Feb. 27, 1968 F. HASLAM 3,370,594

FILTERS FOR TOBACCO SMOKE

Filed Feb. 16, 1965

FIG.1

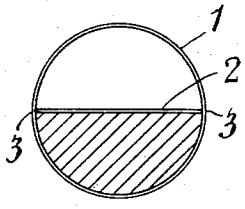


FIG.2

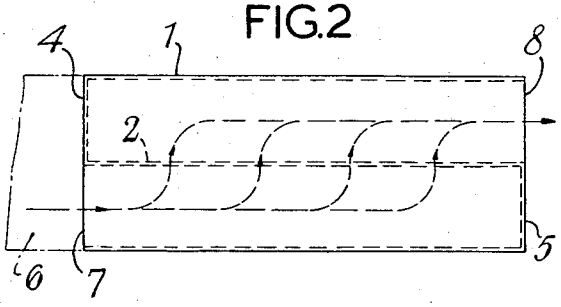


FIG.3

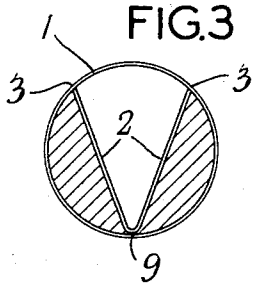


FIG.4

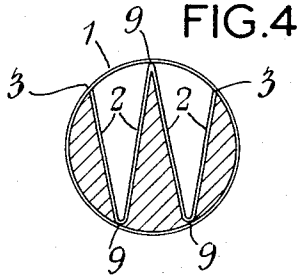


FIG.5

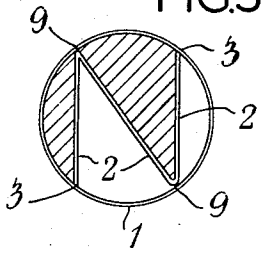


FIG.6

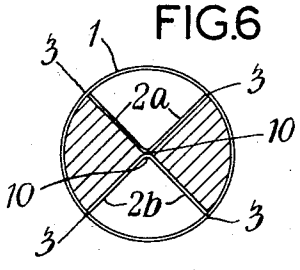
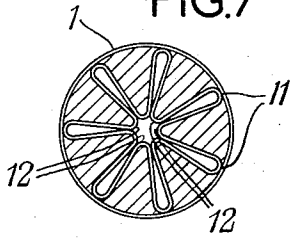


FIG.7



INVENTOR

FRED HASLAM

By Kane, Dalsimer and Kane

ATTORNEYS

United States Patent Office 3,370,594
Patented Feb. 27, 1968

3,370,594

FILTERS FOR TOBACCO SMOKE

Fred Haslam, Bassett, Southampton, England, assignor to Brown and Williamson Tobacco Corporation, Louisville, Ky., a corporation of Delaware

Filed Feb. 16, 1965, Ser. No. 433,109
4 Claims. (Cl. 131—261)

ABSTRACT OF THE DISCLOSURE

A filter mouthpiece for cigarettes having means by which smoke entering the mouthpiece will pass only once through the filtering material before emerging from the filter element, the mouthpiece having means for directing the smoke through an inlet opening at one end thereof and means for directing the smoke through an outlet opening at the other end thereof.

This invention concerns improvements relating to filters for tobacco smoke and to mouthpieces for cigarettes or the like incorporating such filters.

It is well known to provide filters for tobacco smoke which are made from fibrous or sheet material so packed in a mouthpiece that the fibres or sheets lie longitudinally along the path of the smoke flow. Such materials are frequently crimped or crumpled so as to form a series of obstructions, perpendicular to the smoke flow, which impede the smoke particles and thus improve the filtration. However, such obstructions affect the filtration to a small extent only and major variations in filtration effect can only be achieved by alteration of the surface area available for impingement by the smoke, i.e. by the incorporation of more or less filter material. Such changes in the amount of filter material can have disadvantageous effects, such as an undesirable rise in the draw resistance if the amount of material is increased, or undesirable softness of the completed filter if the amount is reduced.

An object of the invention is to provide a kind of filter in which the surface area of the filtering material can be readily varied to give greater or less filtration of the smoke without affecting the firmness of the filter, and which allows of a reduction in draw resistance with increasing area available for filtration.

