

IMPROVEMENTS RELATING TO TOBACCO SMOKE FILTERS

This invention relates to tobacco smoke filters for use with smoking articles, cigarettes for example.

It is well known to provide filter-tipped cigarettes with ventilation means which permit the ingress of ventilation  
5 air into the filter. A purpose of this is to effect a decrease in the mainstream delivery of smoke components. It has been observed that when ventilation air flows into a filter comprising a plug of fibrous filtration material, cellulose acetate for example, through a ventilation zone extending around the filter  
10 the tobacco smoke is caused to pass out of the filter in an axial stream having a diameter less than the diameter of the end face of the filter plug. This comparatively narrow stream of smoke impinges on a limited area of the taste receptors in the mouth of the smoker. It is an object of the present  
15 invention to provide a tobacco smoke filter in the use of which there occurs a stimulation of the taste receptors over a wider region in the smoker's mouth.

The present invention provides a tobacco smoke filter for a smoking article, including a rod-like plug of  
20 filtration material, enwrapped by wrapping means, wherein:

(a) said rod-like plug of filtration material has at least one air flow duct embedded into the periphery of said plug;

(b) said at least one air flow duct extends from  
25 the mouth end of the plug for a distance less than the full length of the plug;

(c) the at least one air flow duct has an outlet at the mouth end of the plug and an inlet opening spaced from the mouth end;

30 (d) said at least one air flow duct has a region in which the depth progressively decreases along the air flow duct in a direction towards the mouth end

and said region continues substantially to said mouth end of the plug;

(e) said wrapping means enwraps said plug such that said at least one air flow duct is defined partially by at least one groove embedded in the peripheral surface of the plug and partially by the inwardly facing surface of the wrapping means;

(f) said wrapping means includes means permitting the ingress of ambient air into said at least one air flow duct at a part thereof remote from the mouth end of the plug; and

(g) the floor surface and side surfaces of the at least one air flow are impervious to air and smoke.

Preferably there may be several said air flow ducts, each defined partly by a respective one of a plurality of said grooves, and partly by the inwardly facing surface of the wrapping means around the filter plug. In this case the width of the grooves may be constant or it may increase or decrease in the direction towards the mouth end of the filter plug.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the following description of various embodiments of the invention, given with reference to the accompanying drawing in which:-

Figure 1 shows a part view, in axial section, of a filter tipped cigarette;

Figure 2 shows a mouth-end view of the filter of the cigarette of Figure 1;

Figure 3 shows a mouth-end view of a filter of a somewhat different form from the filter shown in Figure 1; and

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Figure 4 shows a development view of a portion of the peripheral surface of a filter plug of another form.

The cigarette of Figure 1 comprises a rod 1 of cut tobacco enwrapped in cigarette paper 2, and a filter 3 comprising a self-sustaining filter plug 4 of fibrous cellulose acetate filtration material. At the periphery of the plug 4 there extend a number, eight as shown, of parallel, axially extending grooves 5 - see also Figure 2. As may be seen from Figure 1, the grooves 5, which extend from the mouth end of the plug 4 for a distance less than the full length of the plug, are so formed that the depth of each decreases towards and substantially up to the mouth end of the plug. A convenient method of forming the grooves 5 is to subject the plug 4, or preferably a filter rod length from which the plug was cut, to a hot-moulding process such as, for example, that disclosed in United Kingdom Patent Specification No. 1,507,765, using suitably shaped forming means. The surfaces of the grooves 5 are thus rendered impervious.

Serving to secure the filter 3 to the cigarette rod 1, 2 is a tipping 7 which, in the portions where it overlies the grooves 5, defines, together with the walls of the grooves 5, airflow ducts 8. A row of ventilation perforations 9, shown in exaggerated form, in the tipping 7 encircles the plug 4 at a location overlying the

upstream end of the grooves 5, the arrangement being such that there is in communication with each of the airflow ducts 8 at least one of the perforations 9.

When the cigarette of Figure 1 is smoked, ambient  
5 air is drawn through the ventilation perforations 9 into the airflow ducts 8. The air passes along the airflow ducts 8 to the outlet ends thereof unmixed, or substantially unmixed, with tobacco smoke. Since the depth of the grooves 5 partly defining the airflow  
10 ducts 8 decreases in the direction of flow of the ventilation air along the ducts 8, the air exits the ducts 8 into the smoker's mouth with a component of velocity directed radially outwardly. There is thus provided a divergent air stream which entrains smoke  
15 issuing from the mouth end of the filter plug 4 by a Coanda effect and so causes the smoke to come into contact with taste receptors over a comparatively wide region of the smoker's mouth. This is perceived by the smoker as an enhanced smoke character.

20 The filter, a mouth-end view of which is shown in Figure 3, comprises a plug 4' which, instead of being provided with a number of longitudinally extending peripheral grooves, comprises a single annular circumferential groove 5'. In axial section of  
25 the plug 4', the groove 5' has a contour similar to the contour of the base of each of the grooves 5 of the plug

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4 of Figure 1. A stiff wrapper sleeve or mouthpiece 7', which may be formed of plastics material, encases the plug 4' and receives an end portion of a cigarette rod in a manner analogous with the tipping 7 of the cigarette shown in Figure 1. The sleeve 7' requires to be stiff in order that the annular mouth-end opening, designated 6, of airflow duct 8', defined by the circumferential annular groove 5' and the sleeve 7', remains open when the filter is in use.

