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FILTERS AND FILTER MATERIAL FOR USE IN FILTERING TOBACCO SMOKE

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10 Claims. (Cl. 131—10)

This invention relates to filter material for use in filtering tobacco smoke and to filters incorporating this material.

There has recently been considerable research in various countries concerning the effects of tobacco smoke on the human lungs and other vital organs and it has been demonstrated that tobacco smoke has a tendency to produce lung cancer and may also have a bad effect on the heart and other organs.

The alleged carcinogenic substances in tobacco smoke include certain aromatic hydrocarbons comprising dibenzanthracene II and benzyrene, nicotine and other compounds. It is desirable to remove these carcinogenic substances from the smoke as far as possible while allowing non-toxic constituents of the smoke to pass to the smoker. Various filters having a purely mechanical action have been proposed but since some at least of the carcinogenic substances are gaseous in tobacco smoke these filters do not provide effective protection for the smoker. The object of the invention is to provide filter material capable of absorbing substantial proportions of the carcinogenic substances.

The filter material in accordance with the invention comprises cellulosic material to effect mechanical filtering of the smoke in combination with carbon in porous or finely divided form and of at least 96% purity, and preferably of at least 99% purity, the carbon being obtained by a wet process from lignin produced in the manufacture of paper by the soda process and heated with concentrated sulphuric acid at a temperature of over 220° C. e. g. for five to six hours, the carbon being treated subsequently with steam.

The treatment to which the carbon is subjected in accordance with the present invention differs in only limited respects from that described in applicant's copending application, Serial No. 232,162, filed June 18, 1951, now abandoned, and reference may be had to that specification for a more complete understanding thereof. Essentially, it is suggested there that the residual liquor obtained in the manufacture of paper pulp according to the well known caustic soda process, which liquor contains lignin as its principal solid constituent, is concentrated by evaporation of water to a thick paste and the paste is treated with a weak acid, such as sulphuric or hydrochloric acid of 16°–22° Bé., in large enough quantities to precipitate the lignin. The lignin is separated by decantation, filtered and dried at a temperature not exceeding 90° C. After drying, it is treated with turpentine or alcohol at a temperature of about 60° C. in order to extract the resins and various other impurities therefrom. The purified lignin is treated with a mixture of three parts by volume of sulphuric acid and one part of hydrochloric acid at an elevated temperature below 100° C. and thereafter with concentrated sulphuric acid, of at least 62° Bé. at a substantially higher temperature, which according to the present invention is 220° C. rather than 200° C. as specified in the prior application. The carbon

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formed by the action of the acid on the lignin is treated with hydrochloric acid at normal temperature, washed with distilled water, and dried at normal temperature.

It is desirable in some applications of the filter material that the carbon should possess sufficient strength to retain a porous structure.

It is advisable to wash the carbon with an alkaline solution before treating it with steam.

The proportions of the various carcinogenic substances in tobacco smoke vary with different kinds of tobacco and for each tobacco the most suitable kind, and amount, of cellulosic material should be chosen. In general the cellulose should be chiefly alpha cellulose with a lessers amount of beta cellulose.

The filter material according to the invention can be incorporated in filters in various ways. The carbon, in finely divided form, may be intimately associated with cellulose wool or paper, or with tobacco itself, or the cellulosic material may take the form of a pair of plugs of cellulose wool or paper one at either end of a tubular support between which plugs the carbon is situated.

Filters in accordance with the invention can be provided on individual cigarettes or cigars as "tips," or they may be provided in cigar- or cigarette-holders or in tobacco pipes. In the latter case the filters may be in the form of "throw-away" filter elements: the cigar- or cigarette-holders may also be of "throw-away" paper type. Filters provided in individual cigarettes or cigars should be of a length sufficient to absorb all or most of the carcinogenic substances produced on burning the cigarette or cigar.

I claim:

1. Filter material for use in filtering tobacco smoke comprising cellulosic material to effect mechanical filtering of the smoke, and carbon in combination therewith, in a form penetrable by smoke and of at least 96% purity, the carbon being obtained by a wet process from lignin produced in the manufacture of paper by the soda process and heated with concentrated sulphuric acid at a temperature of over 220° C. the carbon being treated subsequently with steam.

2. Filter material as claimed in claim 1, wherein the carbon is of at least 99% purity.

3. Filter material as claimed in claim 1, wherein the carbon is intimately associated with cellulose wool.

4. Filter material as claimed in claim 1, wherein the carbon is intimately associated with paper.

5. Filter material as claimed in claim 1, wherein the cellulosic material is tobacco and the carbon is intimately associated therewith.

6. Filter material as claimed in claim 1, wherein in production of said carbon, the lignin is heated for five to six hours.

7. A cigarette having a filter tip comprising cellulosic material to effect mechanical filtering of the smoke, and carbon in finely divided form, the carbon being intimately associated with the cellulosic material and being obtained by a wet process from lignin produced in the manufacture of paper by the soda process and heated with concentrated sulphuric acid at a temperature of over 220° C. the carbon being treated subsequently with steam.

8. For a tobacco-smoking device including a tube for smoke from the tobacco and means for removably locating a filter in the path of smoke passing through said tube, a throw-away filter comprising cellulosic material to effect mechanical filtering of the smoke, and carbon in combination therewith, in a form penetrable by smoke and of at least 96% purity, the carbon being obtained by a wet process from lignin produced in the manufacture of paper by the soda process and heated with concen-

trated sulphuric acid at a temperature of over 220° C. the carbon being treated subsequently with steam.

9. A throw-away filter as claimed in claim 8, wherein the carbon is intimately associated with the cellulosic material.

10. A throw-away filter as claimed in claim 8, including a tubular support and a pair of spaced plugs of cellulosic material located within the support one at either end thereof, said carbon being situated between said plugs and retained in position thereby.

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