

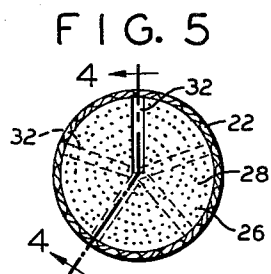
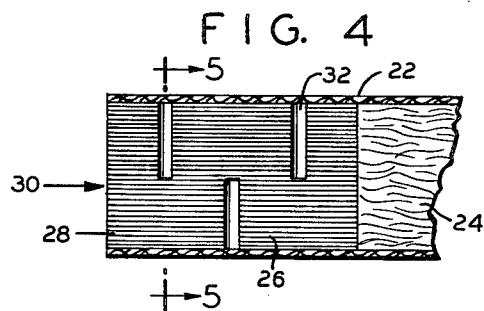
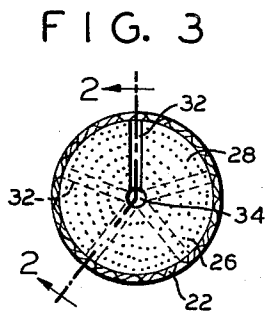
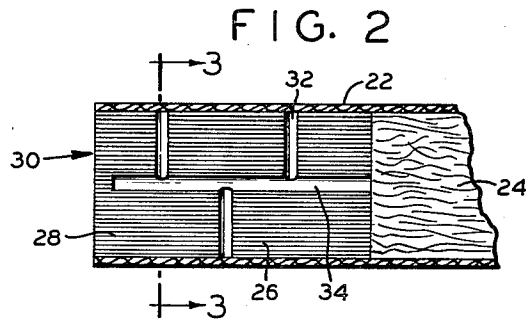
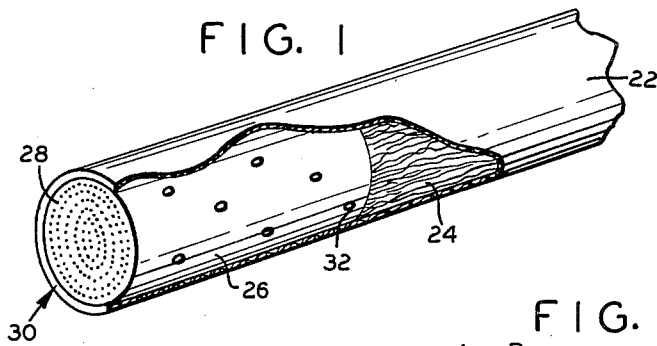
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SMOKE FILTERING DEVICE

Filed Sept. 30, 1958



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SMOKE FILTERING DEVICE

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This invention relates to smoke filtering devices, more particularly to filtering devices incorporated into or used in connection with smoking devices. The invention contemplates filtering devices having spaces or traps transverse to the smoke flow to trap tars, and other deleterious impurities, thus inhibiting harmful effects to the smoker.

Certain compounds, tars for example, formed during the burning of tobacco, especially in cigarettes, have been found to be cancer inducing. These discoveries have vastly increased the development and use of tobacco filters of diverse natures. Of the many types of filters so far devised for cigarettes, few have been successful in accomplishing their intended purpose, since they have not combined the necessary features of low cost, effective filtering, easy drawing, and no adverse effect on the taste of the cigarette. The majority of present filters which are most commercially useful are made from cotton, cellulose, acetate and like materials. Additionally, many present filters consist of parallel materials or fibers fabricated in such a manner that interstices or spaces therein are parallel to the flow of the smoke. The small tubes thus formed, allow tars and other substances to reach the mouth of the smoker principally by capillary action. In order to stop this flow of tars along the filter material and to collect more tars in the filter, the present invention employs traps, generally transverse to such fibers and tubes or passages, which interrupt the flow of said tars and collect them before reaching the mouth of the smoker.

Accordingly, a principal object of this invention is to provide an improved filtering device. Another is to incorporate such a filtering device into a tobacco smoking article thus increasing the smoker's pleasure. A further object of this invention is to prevent harmful effects from smoking. Another object of this invention is to provide a filter which separates from the tobacco smoke more deleterious substances than was heretofore possible. A still further object of this invention is to trap more tars, solids and other impurities in the filter than heretofore possible. Another object of this invention is to eliminate the natural capillary action of the filter to hinder the passage of deleterious substances to the mouth of the smoker. Still another object of this invention is to provide a filter that will use capillary action to trap deleterious substances. A final object of the invention is to provide devices of the above character adapted to facilitate easier drawing when smoking thus increasing the pleasure afforded. Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises an article of manufacture possessing the features, properties, combinations of elements and arrangements of parts as will be exemplified in the article and combinations hereinafter described, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a perspective view, partially in section, of the preferred embodiment of this invention;

FIGURE 2 is a longitudinal sectional view of the structure shown in FIGURE 1;

FIGURE 3 is a lateral sectional view taken along the line 3-3 of FIGURE 2;

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FIGURE 4 is a longitudinal sectional view of another embodiment of this invention; and

FIGURE 5 is a sectional end view taken along the line 5-5 of FIGURE 4.

Similar reference characters refer to similar elements throughout the several views of the drawings.

The filter device of this invention employs a filter material, such as cellulose, acetate, fibers, cotton or the like. Accordingly, the interstices between the fibers of these filter materials form longitudinal passages of microscopic size which principally by capillary action pass tars and other substances from the tobacco end of the filter towards the smoker's mouth. The filter of the present invention, however, has transverse, substantially radially extending holes to form channel-like traps which do not penetrate the wrapper of the filter and which interrupt the flow of tars down the longitudinal interstices of the filter material to collect the tars and other substances in the smoke.

