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FILTER MEANS

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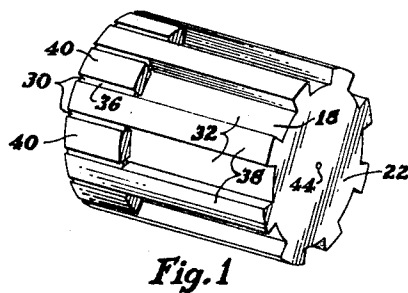


Fig. 1

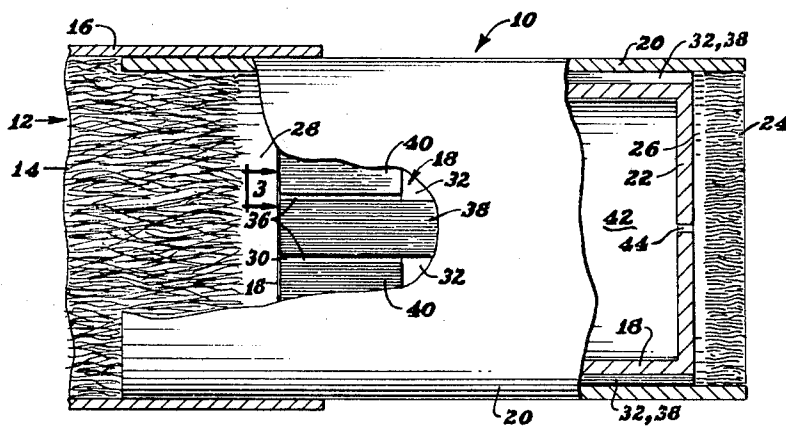


Fig. 2

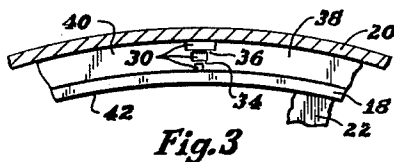


Fig. 3

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FILTER MEANS

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6 Claims

ABSTRACT OF THE DISCLOSURE

A smoke filter having a cylindrical inner body with a hollow but generally restricted axial core, and having restricted smoke passages closely adjacent the outer periphery of the inner body. The smoke passages are formed between radially projecting members of alternating long and short length, the long members extending downstream from the restricted peripheral smoke passages, to form chambers of relatively large cross-sectional area. The passages and the chambers are in longitudinal alignment and communication with each other. The device has an outer body which surrounds the projecting members, the passages and chambers achieving advantages of a wet filter by the advantageous obtaining of condensation of vapors present in the smoke stream.

More particularly, as the inventive concepts are herein illustrated in a filter for a smoking article such as a cigarette, the apparent operational effect is that the temperature-differential existing between the smoke stream and the periphery of the device effects a condensation of vapors, including those of both of water vapor as moisture droplets and also of smoke components.

This condensation, which begins at a relatively early time in the smoking operation, when the unburned tobacco itself may be providing some filtering effect, in turn seems to provide a wet or semi-liquid residue in the downstream channels; and this residue then traps out further components of the smoke, in addition to a continuing condensation of such vapors.

Subsequent portions of the smoke stream, in turn, continue the process of both condensing and serving as residue to trap more vapors, in what might be described as an increasing or cycling effect, with the more that is trapped or condensed serving to provide more bulk of residue effective on subsequent smoke-portions.

The smoke, after passing through the restricted smoke passages, appears to be advantageously flavored by passing along the said residue.

The above description is somewhat introductory and generalized as to the more apparent features of the inventive concepts. Further details as to the inventive concepts are set forth in the following more detailed description of an illustrative embodiment, taken in conjunction with the accompanying somewhat schematic drawings, in which:

FIG. 1 is a pictorial sketch of a main body member of the filter means, with an outer cylindrical member removed;

FIG. 2 is a longitudinal view, in larger scale, of the filter means provided for a cigarette, portions being shown as broken away and in section to illustrate interior details; and

FIG. 3 is a detail view, in considerably larger scale, taken generally as indicated by section-line 3 of FIG. 2.

As shown in the drawings, a filter device 10 is shown in conjunction with a smoking article such as a cigarette 12.

(Other uses come within the inventive concepts, this being illustrative of a practice of the invention according

to the concepts thereof as herein set forth illustratively as for a cigarette filter. The cigarette may generally be of conventional form as shown, including a cylindrical tobacco body 14 and a wrapper 16.)

The filter device 10 shown generally comprises an inner hollow cylindrical body 18, and an outer cylindrical body 20 which extends forwardly (toward the lightable end of the cigarette) of the inner body 18 onto the tobacco 14 and is retained thereon by the wrapper 16.

The outer body 20 also extends rearwardly (toward the smoker's mouth) of the inner body 18, and rearwardly past a transverse wall 22 provided across the rearward end of the inner cylindrical body 18; and a relatively thin filter or baffling means 24 is provided at the extreme rear end of the outer wall 20.

The rear filter element 24, which may be of fibrous type, is shown as slightly spaced rearwardly of the rear wall 22, with a transverse gap 26 therebetween; and the forward end of the inner cylindrical body 18 is shown as slightly spaced rearwardly of the tobacco body 14, with a transverse gap 28 between the tobacco 14 and the inner body 18.

Between the inner cylindrical body 18 and the outer cylindrical body 20, the filter device is provided, adjacent its upstream end, with restricted smoke passages 30 closely adjacent the outer periphery of the device; and downstream of such restricted passages 30, the annular gap between the bodies 18 and 20 provides chambers 32 which collect and trap vapor residue of the smoke stream.

