

[54] **PISTON TYPE CIGARETTE FILTER**

[72] Inventor: **Thomas W. Summers**, Jefferson-town, Ky.

[73] Assignee: **Brown & Williamson Tobacco Corporation**, Louisville, Ky.

[22] Filed: **Nov. 30, 1970**

[21] Appl. No.: **93,560**

[52] U.S. Cl. **131/10 A**, 131/10.3, 131/10.5, 131/198 A

[51] Int. Cl. **A24d 01/04**, A24f 13/04

[58] Field of Search 131/198, 182, 10, 10.3, 10.5, 131/10.7, 10.5

[56] **References Cited**

UNITED STATES PATENTS

3,512,537	5/1970	Pelletier.....	131/198 A X
2,764,513	9/1956	Brothers.....	131/10.5
3,335,733	8/1967	Brooks.....	131/10.5 X

2,145,733 1/1939 Palumbo.....131/182

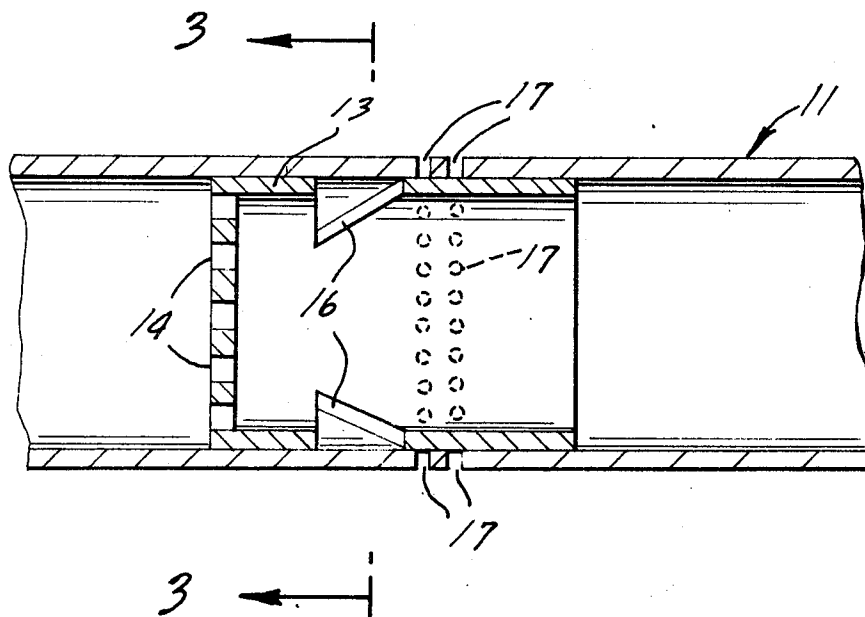
Primary Examiner—Melvin D. Rein

Attorney—Kane, Dalsimer, Kane, Sullivan & Kurucz

[57] **ABSTRACT**

A piston-type mouthpiece for a cigarette or cigarette holder includes an outer tube in which is a slidable cup-like piston with the open end facing the smoker. The piston face has a plurality of perforations which act as a filter. As the perforations become blocked and as the density of puffs increases during the smoking of the cigarette, the vacuum created in drawing on the cigarette gradually draws the piston toward the smoker. As the piston slides toward the smoker, openings in the cylindrical wall of the piston become aligned with openings in the outer tube so that air is drawn from the atmosphere directly into the smoker's mouth through these openings rather than through the tobacco column.

8 Claims, 3 Drawing Figures



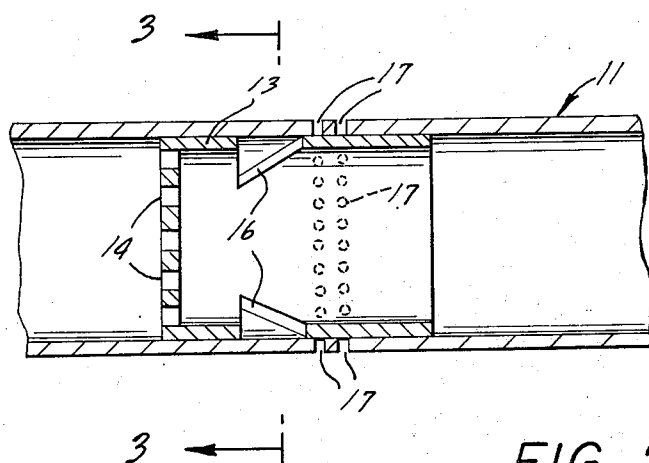
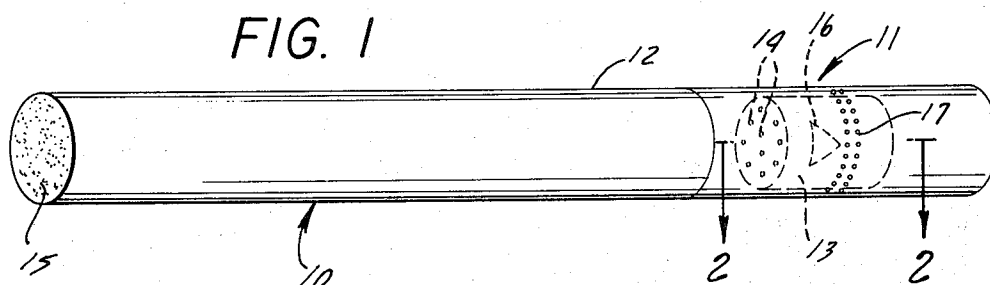


