or any other desired geometric configuration. Also, it has been determined that a circular orifice **20** may have a diameter ranging between 0.005 and 0.100 inch and operate satisfactorily. The smaller the diameter, the greater quantity of deleterious compounds removed from the tobacco smoke as it passes through the assembly. In addition, the smaller the orifice **20**, the greater will be the physical effort required to draw smoke from the cigarette A.

The second part E of the invention is defined by a convex-concave partition **24** disposed adjacent to the web **16** and rearwardly therefrom, and the jet of smoke **22** impinges on the forward face of this partition. The outer extremity of partition **24** merges into a ring **26** that is disposed in a direction normal to the tip B. The outer peripheral portion of ring **26** develops into a second cylindrical flange **28** that extends rearwardly in the tip B, and is adhered to the interior surface thereof by conventional means such as an adhesive, or the like.

In the operation of the assembly, as shown in FIGURE 2 the smoke is drawn rearwardly through the plug C, and a portion of the deleterious products of combustion contained therein is deposited in this plug of filter material. The rear face **30** of the plug C is substantially unobstructed, and as a result, as the smoke is drawn rearwardly it passes uniformly through the plug to a first confined space **32** defined by the rear face **30** and the forward face of the web **16**.

It should be noted that the first part D of the assembly has a ring-shaped surface **34** defined by the forward extremity of flange **18** that is in abutting contact with the outer peripheral portion of the face **30**. The spacing

between the rear extremity of the orifice **20** and the forward face of the partition **24** most adjacent thereto is critical, and from experimentation it has been found that a distance of from 0.005 to 0.100 inch provides the most desirable results in removing deleterious compounds from the smoke.

The interior surface of the flange **18**, the rear surface of the web **16**, and the forward surface of the partition **24** cooperatively define a confined space **36**, best seen in FIGURE 3. As the jet of smoke **22** impinges on the forward face of the partition **24**, coal tar products of combustion that are of a dark color and quite viscous form as a body **38** on the central portion of the partition **24**, as may be seen in phantom line in FIGURE 3. The smoke comprising the jet **22** is thereafter deflected forwardly and outwardly by the partition **24** to traverse a path such as shown in phantom line in FIGURE 3 to pass rearwardly through a number of circumferentially spaced ports **40** formed in the ring **26**, as can best be seen in FIGURE 4. After passing through the ports **40** the smoke then flows rearwardly through the balance of the mouthpiece, as illustrated in FIGURE 2, into the smoker's mouth.

In the form of the invention shown in FIGURE 3, after the jet of smoke **22** passes rearwardly through ports **40** it flows through a second plug F of a filter material, which further removes deleterious compounds that may remain entrained in the smoke in the form of tiny droplets, or the like. The second flange **28**, the rear surface of the partition **24**, and the forward face **42** of the second plug F cooperatively define a second confined space **44** in which the smoke is drawn after it passes rearwardly through the ports **40**.

The forward face **42** of the second plug F is unobstructed relative to the second confined space **44**, and smoke therefrom may, as a result, flow rearwardly and uniformly through the second plug E into the smoker's mouth. The second flange **28** (FIGURE 3) serves to space the second plug F at a predetermined longitudinal distance from the partition **24**. The first and second parts D and E of the assembly can be formed from any desired material, but it has been found convenient to form the same from a polymerized resin such as Tenite, a product of the Eastman Kodak Company of Rochester, New York.

From experimental tests on the assembly it has been found that the web **16**, partition **24**, and the flanges **18** and **28** should preferably be 0.010 inch in thickness. The radius of curvature of the forward face of web **16** should be approximately 0.146 inch, and the radius of curvature of the forward face of partition **24** should be approximately 0.186 inch.

As will be evident from the previous description, the assembly of the present invention is of extremely simple mechanical structure. The assembly performs equally efficiently whether disposed in the tip B of either a filtered or unfiltered cigarette A.

The assembly is considered to embody the following elements of patentable novelty:

(1) Simplicity of structure.

(2) Length of flange **18** which serves to automatically space orifice **20** a desired distance from partition **24**.

(3) Forward extremity of flange **18** which serves to hold plug C a fixed distance from web **16**.

(4) The flange **18** which provides a cylindrical surface that can be adhered to the interior surface of tip B.

(5) When the first member D and plug C are in abutting contact they automatically define a first confined space **32** that is maintained at a negative pressure when a smoker draws on cigarette A, which negative pressure causes smoke to be drawn rearwardly and uniformly through the entire transverse cross section of plug C to obtain a maximum filtering action therefrom.

(6) Flange **28** serves to maintain plug F a fixed longitudinal distance from partition **24**.

(7) Flange **28** provides a cylindrical surface that can be adhered to the interior surface of tip B.

(8) When flange **28** and plug C are in abutting contact they automatically define a confined space **44** that is maintained at a negative pressure when a smoker draws on cigarette A, with smoke from space **44** flowing rearwardly and uniformly through part E to obtain maximum filtering action therefrom.

(9) The critical limits of orifice **20** and its longitudinal spacing from partition **24**.