According to the invention, in a filter mouthpiece for a cigarette or the like, at least one sheet of smoke-filtering material is arranged in and substantially longitudinally of a hollow mouthpiece, by the wall of which it is supported, in such a manner that smoke flowing through the mouthpiece will be constrained to pass through the said sheet. For this purpose, sections of the interior of the mouthpiece separated from each other by the filtering material may be closed at opposite ends to each other of the said mouthpiece by transversely disposed smoke-impervious material. The filter material, preferably paper, may be of any appropriate thickness and porosity and may be pleated or folded to give a required area of material available for filtering the smoke particles and, if desired, to provide a pleasing symmetrical appearance at the end of the cigarette to which it is to be attached. If a plurality of separated sections or space is thus formed by pleating or folding, alternate sections or spaces are closed by smoke-impervious material at opposite ends of the mouthpiece so that air or smoke entering the mouthpiece will pass once only through the filtering material before emerging.

Several examples of ways of carrying the invention into effect will now be more fully described with reference to the accompanying drawing, in which each of FIGURES 1 and 3 to 7 is a diagrammatic cross section through a cigarette mouthpiece and FIGURE 2 is a longitudinal section corresponding to FIGURE 1.

In the simple form shown in FIGURE 1, the mouthpiece consists of a cylindrical outer support **1** with a single sheet **2** of smoke-filtering paper material arranged diametrically along the longitudinal axis of the support and secured thereto at its longitudinal edges **3** by adhesive, for example a lacquer with a cellulose acetate base. One semicircular section at each end of the mouthpiece is closed by half discs, **4** and **5** respectively, of a smoke-impervious material in such a manner that smoke entering the mouthpiece **1** from the cigarette **6** by the semicircular opening **7** left at that end must pass through the sheet **2** of filtering material during its flow through the mouthpiece before leaving the latter by the semicircular opening **8** left at the other end. The half discs **4**, **5** may be made of paper coated or impregnated with the said lacquer and may be secured to the support **1** by the same lacquer.

In each of FIGURES 1 and 3 to 7, the area closed at one end of the mouthpiece has been indicated conventionally by diagonal hatching, while the area closed at the other end is unhatched.

If a larger filtering area is required, a sheet **2** of the filtering material may be folded along its length to a V shape (FIGURE 3), a W shape (FIGURE 4) or an N shape (FIGURE 5), in which case the longitudinal crest or crests **9** are secured to the support **1** as well as the edges **3**.

Alternatively, as illustrated in FIGURE 6, two sheets *2a*, *2b* of filtering material may be folded to a V shape along their length and connected together by adhesive at the crests **10** to form an X shape.

In practice, it may be desirable that the filtering material should have an area even greater than that available with the forms illustrated in FIGURES 1 to 6. This may be achieved by pleating or crimping a larger area of material into the mouthpiece in a symmetrical formation. One suitable such formation is illustrated in FIGURE 7, in which a sheet of paper filtering material *2c* is folded to a petal like formation whose outer crests **11** are secured to the support **1**, while the inner crests **12** come together near the axis of the mouthpiece. Alternate sections of the interior of the mouthpiece are closed at opposite ends thereof, as has again been conventionally indicated in FIGURE 7.

For any given form of the filtering material, the filtration effect can also be increased or decreased by increasing or decreasing the length of the mouthpiece or filter. With increased area, an increased filtration effect can be obtained together with decreased draw resistance. Such variation in filtration effect can be obtained, moveover, without affecting the firmness of the mouthpiece.

The filtration effect can also be influenced by selecting filtering material with properties to suit the particular requirements. The material should be fairly stiff and of a porosity not less than a Potts value of 2,000.

Except for reasons of convenience of production, it is not necessary for the filtering material to extend strictly longitudinally of the mouthpiece. It may be disposed somewhat obliquely or in a conical or frusto-conical form.

The filtering material may be treated with one or more substances capable of altering the composition of the smoke and/or improving its flavour. Examples of such substances are alkaline or acid materials such as calcium carbonate or citric acid, flavour substances such as menthol or its compounds, chemical reagents for the absorption of specific smoke components or absorbent materials such as charcoal-silica gel or zeolites, which may themselves be treated with chemical smoke-modifying substances.