FIG. 2

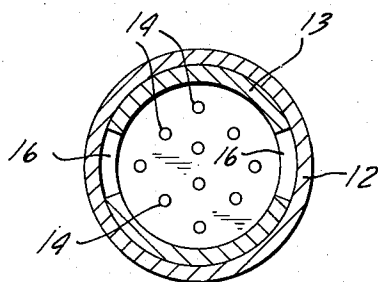


FIG. 3

INVENTOR

THOMAS W. SUMMERS

BY

Kane, Dobson, Fane, Sullivan & Knealy
ATTORNEYS

PISTON TYPE CIGARETTE FILTER

BACKGROUND OF THE INVENTION

This invention relates to cigarettes or cigarette holders and, more particularly, to an improved filtering element within the mouthpiece of the cigarette or holder which automatically moves toward the smoker as the pressure drop of the filter increases and causes openings in the element and mouthpiece outer band to register, allowing a portion of the inhaled air to be drawn directly from the atmosphere. In conventional ventilated cigarettes the ventilation reduces tar and nicotine excessively during the early puffs.

Some of the earlier patents disclose cigarette filters which seek to remedy this problem by providing perforations or openings to mix air with the smoke, which can be varied by the smoker to suit his taste.

It is a principal object of this invention to provide an automatic means of increasing the amount of ventilating air as the cigarette is smoked.

Another object of this invention is to provide a piston type filter which is so constructed that it has the appearance and qualities of a conventional filter forming a part of a cigarette or holder and still functions in the manner herein described.

Another object of this invention is to provide a filter which is efficient for its intended purpose and simple and economical to manufacture.

SUMMARY OF THE INVENTION

The present invention covers a mouthpiece for a cigarette or cigarette holder in which a cup-like piston is slidable within a tube forming the outer wrap of the mouthpiece. The face of the piston is provided with a plurality of holes or perforations which serve as a filter. During smoking of the cigarette the holes become clogged and the density of the smoke stream is increased causing the pressure drop of the cigarette to increase. The vacuum thus created in drawing on the cigarette causes the piston to move toward the smoker. The cylindrical wall of the piston is provided with a number of ports or openings which are covered by the outer wrap prior to smoking of the cigarette. As the piston moves toward the smoker the ports in the piston overlap the perforations in the outer wrap allowing a portion of the inhaled air to be drawn from the atmosphere and mix with the air drawn through the tobacco column. Although the ports in the piston and the perforations in the outer wrap may be of any shape, it has been found preferable to have the ports in the piston so shaped that the size of the overlap of the ports and the flow of air from the atmosphere will increase as the piston moves toward the smoker.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages will become apparent from the following detailed description which is to be taken in connection with the accompanying drawings illustrating a somewhat preferred embodiment of the invention in which:

FIG. 1 is a view of a cigarette showing the piston type mouthpiece of this invention;