10       The effect produced by the filter of Figure 3 is similar to that of the filter 3 of Figures 1 and 2. Ambient air is drawn into the airflow duct 8' through perforations (not shown) in the wrapper or mouthpiece 7' and, because of the contour of the groove 5', the air enters the smoker's mouth as a divergent stream which serves to cause smoke to impinge on an extended region of taste receptors.

Figure 4 shows, as a development view, a pattern of peripheral grooves which may be utilised as an alternative to the axially extending grooves 5 of the filter of Figure 1 or the single annular circumferential groove 5' of the filter of Figure 3. In Figure 4 reference numeral 10 denotes the mouth end of a filter plug 11. A first series has peripheral, parallel grooves 13 extending at a small angle to the axis of the plug 11 and the grooves 14 of a second, similar

series extend at substantially the same angle to the axis but with opposite hand. The two sets of grooves 13, 14 intersect to produce a reticular formation. As with the single series of grooves 5, each of the  
5 grooves 13, 14 has a region of decreasing depth in the direction towards and substantially up to the mouth end 10 of the plug 11. In use the plug 11 is overwrapped by a wrapper (not shown) permitting ventilation air to flow into the grooves 13, 14  
10 at upstream locations thereof and a smoke-spreading effect is achieved similar to that exhibited by the previously described filters.

The wrapping means for the filter plug may comprise a plug wrapper of pervious nature on the  
15 plug exterior and a longer tipping of impervious nature overlying the plug wrapper and securing the filter plug to the tobacco rod 2. In this case the ventilation perforations need only be present in the impervious tipping.

20 The filter plug may, if desired, be formed as two sub-plugs one of which has the grooves 5, 13, 14 or the single circumferential groove 5' therein, the other sub-plug being plain.

If desired, the ventilation perforations may  
25 comprise a micro-perforated region of the tipping.

CLAIMS



1. A tobacco smoke filter for smoking articles including a rod-like plug of filtration material, enwrapped by wrapping means, wherein:

5 (a) said rod-like plug of filtration material has at least one air flow duct embedded into the periphery of said plug;

(b) said at least one air flow duct extends from the mouth end of the plug for a distance less than the full length of the plug;

10 (c) the at least one air flow duct has an outlet at the mouth end of the plug and an inlet opening spaced from the mouth end;

(d) said at least one air flow duct has a region in which the depth progressively decreases along the air flow  
15 duct in a direction towards the mouth end and said region continues substantially to said mouth end of the plug;

(e) said wrapping means enwraps said plug such that said at least one air flow duct is defined partially by at  
20 least one groove embedded in the peripheral surface of the plug and partially by the inwardly facing surface of the wrapping means;

(f) said wrapping means includes means permitting the ingress of ambient air into said at least one air flow  
25 duct at a part thereof remote from the mouth end of the plug; and

(g) the floor surface and side surfaces of at least one air flow duct are impervious to air and smoke.

2. A tobacco smoke filter according to claim 1,  
30 wherein there are several said air flow ducts, each defined by the wrapping means and a respective one of a plurality of said grooves.

3. A tobacco smoke filter according to claim 2, wherein said grooves are of constant width.

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4. A tobacco smoke filter according to claim 2, wherein said grooves increase in width towards the mouth end of the plug.

5. A tobacco smoke filter according to any one of claims 2 to 4 wherein there are two sets of said grooves, the grooves of a first said set being helical of a first hand, and the grooves of the second set being helical of opposite hand, whereby at least one of the grooves of said first set intersects several of the grooves of said second set and each groove of each of said sets has an inlet end which is deeper than its outlet end and a region of progressive reduction in depth between said inlet and outlet ends.

6. A tobacco smoke filter according to any one of claims 2 to 5, wherein ingress of air into said parts of the air flow ducts is permitted by way of ventilation perforations in the wrapping means.



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7. A tobacco smoke filter according to claim 6, wherein said ventilation perforations comprise a micro-perforated region in the wrapping means.

8. A tobacco smoke filter according to any one of  
5 claims 2 to 5 wherein said wrapping means includes an inner layer of air-pervious material and an outer layer which is less pervious to air and includes ventilation perforations to permit ingress of air into said part of the at least one airflow duct.

10 9. A tobacco smoke filter according to claim 1, wherein there is one said airflow duct in the form of an annular groove extending around the plug and having one side deeper than the other, the shallower side being disposed at the mouth end of the plug and the deeper side being spaced from the  
15 mouth end.

10. A tobacco smoke filter according to claim 9, and including a relatively stiff outer sleeve around and encasing the plug, said sleeve terminating at the mouth end of the plug and leaving a clearance between the outer periphery  
20 of the mouth of the plug and the inner surface of the sleeve to define said outlet end of the airflow duct, said sleeve including a plurality of ventilation perforations therearound overlying the deeper side of said groove so as to be in communication with the single airflow duct defined by said  
25 groove.

11. A tobacco smoke filter for smoking articles, substantially as hereinbefore described with reference to and as illustrated in, Figures 1 and 2, or Figure 3 or Figure 4 of the accompanying drawings.



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12. A smoking article including a tobacco smoke filter according to any one of the preceding claims.

13. A smoking article according to claim 12, when appendant to claim 10, wherein said sleeve overlies  
5 the whole of said filter plug and at least part of the tobacco rod of said smoking article.

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