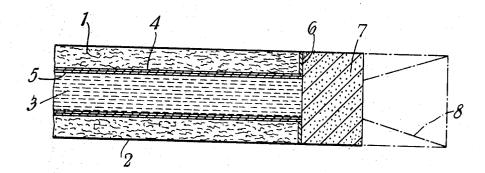
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SMOKING ARTICLES

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3,614,956 **SMOKING ARTICLES**

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ABSTRACT OF THE DISCLOSURE

The invention relates to a tobacco-smoking article in which the tobacco is contained in an elongated annular region and an axial core comprising an absorbent capable of selectively absorbing aromatic polycyclic hydrocarbons, for example activated charcoal or basic alumina, ammonium nitrate or oxides of transition metals, is arranged so that the smoke from the combustion of the tobacco is drawn through the said core by the smoker.

This invention concerns improvements relating to to- 25 bacco smoking articles, for example of the nature of cigarettes, and has for one of its objects to provide means for modifying the characteristics of tobacco smoke.

Tobacco smoke consists of a particulate phase which comprises largely the less volatile constitutents of the 30 smoke in solid or liquid form, and a vapour phase which comprises the more volatile constituents as vapours or gases mixed with the so-called permanent gases.

Various means are available to remove a proportion of the vapour phase of tobacco smoke, or to remove specific 35 substances therefrom. For removing the less volatile particulate phase, use is commonly made of mechanical means whereby the aerosol particles are deposited upon a barrier surface. While such means are effective in removing a proportion of the particulate phase, they are ineffective or 40 only partially effective in removing specific substances or groups of substances which it may be desirable to remove, such as, for example, aromatic polycyclic hydrocarbons.

An object of this invention is to provide a smoking article in which means are included to remove a substantial proportion of the aromatic polycyclic hydrocarbons from the smoke produced on combustion of the tobacco.

According to the invention, a tobacco smoking article comprises tobacco contained in an elongated annular region and an axial core which is made of an absorbent 50 capable of selectively absorbing aromatic polycyclic hydrocarbons and is arranged so that the smoke from the combustion of the tobacco is drawn through the said core. The absorbent core may be formed into a self-sustaining rod or may be totally enclosed in a highly porous frangible tube. The rod or tube may be wrapped in a layer of relatively smoke-impervious paper before being arranged axially of a smoking article of the conventional dimensions of, say, a cigarette. If desired, the smoking article may also be fitted with a filtering or other mouthpiece. 60 Preferably, an impervious barrier of non-combustible material is arranged close to the mouth end of the smoking article to ensure that the smoke passes through the axial core and also to arrest the combustion of the tobacco at a pre-determined point. The absorbent material forming the axial core may comprise a support material, for example a calcined earth such as one of those available for use in gas chromatography columns under the trade name "Celite" or "Chromosorb," which incorporates, 70 as by admixture or impregnation, a substantial proportion of a substance which can selectively absorb aromatic poly-

cyclic hydrocarbons such as, for instance, activated charcoal or an activated basic alumina, ammonium nitrate or oxides of transition metals. The proportion of the selective absorbent added may be between 5 and 50% calculated on the weight of the support material, but preferably between 10 and 40% by weight is applied.

An embodiment of the invention by way of example will now be described with reference to the accompanying drawing which is a diagrammatic axial section through 10 Claims 10 a cigarette.

Tobacco is accommodated in an angular region 1 between an outer wrapping 2 of conventional cigarette paper and an absorbent core 3 from which it is separated by a sleeve of relatively smoke-impervious paper 4. Particularly if the core is not self supporting, it may be surrounded, as shown, by a sleeve or tube 5 of very frangible, porous, material, for instance a ceramic material. However, one or other of the sleeves 4 and 5 may be dispensed with. The end of the annular zone towards the mouthpiece is closed by an annular member of smoke-impervious, non-combustible, material, as illustrated an annular disc 6 of thin aluminum foil, the opening in the disc being coincident with the end of the sleeve or sleeves. The cigarette is terminated by a filter plug 7 filling the whole cross section of the wrapping 2.

Such a cigarette, without the sleeve 5, can be produced by packing the material of the core 3, in the form of a stiff paste, into a tube 4 of paper, the filled tube being then utilised as axial core around which the tobacco is brought to cigarette form within the paper wrapping 2. The disc 6 is secured between the wrapping 2 and the core, using a rubber-based adhesive.

The filter 7 may be made of a filter paper or of a fibrous material such as cellulose acetate. If desired, a mouthpiece may be provided beyond the filter 7, for example and as illustrated by chain lines a flaring mouthpiece 8 made of a plastic material. The end of the core 3 remote from the mouthpiece could, if required, be blanked off by a small metal disc.

In a modification of the cigarette illustrated, the disc 6 is replaced by an annular plug of, for instance, paper impregnated with sodium silicate solution and dried. A plug of filter material is accommodated within an extension of the sleeve or sleeves 4, 5 into the said annular plug. In this case, the absorbent material may be moulded while moist into rod form and wrapped with the filter plug in a paper sleeve similar to the sleeve 4. A tobacco rod is formed around a hollow cylindrical mandrel of substantially the same diameter as the wrapped core. The tobacco rod and annular plug are enclosed in the paper wrapping 2. Finally, the core is inserted into the hollow mandrel and the latter is removed from the tobacco.

