Feb. 13, 1968 S. Z. AVEDIKIAN 3,368,566

FILTER CIGARETTE

Filed June 17, 1964

FIG. 1.

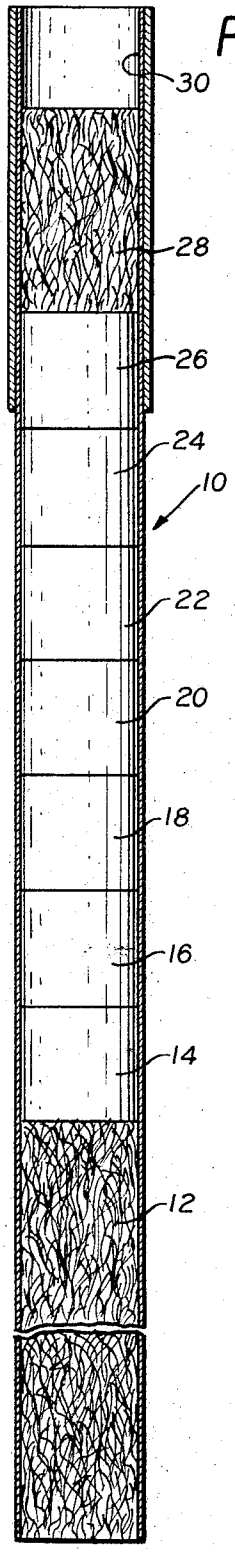
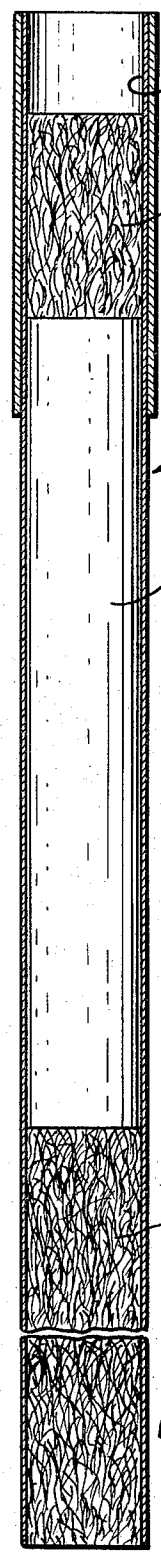


FIG. 2.



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FILTER CIGARETTE

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ABSTRACT OF THE DISCLOSURE

The invention relates to a cigarette having a burnable charge of relatively inexpensive material, a composite filter having mechanical filtering means for removing particulate material and chemical reacting materials for removing some noxious gases from the gas stream and a terminal charge of relatively high quality tobacco at the mouth end of the cigarette for providing a tobacco flavor to the exiting gas stream.

This invention relates to cigarettes and more especially to filter cigarettes.

Although filter cigarettes have come into widespread use by those who want to enjoy the pleasure of smoking without incurring the health hazard, it is doubtful whether any of the currently available filter cigarettes actually eliminate the health hazard. It has been established that the extensive smoking of cigarettes is apparently a cause of certain ailments, but there is doubt as to what product or products of combustion of the cigarette are primarily injurious. Presently used filters remove so little of the products of combustion that they may be completely useless.

It is an object of this invention to remove practically all of the particulate matter and a very substantial amount of the other products of combustion of the cigarette. Thus much of the toxic, irritating and noxious components produced by the combustion of the cigarette are removed by the filter before they enter the mouth of the smoker. These components include nicotine, acrolein, phenolic compounds, tars, organic acids, such as acetic acid, alcohols, ketones, esters and other hydrocarbons. It is believed that the removal of these components results in a safer cigarette. The pressure drop through the cigarette need not be significantly higher than that obtained with conventional filter cigarettes.

Another object is to provide a cigarette of the character indicated, with tobacco behind the filter for reconstituting the flavor, but this requires only a small amount of tobacco which does not burn and which is used to provide the aroma and taste that adds to the enjoyment of smoking for those who like to smoke.

Among the economic advantages of this invention are that the tobacco which is to be burned may be a grade which is low in cost since the "taste" of the burning tobacco is filtered out. Only a small amount of reconstituting tobacco behind the filter need be tobacco of high quality to provide a desirable taste and aroma carried by the nitrogen stream which the smoker draws into his mouth.

The invention can be made with several short filters in series or with a single longer filter constituting the different ingredients required for accomplishing the new results of this invention.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIGURE 1 is a diagrammatic sectional view of a cigarette made in accordance with this invention and having a series of short filters; and

FIGURE 2 is a view similar to FIGURE 1 but showing

a modified form of the invention in which a single filter replaces the plurality of filters shown in FIGURE 1.

The cigarette shown in FIGURE 1 includes a cover **10**, which is conventionally made of paper and a quantity of tobacco **12** packed in the front end of the cover in accordance with conventional practice. The tobacco **12** may be a blend, and may be made up partly or wholly of some of the tobacco substitutes which have been suggested and which for purposes of this invention are to be considered equivalent of tobacco.