(10) The maximum utilization of filtering capabilities of plug C and plug F.

(11) Two-step and three-step removal of deleterious compounds from tobacco smoke.

(12) Varying of the diameter of orifice **20** to regulate the percentage of deleterious compounds to be removed from the tobacco smoke.

An alternate form of the device is shown in FIGURE 6, which is also shown and described in my copending application Serial No. 326,119. In the alternate form, a cylindrical roll **80** of cigarette paper is provided which has two longitudinally spaced, first and second partitions **82** and **84** respectively, in the rear end portion thereof. Tobacco **86** is disposed in roll **80** forwardly of the first partition **82**.

The edge portions of the first and second partitions **82** and **84** are each attached by adhesive or other conventional means to the interior surface of roll **80**. The first partition **82** is preferably of concave-convex configuration, as shown in FIGURE 6, and an orifice **88** is formed in the center thereof.

Second partition **84** includes a ring-shaped portion **90** that supports a rearwardly extending recessed portion **91**. A number of circumferentially spaced openings **96** are formed in the ring-shaped portion **90**. The orifice **88** can vary in diameter between 0.005 and 0.1 inch, and still form tobacco smoke into a high velocity jet **92** that will deposit coal tar products and particles of solid materials on the forward surface of recessed portion **92**. The second partition **84** may be disposed rearwardly of first partition **82** within a range of distances between 0.005 and 0.1 inch.

To prevent entry of particles of tobacco **86** into orifice **88** whereby it may become clogged or plugged up, a screen **94** or other perforated body (not shown) is disposed forwardly of the orifice. It is preferable that the screen **94** be physically connected to the first partition, such as by adhering the edges thereof to the forward surface of the first partition **82**. To prevent collapse of the roll **80** rearwardly of the second partition **84**, a body **98** of porous materials is preferably disposed therein.

The use and operation of the alternate form of the invention is substantially the same as that of the assembly previously described when used with the part E only, and hence a description thereof need not be repeated.

Although the present invention is fully capable of achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that it is merely illustrative of the presently preferred embodiments thereof and I do not mean to be limited to the details of construction herein shown and described, other than as defined in the appended claims.

I claim:

1. A cigarette including an assembly, comprising:

(a) a wrapper in which tobacco is contained from tip to mouthpiece thereof;

(b) a first plug of porous filter material disposed in said mouthpiece rearwardly of said tobacco;

(c) a first part of said assembly disposed in said mouthpiece rearwardly of said first plug, which first part includes a concave-convex web having a first cylindrical flange extending rearwardly therefrom that is in abutting contact with the interior surface of said mouthpiece and adhered thereto, with said web having an orifice formed therein, with the forward edge of said

first flange being in abutting contact with the rear surface of said first plug to permit said web and first plug to define a first confined space that is maintained at a negative pressure when a smoker draws on said cigarette, which negative pressure causes smoke from said tobacco to be drawn uniformly through the entire transverse area of said first plug to obtain a maximum filtering action from said first plug, and with said smoke discharging rearwardly from said orifice as a high velocity jet; and

(d) a second part of said assembly disposed in said mouthpiece rearwardly of said first part and in abutting contact with the rear edge of said first flange, which second part includes a cylindrical flange that is adhered to the interior surface of said mouthpiece, a ring that extends inwardly from the forward end of said second flange, a concave-convex partition supported from the inner edge of said ring on which said jet impinges as a smoker draws on said cigarette, which jet deposits deleterious products of combustion contained therein on said partition as it impinges on a concave surface thereof, with said smoke thereafter being deflected forwardly and outwardly into a second confined space defined by said first flange, said web and said partition, to flow rearwardly therefrom through a plurality of circumferentially spaced ports formed in said ring, and with the length of said first flange determining the longitudinal spacing between the rear extremity of said orifice and said partition.

2. A cigarette as defined in claim 1 wherein said first and second parts are formed from a polymerized resin.

3. A cigarette as defined in claim 1 wherein the radius of curvature of the concave surface of said web is substantially 0.146 inch.

4. A cigarette as defined in claim 1 wherein the diameter of said orifice ranges between 0.005 to 0.100 inch.

5. A cigarette as defined in claim 1 wherein the radius of curvature of the concave surface of said partition is substantially 0.186 inch.

6. A cigarette as defined in claim 1 wherein the longitudinal spacing between the rear extremity of that portion of said web defining said orifice ranges between 0.005 and 0.100 inch from the forward concave surface of said partition.

7. A cigarette as defined in claim 1 which further includes:

(e) a second plug of porous filter material disposed in said mouthpiece rearwardly of said second part and in abutting contact with the rear extremity of said second flange, which second plug, partition and said second flange cooperatively define a third confined space into which smoke from said ports passes, with said smoke from said third confined space being drawn uniformly through the entire transverse cross section of said second plug to obtain maximum filtering action therefrom.

References Cited by the Examiner

UNITED STATES PATENTS

2,511,898	6/1950	Brothers	131—202
2,764,513	9/1956	Brothers	131—10.5
3,234,949	2/1966	White et al.	131—210

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