

CIGARETTE FILTER

This invention relates to filter devices for cigarettes. In one respect it relates to a filter with novel ventilating means therein. In another respect the invention relates to a filter cigarette having air-flow grooves therein.

It is well known in the art to add to cigarettes filters provided with ventilating means to bring in ambient air into the filter to dilute the smoke stream. The dilution of the smoke stream reduces the quantity of smoke particulates as well as gas phase components which are delivered to the mouth of the smoker. A number of means have been proposed and are utilized for introducing ventilating air into the cigarette. For example, the wrapper for the tobacco in a cigarette can be made from a porous material which allows for introduction of air along the entire length of the cigarette where it mixes with the smoke stream passing therethrough thereby diluting the smoke in the stream. Also, the cigarette wrapper may be perforated at selected locations along the length of the cigarette which provides ports for the cigarette through which ventilating air enters. Even further, it is known to perforate the wrapper of the filter on the filter end of the cigarette to allow for ventilating air to enter the filter for dilution of the smoke stream. There have also been a number of suggestions for incorporating grooves within the filter plug for the cigarette in order to facilitate the addition of ventilating air into the smoke stream.

For example, U.S. Patent No. 3,596,663 relates to a tobacco smoke filter provided with a corrugated^d porous plug wrap surrounding a filter element which is circumscribed by a tipping paper having flow-through perforations therein whereby ventilating air enters directly into the filter element or progresses down the grooves to the smokers mouth. Other patents which relate to cigarette filters having grooves circumscribing the filter element for the introduction of ventilating air into the filtering end of the filter cigarette include U.S. Patent No. 3,557,995; U.S. Patent No. 3,572,347; U.S. Patent No. 3,490,461; U.S. Patent No. 1,718,122; U.S. Patent No. 3,788,330; U.S. Patent No. 3,773,053; U.S. Patent No. 3,752,165; U.S. Patent No. 3,638,661; U.S. Patent No. 3,608,561; West German Patent No. 2,302,677; British Patent No. 1,414,745; British Patent No. 1,360,612; British Patent No. 1,360,611; and, U.S. Patent No. 3,910,288, the aforementioned British patents being directed to non-wrapped acetate filters.

The present invention advantageously provides a straight forward arrangement of a filter for a cigarette which in one form achieves normal cigarette pressure drop with low to moderate efficiency filters. The present invention further provides a cigarette filter for lowering tar predominantly by ventilation instead of filtration. The present invention even further provides a filter ventilation system for a cigarette utilizing grooves in the filter plug extending from tipping perforations in the tipping paper to one end of the filter. The present invention also provides a grooved filter with a non-porous plug wrap.

In accordance with the present invention, a filter device for a cigarette comprises a porous smoke-filter rod of cylindrical configuration, a non-porous wrapper extending longitudinally of and circumscribing said rod, leaving
5 the opposed ends of the rod open for flow therethrough, said wrapper and rod having a plurality of longitudinally extending air-flow directing grooves located at the circumference of the rod and spaced circumferentially there-around, said grooves extending along the rod for a pre-
10 scribed distance less than the length of the filter rod to at least the mouth end thereof, and tipping material extending longitudinally of and circumscribing said wrapper, which tipping material is permeable to air or is provided with openings permitting flow of air through the tipping
15 into the grooves, whereby, during use of the device, air entering the grooves through the permeable tipping material or through said openings provided in the tipping material can travel along the grooves separately from smoke passing from the cigarette through the filter rod to the smoker's
20 mouth.

It is to be understood that the description of the examples of the present invention given hereinafter are not by way of limitation and various modifications within the scope of the appended claims will occur to those skilled
25 in the art upon reading the disclosure set forth hereinafter.

Referring to the drawing:

Figure 1 is a perspective view of a preferred filter element and a non-porous plug wrap of the present invention;

30 Figure 2 is a perspective view of another filter element and non-porous plug wrap of the present invention;

Figure 3 is a perspective view of even another preferred filter element and non-porous plug wrap of the present

invention attached to a cigarette with tipping material shown in an unwrapped condition.

Figure 4 is a perspective view of the filter element including the non-porous plug wrap of Figure 1 attached to a cigarette with tipping material shown in an unwrapped condition.

Figure 5 is a perspective view of another preferred filter element and non-porous plug wrap of the present invention attached to a cigarette with tipping material shown in an unwrapped condition.

In Figure 1, a filter plug of the present invention is shown. This filter plug 2 comprises a cellulose acetate filter element 10 or any other filter made from fibrous or foamed materials for tobacco smoke which may be known in the art circumscribed by a non-porous wrapper 12. It is realized that in the use of the term "non-porous wrapper", this includes non-porous outer surfaces of foamed material which are integral with the filter element as well as non-porous wrapping material which is not integral with the filter element. The filter plug 2 is provided with a plurality of grooves 14 therein extending longitudinally therealong. The filter plugs 2 are generally prepared by taking a standard filter rod of cellulose acetate or the like, wrapping the rod with a non-porous wrapping material, then subjecting the wrapped filter rod to a mold or other treating means designed for putting appropriate grooves therein. One such method is known as a heat molding technique, which is well known in the art.

