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CIGARETTE CONSTRUCTION

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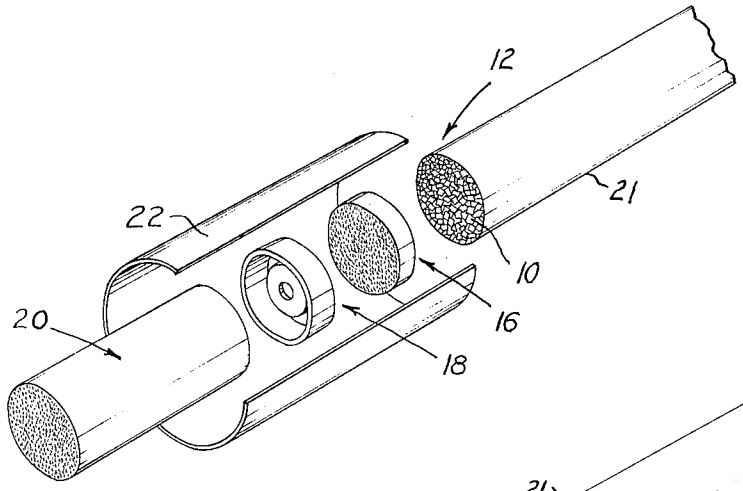


Fig. 1.

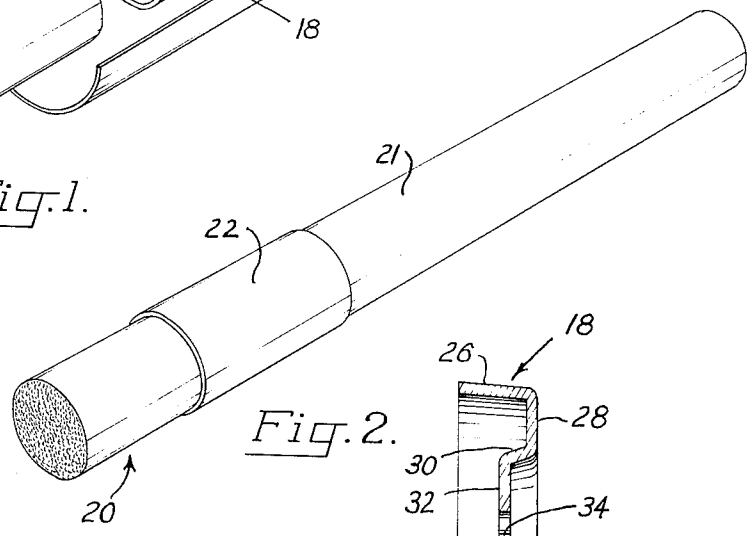


Fig. 2.

Fig. 3.

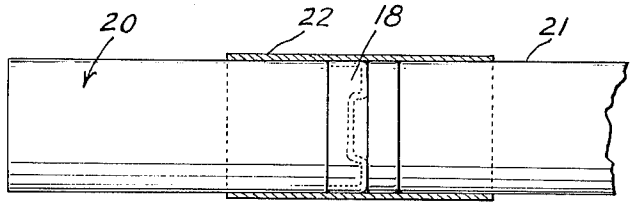


Fig. 4.

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CIGARETTE CONSTRUCTION

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2 Claims. (Cl. 131—10)

This application is a continuation-in-part of an earlier application, entitled Smoke Filtering Device, Serial No. 176,359, filed February 28, 1962, now abandoned.

This invention relates to a construction for cigarettes, and more particularly to novel means to be incorporated with filtering agencies in cigarettes for better removing tars and other harmful substances in cigarette smoke.

There has been a considerable amount of evidence accumulated that cigarette smoking, if done excessively, may be injurious to one's health. In an effort to minimize any harmful effects to be derived from smoking, considerable efforts have been directed toward developing improved filtering devices and means for the purpose of removing more efficiently and completely tars, resin and other materials from cigarette smoke. Preferably, any device contemplated for inclusion with a cigarette should not only perform its removal function effectively, but also should meet other criteria, in order to be a successful device as a practical matter. Thus, any tar removal device should not be of the type as to affect noticeably the draw in a cigarette. With popular brands, the cost of the device should not be excessive. To facilitate cigarette manufacture, any agency used for filtration should be easily and conveniently assembled in the cigarette with the final product meeting factory specifications.