Preferably the resistance to air-flow of the core 3 is substantially greater than that of the tobacco in the region 1 surrounding it and suitably about five times greater. Thus a convenient resistance in practice is 3 cm. water gauge and 20 cm. water gauge respectively for the tobacco section and the core, both measured at 1050 cc. per minute air-flow.

With such arrangements, at least a major proportion of the air entering the cigarette will pass initially into the annular region 1 and only a minor proportion into the core 3. Since the end of the annular region 1 towards the mouth is closed or substantially closed to the smoke from the combustion of the tobacco, this smoke will be constrained, while still hot enough to be almost wholly in the vapour phase, to pass through the axial core, where the aromatic polycyclic hydrocarbons are absorbed. Hence the general effect of the axial core is that of a built-in filter with the ability to remove aromatic polycyclic hydrocarbons selectively.

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Several examples employing different core materials will now be described:

EXAMPLE I

A tube 4 of conventional cigarette wrapping paper of 3 mm. diameter and 70 mm. length was produced, using a mandrel, as described with reference to FIG. 1. Amounts of "Celite," a calcined absorptive earth supplied by the Johns-Manville Products Corporation, and activated charcoal both of 30-44 BSS mesh size were mixed in proportions of 90 and 10% respectively by weight. The mixture, formed into a stiff paste by the addition of 20% of glycerol, calculated on the weight of the "Celite" employed, was filled into the tube 4, which was used as the core 3 of a cigarette of 8.5 mm. diameter and 70 mm. 15 length prepared from a conventional tobacco blend.

EXAMPLE II

The procedure of Example I was repeated, but using, for the core, "Celite" of mesh size 30-44 BSS previously sprayed with an aqueous solution of ammonium nitrate to give, after drying, a 5% increase in weight.

EXAMPLE III

The procedure of Example I was repeated, but using, for the core, "Hopcalite," an absorptive mixture consisting largely of the oxides of transition metals and supplied by Hopkin and Williams Ltd., of mesh size 30-44 BSS.

EXAMPLE IV

The procedure of Example I was repeated, but using, for the core, a mixture of 75% by weight of "Celite" and 25% by weight of an activated basic alumina, both of mesh size 30-44 BSS.

The cigarettes so produced were attached to filters, of the paper known as "Myria," of 15 mm. length and were smoked in comparison with cigarettes provided with similar filters and containing the same weight of tobacco, but without the axial core. The smoking was performed with a smoking engine which provided one puff per minute of 2 seconds' duration and 35 ml. volume. The contents of undesirable aromatic polycyclic hydrocarbons in the smoke so produced were determined using gas/liquid chromatography together with an electron capture detector.

The results obtained were as follows:

Cigarette: Aromat	tic 1	50
Control	3.0	00
Example I	2.4	
Example II	2.2	
Example III	2.0	
Example IV	2.0	55
¹ Polycyclic hydrocarbons micrograms/100 cigarettes.		

As is evident, an appreciable diminution in the amount of aromatic polycyclic hydrocarbons in the smoke from the test cigarette can be achieved.

If desired, a small proportion of an alkaline salt, such 60 as sodium carbonate, may be added to the core material to effect further modification of the smoke characteristics. The addition is preferably between 3 and 8%, for example 5%, calculated on the weight of the support material.

I claim:

1. A tobacco smoking article in which the smoke is

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adapted to be filtered over substantially the entire unsmoked length thereof which comprises:

- (a) a tubular outer wrapper;
- (b) a cylindrical cigarette body having a mouthpiece end and an ignition end and divided into an annular outer portion made of tobacco smoking material and a central cylindrical core portion made of a tobacco smoke filter material other than tobacco with both portions extending for substantially the entire length of the cigarette body;
- (c) an annular smoke impervious barrier extending over the end of the annular tobacco smoking material portion at the mouthpiece end of the cigarette; and
- (d) a tubular heat destructible smoke impervious barrier positioned between the inner surface of the annular tobacco smoking material portion and the cylindrical filter material core portion whereby when the tobacco smoking material is ignited at the ignition end and is smoked from the mouthpiece end a major portion of the tobacco smoke will be drawn through the filter material to the mouthpiece end of the cigarette for the entire unsmoked length of the cigarette.
- 2. An article as claimed in claim 1, wherein the ab-25 sorbent core is formed as a self sustaining rod.
 - 3. An article as claimed in claim 1, wherein the absorbent core is enclosed in a porous frangible tube.
 - 4. An article as claimed in claim 1, wherein the core is wrapped in a paper sleeve.
 - 5. An article as claimed in claim 1 and fitted with a filtering mouthpiece, communicating with the core, through which the smoke is drawn.
 - 6. An article as claimed in claim 1, wherein the annular region is closed towards the mouth end of the article by a barrier of smoke-impervious non-combustible material.
 - 7. An article as claimed in claim 1, wherein the core comprises a support material as well as a substance which can selectively absorb aromatic polycyclic hydrocarbons.
 - 8. An article as claimed in claim 1, wherein the said absorbent is selected from the group consisting of activated charcoal, diatomaceous earth and activated basic alumina.
 - 9. An article as claimed in claim 1, wherein the said absorbent is ammonium nitrate.
 - 10. An article as claimed in claim 1, wherein the absorbent comprises oxides of transition metals.

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