Figure 2 shows another preferred filter plug 4 of the instant invention which is comprised of a cellulose acetate filter element 20 circumscribed by a non-porous plug wrapper 22 with one or more grooves 24 extending from one end of the plug wherein the grooves 24 are disposed at an angle around the filter plug 4. A circumferentially extending groove 26 is also provided to communicate with the grooves 24 wherein the groove 26 is generally in alignment with tipping perforations as hereinbefore described. In the method of preparing a filter plug 4, the same procedure is utilized as mentioned hereinbefore in discussion of the preparation of filter plugs in Figure 1.

Figure 3 shows a filter plug 6 which is comprised of a filter element 30 which may be cellulose acetate, or other filter element known in the art, circumscribed by a non-porous wrapper 32 and includes a plurality of grooves 34a and 34b extending longitudinally from each end of the plug a preselected distance therealong. In the method of preparing a filter plug 6, the same procedure is utilized as mentioned hereinbefore in discussion of the preparation of filter plugs in Figures 1 and 2. However, in use of the filter plug 6 of Figure 3, by attaching the filter plug 6 to a cigarette or tobacco column 7 and then surrounding the plug by tipping material 36 which includes a pair of parallel rows of ventilating perforations 38, perforations 38 are disposed for alignment with grooves 34a and 34b.

In use, ventilating air travels into the smoker's mouth through grooves 34b and travels down the filter plug 6 into the tobacco column 7 through grooves 34a simultaneously therewith.

In Figure 4, a filter plug 2 is attached to a tobacco column or cigarette 3 and is positioned for being wrapped by tipping paper 16 which includes a plurality of perforations 18 therein circumferentially surrounding filter plug 2 and disposed for alignment with the grooves 14 wherein ventilating air radially enters the grooves 14 through the perforations 18. As shown in Figure 4, ventilating air enters through the tipping perforations 18, travelling down the grooves 14 and toward the smoker's mouth.

Figure 5 shows a filter plug 8 which is comprised of a filter element 40 which may be cellulose acetate, or any other filter element known in the art, circumscribed by a non-porous wrapper 42 and includes a plurality of grooves 44a and 44b extending longitudinally from each end a preselected distance therealong. The method of preparing filter plug 8 is the same procedure as utilized in the preparation of filter plug 2 as discussed hereinbefore. In attaching the filter plug of Figure 5 to a cigarette or tobacco column 9, the plug 8 and the column

9 are enclosed by tipping material 46 which includes a row of ventilating perforations 48 therein. The perforations 48 are disposed for flow-through communication with the inwardly extending portions of the grooves 44a and 44b which are in spaced overlapping relation. In use, the ventilating air travels into the smoker's mouth through grooves 44a and travels down the filter plug 8 into the tobacco column through grooves 44b simultaneously therewith.



C L A I M S

1. A filter device for a cigarette, comprising a porous smoke-filter rod of cylindrical configuration, a non-porous wrapper extending longitudinally of and circum-
5 scribing said rod, leaving the opposed ends of the rod open for flow therethrough, said wrapper and rod having a plurality of longitudinally extending air-flow directing grooves located at the circumference of the rod and spaced circumferentially therearound, said grooves extending along
10 the rod for a prescribed distance less than the length of the filter rod to at least the mouth end thereof, and tipping material extending longitudinally of and circum-scribing said wrapper, which tipping material is permeable to air or is provided with openings permitting flow of air
15 through the tipping into the grooves, whereby, during use of the device, air entering the grooves through the permeable tipping material or through said openings provided in the tipping material can travel along the grooves separately from smoke passing from the cigarette through
20 the filter rod to the smoker's mouth.
2. A filter device according to claim 1 and connected to a cigarette.
3. A filter device according to claim 1 or 2, wherein the tipping material is impermeable to air but is provided with
25 perforations selectively disposed for flow communication with said grooves.



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4. A filter device according to any one of claims 1 to 3, wherein the grooves, extending along said filter rod, are disposed around said rod at an angle to the longitudinal axis of said rod.
- 5 5. A filter device according to any one of claims 1 to 4 and comprising also a groove, extending circumferentially of said rod, in through-flow communication with said longitudinally extending grooves.
6. A filter device according to any one of claims 1 to 10 5, wherein longitudinal grooves extending from respective ends for prescribed distances along said filter rod are not connected to each other.
7. A filter device according to any one of claims 1 to 6, wherein said non-porous wrapper and porous filter rod 15 are integral with each other.
8. A filter device according to claim 1 and substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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