In general terms, this invention contemplates novel means in a cigarette for treating smoke, which utilizes a pair of filter sections separated by smoke impeding means, where substantial tar removal is performed at different points in the filtering means including in the filter section upstream from the smoke impeding means, all without noticeably affecting the draw of the cigarette.

More specifically, an object is to provide cigarette smoke filtering means, featuring a pair of filter sections and between these sections a pair of chambers on opposite sides of a wall, said wall including a smoke accelerating orifice where smoke passes at high velocity. The chamber upstream from the wall has a cross-sectional area (in a cross-sectional view of the chamber taken perpendicularly of the axis of the cigarette) which is substantially less than the cross-sectional area of the cigarette (in a cross-sectional view taken perpendicularly to the axis of the cigarette). This chamber communicates with a portion only of the filter section upstream from the chamber, and it has been noted that accelerated smoke flow through this filter section, and significant depositing of tar and other matter takes place in this filter section as a result. The chamber downstream from the wall has a substantially larger size, and functions to contain smoke while cooling takes place, prior to such smoke traveling through the other filter section to the end of the cigarette.

In a preferred and featured form of the invention, the smoke flow impeding means comprises a cylindrically shaped insert or disc, of relatively short length, constructed so that the various chambers mentioned are provided between the ends thereof. In manufacturing a completed cigarette, this element is placed between two filter sections of conventional structure, and a suitable wrapping applied around the filter sections, insert, and tobacco supply, to produce the cigarette.

The foregoing and various other objects, features and advantages will become more fully apparent as the following description is read in conjunction with the accompanying drawings, wherein:

FIG. 1 is an exploded perspective view of a cigarette constructed according to a preferred embodiment of the invention;

FIG. 2 is a perspective view of a completed cigarette which has been constructed using the various elements illustrated in FIG. 1;

FIG. 3 is a sectional view, on a somewhat enlarged scale, of a disc or insert used in the manufacture of a cigarette and placed between first and second filter sections in the cigarette; and

FIG. 4 is a cross-sectional view taken through the axis of a completed cigarette.

Referring now to the drawings, an elongated, substantially cylindrical supply of tobacco such as is found in the usual cigarette is indicated at **10**. This elongated supply terminates in ends referred to herein as lightable and downstream ends, respectively. Such downstream end is indicated in FIG. 1 at **12**.

To produce filtering of the smoke and removal of tars, there is provided adjacent the downstream end of the tobacco supply a substantially cylindrical first filter section, shown at **16**, which is abutted against the downstream end of the tobacco supply. Axially aligned with this filter section, and abutted thereagainst, is a disc or insert, also referred to herein as a smoke flow impeding means, designated at **18**. Abutted against this disc or insert, and axially aligned therewith, is a second substantially cylindrical filter section **20**.

The filtering material selected for the first and second filter sections may be conventional. Thus it may comprise cotton, light or heavy absorbent tissue paper, fibrous, or cellulosic material, or any of the other filtering materials commonly used for smoke cleansing purposes. As is conventional with filters made from such materials, between the various fibrous components in the filter are small passages generally extending axially through the filter in a path. These passages accommodate the flow of smoke, with some depositing of tars and resins occurring on the material in the filter as smoke travels therethrough.

In FIG. 1 a combustible wrapper **22** of paper encloses the tobacco supply **10**. Also part of the wrapper means in the cigarette and uniting the various parts is a wrap-around sleeve **22**, overlapping the downstream end of the tobacco supply, and enclosing the first filter section and insert or disc. This sleeve also overlaps the forward end of the second filter section in the completed assembly. The wrapper may be adhesively secured in place.

We have discovered after conducting numerous tests that most effective removal of tars and other materials results if the insert is included between the filter sections, and this insert has the specific features to be described. With the insert present, the flow of smoke is accelerated in a region of the cigarette whereby tar deposit takes place on the forward end of the second or rearward filter section. The insert also accelerates smoke flow through the first or forward filter section, whereby surprisingly substantial tar and other material removal takes place in a region in advance of the disc (or toward the lighted end of the cigarette). The effectiveness of the disc or insert readily becomes apparent on viewing coloration taking place in filter sections placed in advance of the disc, and comparing the coloration when different types of discs are utilized.