Beyond the tobacco mass **12** there are a plurality of short filters **14, 16, 18, 20, 22, 24** and **26**. The cigarette will be described as having these filters, each of which performs a separate function, since this will describe the principle of the invention more clearly; but in actual practice some or all of these plural filters are ordinarily combined so that the number of filters is actually reduced. The first filter **14** is for the purpose of removing the solids that are present in the tobacco smoke, such as colloidal nicotine which is present as an aerosol suspension; carbon; and higher hydrocarbons (tars). This first filter **14** is a fine mesh web capable of mechanically removing small solid particles from the smoke.

The filter **14** may be made of a carded web, oriented, 180–200 grains per square yard, viscose fiber, 1.5 denier, ¾ to 2″ long. Or it may be a carded web, oriented, 150–450 grains per square yard, viscose fiber, 1.5 denier to 3.0 denier, ½ to 2″ long. Such a filter made with fibers of nylon, polyesters such as Dacron, polyethylene, polypropylene, vinyon, acrylic such as Acrilan, Orlon or Creslan, or blends of any of these, is highly satisfactory. These fibers may also be used to make the web referred to below as a Rando-webber web.

Web made on a Rando-webber where the web is randomly formed with the fibers blown in an airstream and deposited in a random fashion on a rotating screen, is doffed off the screen onto a conveyor. The Rando-webber web may have a composition as follows:

Vinyon, ⅛″ fiber length, 1.5 denier 10–40%
Viscose, ¼″ fiber length, 1.5 and 3.0 denier 60–40%
Glass .5 to .75 micron diameter ⅛ to ⅜″ fiber length, 30–20%.

The second filter **16** removes condensible substances. This filter **16** contains activated carbon to which may be added, if desired, a quantity of silica gel. This filter condenses condensible gases which are then absorbed by the activated carbon. Silica gel condenses water vapor and the water absorbs water soluble gases.

The third filter **18** is impregnated with alkali-reacting materials (such as sodium carbonate, soda lime, sodium phosphate and borax). Soda lime is a mixture of sodium hydroxide and calcium oxide reacted together to form pellets that are rather hard and have definite and well formed physical structures. The alkaline reacting substances remove acetic acid, formic acid and acidic phenolic compounds.

The fourth filter **20** contains catalytic oxides for converting any carbon monoxide to carbon dioxide. The catalytic materials comprise manganese dioxide, chromium trioxide, and other oxides of chromium and copper oxide.

The fifth filter **22** contains acidic acting substances for combining with alkaline noxious substances such as vaporized nicotine and other organic amines. The filter **22** may contain as the acidic reacting substances sodium bisulfate, and/or sodium acid phosphate, citric acid, and sodium acid tartrate.

The sixth filter **24** can be used with alkaline reacting substances like the filter **18** for the purpose of removing carbon dioxide which has been formed by converting the carbon monoxide in the fourth filter **20**. Since carbon

dioxide is known to be a harmless product in small quantities, this filter **24** and its function can be omitted, if desired.

The seventh filter **26** is a clear fine mesh filter like the first filter **14**, and beyond this last filter **26** there is a short length of reconstituted tobacco **28** for reconstituting the taste, aroma and fragrance of the cigarette. This fine grade tobacco, in the gas stream, may be recessed from the back end of the cigarette, if desired. This recess is indicated by the reference character **30** in FIGURE 1.

FIGURE 2 shows a construction in which a filter **34** replaces the plural filters of FIGURE 1. The various active ingredients are applied to the filter web, either as a mixture or with some of them put on the web locally to maintain some sequential resemblance as with the plural filters of FIGURE 1.

The amount of each product of combustion that is generated by the burning of the tobacco can be computed and the amount of active substances in the filter to prevent these products from passing through the filter zone can be determined from the known products to be absorbed. Some factor of safety should, of course, be allowed.

The preferred embodiment of the invention has been illustrated and described, but changes and modifications can be made, and some features can be used in different combinations without departing from the invention as defined in the claim.

What is claimed is:

1. A filter cigarette structure designed to produce a flavored warm gas stream with an almost negligible amount of particulate matter at the mouth end thereof during smoking comprising a combustible charge of relatively low quality smokable material, a composite filter element constituting a fine mesh particulate matter remover selected from the groups consisting of viscose and synthetic fibers, a serially arranged group of chemical reacting agents comprising an activated carbon charge, an impregnation of an alkali material selected from the group consisting of sodium carbonate, soda lime, sodium phosphate and borax for the removal of much of the acetic acid, formic acid and acidic phenolic compounds, a catalytic oxide selected from the group consisting of manganese dioxide, chromium trioxide, and copper oxide for converting carbon monoxide to carbon dioxide, an acidic acting charge selected from the group consisting of sodium bisulfate, sodium acid phosphate, citric acid and sodium acid tartrate, a final fine mesh filter at the downstream end of the said serially arranged group and a terminal charge of higher quality tobacco designed to reintroduce flavor in the filtered gas stream, the final flavor being to a large extent independent of the exact composition of the combustible charge.

References Cited

UNITED STATES PATENTS

2,181,614	11/1939	Streifling	131—10
2,881,770	4/1959	Touey	131—208

FOREIGN PATENTS

406,401	3/1934	Great Britain.
1,101,759	4/1955	France.
753,203	7/1956	Great Britain.
757,841	9/1956	Great Britain.
760,772	11/1956	Great Britain.
316,144	11/1956	Switzerland.
1,152,836	9/1957	France.
1,244,397	9/1960	France.

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