FIG. 2 is a cross-sectional view along the line 2-2 of FIG. 1; and

FIG. 3 is a cross-sectional view along the line 3-3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 of the drawings, there is shown a cigarette 10 encased in an outer wrap 12 with a mouthpiece 11 of this invention. Slidable within the outer wrap 12 is a cup-like piston 13 (FIG. 2) provided with holes or perforations 14 which act as a filter for air being drawn through the tobacco 15. The piston may be made of various materials, but nylon and polyethylene are the most preferred. It has been found preferable to use between seven and 11 holes, each having an area of 0.46 square millimeters, although such area may be varied between 0.1 and 0.7 square millimeters. The total area of these holes would be within the approximate range of 1 to 5 square millimeters. The piston has ports 16 in the side covered by the outer wrap. Although the number of such ports 16 may vary in number and size, it has been found that three or four ranging from 1 to 16 square millimeters will not weaken or destroy the strength of the piston. There are also perforations 17 in the outer wrap, which likewise may vary in number and size. In the initial position of the piston, before the cigarette is smoked, the perforations 17 in the outer wrap are covered on the inside by the wall of the piston to prevent air from the atmosphere being inhaled by the smoker through such perforations. The size of the ports is defined by the degree of perforations in the outer wrap. It is desirable to have the overlap of ports and perforations to have a pressure drop approximately between 5 and 30 inches at a 17.5 cc/sec. flow rate. For example, two holes each with an area of 0.224 square millimeters or one hole with an area of 0.46 square millimeters can be used. The pressure drop of the overlap of the piston ports and outer wrap perforations must be balanced with the piston face. It is desirable to maintain a total cigarette pressure drop during smoking within reasonable limits between 2 and 7 inches H₂O. Thus, if it is desirable to use a relatively large area for the holes in the piston face, which would subsequently increase pressure drop upon smoking by a small amount, then a relatively small area in the overlap would be necessary to maintain the total cigarette pressure drop within practical limits. Likewise for a small hole area in the piston face, a relatively large overlap area would be required. The equation by which these pressure drops are related is:

$$P_{\text{cig}} = \frac{P_2(P_1 + P_3)}{P_2 + P_3 + P_1}$$

where

P_1 is the tobacco section pressure drop;

P_2 is the pressure drop of the hole in the face of the piston; and

P_3 is the pressure drop of the overlap.

Each port 16 in the piston is shown in the shape of a triangle with the registering perforations 17 in the outer wrap in the shape of rectangles. Since the main object is to have the overlapping ports and perforations form an air opening which will become larger as the piston moves toward the smoker, it will be apparent that such ports can be varied in shape and combinations of shapes to achieve that result. For example, the overlapping ports could be rectangles, circles, triangles or similar figures.

The operation of the filter device should be clear from the foregoing description. The invention provides

a device which can be connected to a cigarette either as a cigarette holder or as a unitary filter cigarette. It will be understood that this filter device can also be used with a conventional cellulose acetate filter at either end or inside the piston. It does not detract from the holder or cigarette, is simple and economical to manufacture, and operates effectively.

Thus, among others, the several aforementioned objects and advantages are most effectively attained. Although a single somewhat preferred embodiment of the invention has been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

Having thus described the invention, what is claimed is:

1. A filter device adapted to be interposed between the tobacco end and the mouthpiece end of a smoking device comprising:

- a sleeve forming the outer wrap of the device and having at least one opening in its side wall,
- a tubular piston slidable in said sleeve and having at least one port in its side wall, the said port being interposed between the said opening and the tobacco end of the device and the tubular side wall of said piston covering the said opening when the piston is in its initial position,
- said opening and said port when in registry forming a free air passage when the said piston moves from its initial position toward the mouthpiece end,
- said opening and said port having predetermined dimensions which increase the air passage area as the said piston moves toward the mouthpiece end, the face of said piston adjacent said tobacco end having a plurality of perforations,

said piston being adapted to move axially toward the mouthpiece end in response to a pressure differential across the said face as the smoker draws on the device,

whereby the piston will move until sufficient air enters the air passage formed by the overlapping port and opening and there is no pressure differential across the face.

2. The invention of claim 1 wherein the number and size of perforations in the face of the piston shall be such that the resistance of air flow through the piston face is within the values defined by 0.01 -0.1 inches H₂O pressure drop at 17.5 cc/sec.

3. The invention of claim 1 wherein the number of perforations in the face of the piston shall be between seven and 11.

4. The invention of claim 3 wherein the area of each perforation shall be between 0.1 and 0.7 square millimeters.

5. The invention of claim 1 wherein the number of ports in the side wall of the piston shall be between one and five.

6. The invention of claim 1 wherein the overlapping ports and openings shall form an air opening having a total area ranging in size from 0.25 to 5 square millimeters.

7. The invention of claim 1 wherein the ports shall be so shaped that the air opening formed by the overlapping ports and openings shall increase in dimension as the piston slides from its initial position to a position where the openings fully register with the ports.

8. The invention of claim 7 wherein the ports are triangles with their apexes pointing in the direction of the smoker.

* * * * *

40

45

50

55

60

65

Disclaimer

3,695,274.—*Thomas W. Summers*, Jeffersontown, Ky. PISTON TYPE CIGARETTE FILTER. Patent dated Oct. 3, 1972. Disclaimer filed Apr. 27, 1973, by the assignee, *Brown & Williamson Tobacco Corporation*.

Hereby enters this disclaimer to claim 2 of said patent.

[*Official Gazette November 6, 1973.*]