Specifically describing the disc or insert illustrated, the element may comprise, as one integral piece, a substantially cylindrical outer skirt **26** which fits snugly within the wrapper means of the cigarette, and an annular web (shown at **28**) having an outer margin joined to one end (the upstream end) of outer skirt **26**. In the completed

cigarette this web is mounted flush against the downstream end of the tobacco supply. Further describing the insert, joined at one end to inner margins of this annular web is an inner annular skirt 30 having a diameter which is substantially less than the diameter of skirt 26. Joined to the opposite end of this inner annular skirt is a wall 32 occupying a plane normal to or extending transversely of the cigarette, having a substantially circular outline. Extending in an axial direction, substantially centrally of and through this wall, is a smoke accelerating orifice, designated at 34.

Orifice 34 accelerates the flow of smoke, whereby smoke is directed at high velocity against the upstream end of the second filter section. This has the effect of causing the deposit of tars and other residues against the end of the second filter section.

Outer cylindrical skirt 26 forms a chamber 36 facing the second or rear filter section having a cross-sectional area (in a cross-sectional view of the chamber taken perpendicularly of the axis of the cigarette) which is substantially the cross-sectional area of the tobacco supply (in a cross-sectional view taken perpendicularly to the axis of the cigarette). This chamber by being relatively large exposes substantially all of the forward end of the rear filter section, and thus a maximum expanse over which tar deposit may occur. The large size of the chamber also promotes maximum cooling of the smoke. It is of special importance in this regard to note that annular web 23 which bounds a portion of chamber 32 is flush against the rear of the forward or first filter section. This has the effect of preventing any significant passage of smoke through peripheral portions of the forward filter. As a consequence, there is minimum heating of these portions of the filter section, and the wall lying thereagainst remains at a low temperature.

Annular skirt 30 and wall 32 form upstream of aperture 34 a second chamber designated at 38. This chamber has substantially smaller size than chamber 36. The chamber communicates with the orifice, and functions to direct smoke to the orifice whereby it may pass on through.

It is important that chamber 38 have an area viewing a cross section of the cigarette within limits to be described, if proper removal of tar and other materials is to result. This determination of size has been made from the results of tests relating to ease of draw, and to coloration in the first or forward filter section after an interval of smoking.

In order that the draw of the cigarette be acceptable, the chamber must have an area such that the portion of the end of the forward filter section exposed to the chamber have passages extending through it that have a combined cross-sectional area at least equal to the cross-sectional area of orifice 34. Otherwise the forward filter section would be introducing a restriction to flow greater than the restriction offered by the orifice. As a practical matter, a somewhat larger portion of the end of the forward filter section should be exposed, as clogging may tend to occur making it difficult to draw on the cigarette. As a practical matter, it has been noted that the area of this chamber viewing a cross section of the cigarette should be at least about four times the cross-sectional area of orifice 34, if good smoking properties are to be retained throughout smoking of the entire cigarette.

With smoke pulled through only a portion of the forward filter section, because of the usual passages in the filter section, there is an acceleration in the flow of smoke which apparently enhances the deposit of tar and other substances on the material in the filter. With the usual filters, if chamber 38 is proportioned so that its area in a cross section of the cigarette is not more than one-half the cross-sectional area of the tobacco supply, significant and decided darkening of the forward filter section in that part which is exposed to the chamber is noted after the smoking of a cigarette. This is indicative of removal of tars, etc. in a region in advance of the insert or disc.

If this area is exceeded, an entire cigarette can be smoked without any significant coloration of the forward filter section.