Examples of results obtainable with such filters will now be given:

EXAMPLE I

Filters were made by pleating sheets of paper, of 16 sq. cm. area, of a general utility filter grade such as Whatman's No. 1 paper with a Potts porosity value of 3,000 to form shown in FIGURE 7 and fitting them into cylindrical hollow mouthpieces of 8 mm. diameter and 25 mm. length opposite ends of alternate sections of the interior of the mouthpiece being closed as described above. The average pressure drop of the final filters was 6 cm. water gauge.

On smoking cigarettes through these filters, with a puff of 35 cc. volume and 2 seconds duration taken twice per minute and using an absolute filter to trap the smoke passing through the cigarette filters, an average of 53% of the total tar in the smoke was found to be retained by the cigarette filters.

EXAMPLE II

Filters were prepared as in Example I, but using a strong, rough surfaced, paper with a Potts porosity value of 2,500. The average pressure drop of the final filters was 9.0 cm. water gauge.

On smoking cigarettes through these filters as described in Example I, an average of 82% of the total tar produced was retained by the cigarette filters.

EXAMPLE III

Filters were prepared as in Example I, using singly acid-washed paper with a Potts porosity value of 2,500, and further filters were prepared from similar, but doubly acid-washed paper with a Potts porosity value of 3,200. The average pressure drops for the filters were, respectively, 8.0 cm. and 8.2 cm. water gauge.

On smoking cigarettes through these filters as described in Example I, the average proportion of the total tars in the smoke retained by the filters was 63% in each case.

EXAMPLE IV

Filters were prepared by the method of Example I, using a high wet-strength paper with a Potts porosity value of 2,000. The average pressure drop of the completed filters was 8.0 cm. water gauge.

On smoking cigarettes through these filters as described in Example I, the average proportion of the total tar in the smoke retained by the filters was 51%.

EXAMPLE V

Filters were prepared from two sheets of paper of a chromatographic grade and of 8 mm. width and 15 mm. length inserted in the form shown in FIGURE 6 into a mouthpiece of 8 mm. diameter and 15 mm. length. The filters had an average pressure drop of 11 cm. water gauge.

On smoking cigarettes provided with these filters as described in Example I, the average retention of the total tars produced in the smoke was 60%.

I claim:

1. A filter mouthpiece for a cigarette comprising: a hollow, cylindrical supporting member and at least one sheet of tobacco smoke filter paper having a Potts porosity value of at least 2,000, the filter paper being arranged in and substantially longitudinally of the member and extending transversely of the interior thereof so as to divide the interior into at least two longitudinally extending passages, closure means mounted in sealing relationship between said filter paper and the inner surface of said hollow member and disposed at opposite ends of said hollow member and at opposite sides of said filter paper to present smoke inlet and smoke outlet openings respectively at opposite ends of said hollow member and on opposite sides of said filter paper so that tobacco smoke entering the inlet opening is constrained to pass through the filter paper and through the outlet opening, the filter paper mounted in sealing engagement throughout its length to the inner surface of the hollow member whereby the filter material is supported longitudinally of the mouthpiece and its opposite ends are supported by the closure means.

2. A filter mouthpiece according to claim 1, wherein the filtering material is folded to produce an angular form as seen longitudinally of the mouthpiece.

3. A filter mouthpiece according to claim 1, wherein the filtering material is pleated to a symmetrical formation as seen longitudinally of the mouthpiece.

4. A filter mouthpiece according to claim 1, wherein the filtering material is pleated to a symmetrical petal-like formation as seen longitudinally of the mouthpiece.

References Cited

UNITED STATES PATENTS

1,605,059	11/1926	Oakes et al.	131—10.5
1,657,290	1/1928	Waugh	131—207 X
2,181,614	11/1939	Streifling	131—10

FOREIGN PATENTS

1,118,860	3/1956	France.
643,203	7/1962	Italy.

SAMUEL KOREN, *Primary Examiner.*

MELVIN D. REIN, *Examiner.*