Accordingly, the peripheral restricted smoke passages 30 are shown as provided by circumferentially-directed walls 34 and 36, which in a desired embodiment shown, are on the order of .001 inch thick and which divide the annular gap between the inner body 18 and outer body 20 into three passages each on the order of about .003 inch in radial extent.

The radially-extending walls of the passages 30 are shown as provided by the adjacent walls of axially-directed elements, there being an alternating series of relatively long elements 38 and of relatively short elements 40, the shorter ones 40 being shown disposed at the forward end of the inner body 18, and the longer ones 38 extending the full length of the inner body 18.

The aforementioned walls 34 and 36 are shown as extending axially only as far as do the relatively shorter elements 40; for it is in that axial span that the said restricted peripheral smoke passages 30 are provided.

Downstream of the region of the relatively short elements 40, the region between each set of adjacent ones of the longer elements 38 provides a series of the afore-said chambers 32.

Returning in this description to the smoke passages 30, the radially-extending walls thereof are shown as provided by adjacent walls of the adjacent longer elements 38 and shorter elements 40; and it will be noted that radially projecting outer walls are shown as of increasing circumferential measurement, the dimensions in the illustrative embodiment, circumferentially measured, being about of the order of, respectively, .003, .006, and .012 inch, that is increasing outwardly.

It is thus seen that the restricted smoke passages 30 are of small size, and are located closely adjacent the periphery of the device; and thus the smoke stream passing therethrough and along the chambers 32 may be cooled by the relatively cool temperatures existing at the periphery of the device. (To assist in permitting the periphery of the device 10 to be cool, the wrapper 16 is shown as extending only a portion of the extent of the outer body 20.)

The inner cylindrical body 18 is hollow, but is plugged at its rearward end by the wall 22. This provides a central smoke-screen trap or core 42, which is kept at a

relatively hot temperature by smoke entering and confined therein.

This hollow core 42 tends to keep the interior portions of the smoke passages 30 and chambers 32 hotter than portions thereof adjacent the device periphery; and it is felt that this causes portions of the smoke-stream in an early stage of the smoking process to have sufficient temperature differential (in contrast to exterior temperatures) as to cause the said desired condensation to be achieved at a desired earlier time in the smoking process than would be attained otherwise.

If desired, one or more small openings 44 may be provided in the wall 22, thus tending to assure a continuing replenishing of hot-temperature smoke in the central core 42. This advantage, which assists the smoke-filtering effect of the passages 30 and chambers 32, and incidentally permits some ease of drawing smoke through the device, may be felt to more than offset any disadvantage in bypassing the passages 30 and chambers 32 by a limited portion of the smoke stream. And the rear filter 24 provides some filtering of that limited smoke-portion.

It is to be understood that the novel concepts of the present invention are not limited by what is mentioned herein as being what presently appear to be the working principles or scientific technicalities of the invented device. Rather, those apparent principles and apparent scientific technicalities are set forth as merely being what appears to be the explanation of the overall and specific effects of a device embodying the inventive concepts.

It is thus seen that the novel and advantageous concepts and features of the present invention provide an advantageous filter means, achieving the advantages of a "wet" filter without the need of a wetting agent except the smoke itself.

Accordingly, it will thus be seen from the foregoing description of the invention according to this illustrative embodiment, considered with the accompanying drawings, that the present invention provides a new and useful device having desired advantages and characteristics, and accomplishing its intended objects, including those hereinbefore pointed out and others which are inherent in the invention.

Modifications and variations may be effected without departing from the scope of the novel concepts of the invention; accordingly, the invention is not limited to the specific form or arrangement of parts herein described or shown.

What is claimed is:

1. A tobacco article smoke filter device having an upstream end and a downstream end, comprising:
 - an inner body having its downstream end blocked, and a hollow outer body, said bodies being substantially cylindrical;
 - said inner body having circumferentially spaced longitudinally extending spacer means located between said bodies, wherein said spacer means comprise radially projecting members of alternating relatively long and relatively short axial length;
 - said long members and said short members being so circumferentially spaced as to define a plurality of restricted area vapor passages therebetween;
 - said long members in their portion extending downstream of said short members, and said restricted area vapor passages, being so circumferentially

spaced as to define a plurality of vapor-receiving chambers therebetween, of substantially larger cross-sectional area than the aforesaid restricted area vapor passages;

said respective restricted area vapor passages and vapor-receiving chambers being in longitudinal communication with each other such that vapor entering the device, the vapor travel being blocked inwardly of said restricted-area passages, must pass through said restricted area vapor passages into said chambers, in its travel from the upstream end to the downstream end of the said filter means.

2. The invention as set forth in claim 1, in a combination in which said restricted-area vapor passages are located at the device periphery and outwardly of the said inner body such as to assure that said passages will be relatively cooler than the vapor being moved there-through, and thus attain a condensing effect on said vapor.

3. The invention as set forth in claim 2, in a combination in which said vapor-receiving chambers are located at the device periphery and outwardly of the said inner body and assures their relative coolness and vapor-condensing effect.

4. The invention as set forth in claim 1, in a combination in which the interior of said inner body is hollow in the axial span of said vapor passages, and is open at its upstream end for communication with vapor moving from upstream, thereby providing that the inner walls of said restricted-area vapor passages will be heated by the vapor retained therein and thus be relatively warmer than said restricted-area vapor passages.

5. The invention as set forth in claim 4, in a combination in which the said inner body is substantially blocked downstream of said hollow portion thereby assuring that vapor will be substantially retained therein and thus exert its said heating effect on the inner walls of said restricted-area vapor passages.

6. The invention as set forth in claim 5, in a combination in which the said substantially blocked end is provided with an opening, thus assuring that as vapor is drawn through the device there will be a continuing replenishing of the vapor in said inner body by new portions of said vapor from upstream.

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