One embodiment of this invention employs a longitudinal passage larger in cross section than the natural longitudinal passages of the filter which is connected with the transverse traps to allow tars and other impurities to collect in the traps. The cross sectional size of the transverse radial traps is such that the capillary pressure developed therein is greater than the capillary pressure developed in the natural longitudinal interstices of the filter thus holding tars and other substances which are trapped by capillary action.

As depicted in FIGURES 1, 2 and 3, the preferred embodiment of this invention comprises an elongated wrapper 22 enclosing the tobacco 24 and porous filter material 26 which contains microscopic longitudinal passages 28 which principally by capillary action allow tars and other substances to proceed toward the outer end of the filter generally indicated at 30. The filter material has transverse radially extending channel-like traps 32 which are closed by the wrapper 22, thus being sealed from the atmosphere. These traps interrupt the flow of tars and other substances along the longitudinal capillary passages 28 and collect them. This embodiment of the invention may employ a longitudinal passage 34 in the filter material 26 which is connected to the transverse radial traps 32 affording the tars and other impurities access to these traps and facilitating the flow of smoke through the filter.

Another embodiment of the invention, as will be seen in FIGURES 4 and 5, comprises an elongated wrapper 22 enclosing tobacco 24, porous filter material 26 and transverse radially extending channel-like traps 32, which are closed by the wrapper 22 and sealed from the atmosphere. This embodiment does not contain a longitudinal passage.

Filters constructed substantially as described have been found to greatly increase the filtering action of the filter material used without materially affecting the taste of the smoke. The construction appears to be selective in retaining the liquid tars and passing the gases of the smoke.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above articles without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. As an article of manufacture, a filter device comprising a body of porous longitudinally oriented filter material adapted to be interposed in a stream of smoke, fumes or vapors for removing impurities therefrom, said body of porous filter material containing a large number of radially-extending cylindrical channel-like traps, each trap being substantially larger in cross section than the natural interstices of said porous filter material and substantially smaller in cross-sectional area than the cross-sectional area of said body, each of said traps occupying only a portion of the cross-sectional area of said body, said traps being disposed substantially transverse to the general direction of smoke flow through said device and extending across the major portion of a radius of said device, whereby they collect and retain impurities in the smoke, such as tars, solids, and the like and a tubular covering member enclosing said body and forming a smoke-conducting conduit directing said stream through said body, said tubular member sealing said channel-like traps from the exterior of said device.

2. As an article of manufacture, an improved cigarette, comprising in combination an elongated wrapper enclosing tobacco therein, a filter device adjacent one end of said cigarette, said filter device having longitudinally extending strands of substantially tobacco free filter material packed to form longitudinal interstitial capillary-like spaces between said strands, means forming radially extending channel-like traps through said filter material, said traps being substantially normal to the longitudinal interstitial capillary spaces between the strands of said filter material, said traps being greatly larger in cross section than the capillary-like spaces of said filter material and substantially less in cross-sectional area than the cross-sectional area of said filter device, each of said traps occupying in section only a portion of the cross-sectional area of said filter, said traps extending over a major portion of the distance from the outer surface of said filter device to the axis of said filter device, and a wrapper around said filter device closing said traps at their outward ends and forming a conduit for smoke through said filter device whereby tars and other impurities are collected in said traps, said traps inhibiting longitudinal movement by capillary action of said tars and impurities to the mouth of a smoker and preventing combustion of said tars and impurities thus collected.

3. The combination defined in claim 2 in which said filter device is provided with means forming a longitudinal passage extending from the end of said filter device adjacent said tobacco over a major part of the length of said filter material and communicating with a plurality of said transverse traps whereby longitudinal capillary flow of tars and other impurities is interrupted by said traps.

4. In a filter device, the combination comprising: a bundle of substantially parallel fibers of filter material closely packed about a central axis, each of said fibers being in intimate contact with the adjoining fibers for a substantial length parallel to said central axis and form-

ing with said adjoining fibers the walls of minute passages, said passages being substantially parallel with said central axis and with said fibers; a large plurality of channels in said bundle, the axis of each of said channels extending in a radial direction away from said central axis and extending over a major portion of the distance from said central axis to the outermost of said filaments, said channels being spaced along and about said central axis and being circumferentially displaced from each other with respect to said central axis, the cross-sectional area of each of said channels being substantially larger than the average cross sectional area of said passages and substantially smaller than the cross-sectional area of said bundle; and a continuous tubular cover closely surrounding said bundle, the axis of said tubular cover being parallel to said central axis, whereby said channels are isolated by said tubular cover from the atmosphere and the tubular cover forms a conduit to constrain the material to be filtered to flow in a direction generally parallel to said central axis.

5. A filter comprising a cylindrical body of filter material having a side surface parallel to the axis of the cylinder and two end surfaces, said body containing a large number of capillary passages through which a stream of gas is to be passed, said passages being substantially parallel to the axis of the cylinder and extending substantially the length of the said axis; a large number of channels distributed in said material and extending radially inwardly from said side surface of said body toward said cylindrical axis, said channels extending over a major portion of the distance from said side surface to said axis, each said channel being substantially less in cross-sectional area than the cross-sectional area of said body normal to said cylindrical axis, each of said channels further being greatly larger in cross-sectional area than said capillary passages and intersecting a large number of said passages; and a cylindrical wrapper around said side surface of said body closing said channels at their outer ends and forming a conduit for gases through said filter device, said channels inhibiting longitudinal movement of liquids along said capillary passages.

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