By way of example, and explaining a typical cigarette construction, a disc-shaped insert of the type described has been manufactured from material of about 0.20 inch gauge. With a cigarette tobacco supply about 5/16" in diameter, and having an approximate cross-sectional area of .076 square inch, an area in chamber 38 of .027 square inch has produced fine results both with respect to draw and tar removal in the forward filter section. Such chamber has been utilized in conjunction with a smoke accelerating orifice of .020 to .040 inch diameter. Chamber 36 on the downstream side of wall 42 may have a cross-sectional area which is equal to the cross-sectional area of the tobacco supply minus the small area taken up by skirt 26. Wall 32 is usually placed about midway between the ends of skirt 26, and skirt 26 may have a total length of about 1/8 inch.

The disc or insert is easily assembled with the filter sections and tobacco supply to produce a completed cigarette. The element preferably is one piece, so that all parts therein have a fixed relationship with respect to each other which is not changeable inadvertently during cigarette manufacture. The disc is readily placed in axial alignment with the filter sections and tobacco supply.

While an embodiment of the invention has been described, it is recognized that various changes and reorganizations are possible. It is intended to cover all modifications of the invention as would be apparent to one skilled in the art, and that come within the scope of the appended claims.

It is claimed and desired to be secured by Letters Patent:

1. In a cigarette having an elongated, substantially cylindrical supply of tobacco terminating in lightable and downstream ends, respectively,

a first filter section abutted against the downstream end of the tobacco supply, smoke flow impeding means downstream from and abutted against said first filter section, a second filter section downstream from and abutted against said smoke flow impeding means, all in substantial axial alignment, and wrapper means uniting the tobacco supply, filter sections, and smoke flow impeding means,

said smoke flow impeding means comprising an insert including, as integral parts thereof, a cylindrical outer skirt snugly mounted within the wrapper means in the cigarette, an annular web flush with the upstream end of the skirt and joined to the skirt abutted against said first filter section and operable to close off a portion of the end of the first filter section, a central wall extending transversely of the cigarette and disposed between the ends of the skirt, a smoke accelerating orifice extending axially in said wall, and an inner annular skirt joining outer margins of said wall and inner margins of said annular web,

said inner annular skirt defining a first chamber upstream of said wall which, in a cross-sectional view of the chamber taken perpendicularly of the axis of the cigarette, covers an area not exceeding about one-half the cross section of the tobacco supply, and no less than about four times the area of said orifice in said wall,

said cylindrical outer skirt defining a chamber of substantially larger size which surrounds the first-mentioned chamber, and which is bounded on the upstream end thereof by said annular web which is abutted against the first filter section to close off a portion of the end thereof.

2. A cigarette comprising

an elongated substantially cylindrical supply of tobacco terminating in lightable and downstream ends, respectively,

substantially cylindrical first and second filter sections

having approximately the diameter of the tobacco supply mounted on the downstream end of the tobacco supply with the first filter section abutted against the tobacco supply, and the second filter section spaced axially from the first filter section,

a smoke flow impeding element mounted between the first and second filter sections, substantially cylindrical in shape, and with an outer diameter substantially that of the tobacco supply, and

wrapper means uniting the tobacco supply, smoke flow impeding element, and filter sections,

said smoke flow impeding element comprising an annular web extending transversely of the cigarette closing off marginal portions of said first filter section on the downstream end thereof, an outer skirt snugly bonded by the wrapper means joined at one end to outer margins of the web, a transverse wall, circular in outline, located between the ends of the outer skirt, and an inner annular skirt joined at one end to inner margins of said annular web and at an opposite end to outer margins of said wall,

said wall having a centrally located axially extending smoke accelerating orifice extending therethrough,

said inner annular skirt in conjunction with the side

of the wall facing the tobacco supply defining a chamber which, in a cross-sectional view of the chamber taken perpendicularly of the axis of the cigarette, covers an area not greater than about one-half the cross section of the tobacco supply, and no less than about four times the area of said orifice,

said cylindrical outer skirt, the side of the annular web facing downstream in the cigarette, and said inner annular skirt forming a second chamber communicating with said orifice and downstream therefrom having a size approximately at least twice the size of said first mentioned chamber.

References Cited by the Examiner

UNITED STATES PATENTS

2,117,492	5/1938	Meyer	131—187
2,185,598	1/1940	Lackow et al.	131—207
2,954,783	10/1960	Lebert	131—201
2,968,305	1/1961	Barnett	131—10

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