United States Patent [19]

Naylor

[11] **3,854,384**

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[54] **METHOD OF MAKING TOBACCO SMOKE FILTERS**

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[73] Assignee: **Brown & Williamson Tobacco Corporation,** Louisville, Ky.

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Related U.S. Application Data

[62] Division of Ser. No. 245,357, April 19, 1972, abandoned.

[30] **Foreign Application Priority Data**

May 24, 1971 Great Britain 16572/71

[52] **U.S. Cl.** ..... **93/1 C,** 93/77 FT, 131/261 B

[51] **Int. Cl.** **A24c 5/50**

[58] **Field of Search** ..... 93/1 C, 77 FT, 94 M; 131/261 B, 10.5, 210

[56] **References Cited**

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[57] **ABSTRACT**

A tobacco-smoke filter comprises a filter tube extending eccentrically within an outer tubular wrapper, the spaces within the tube and between it and the wrapper being closed at opposite ends so that smoke entering the filter at one end is constrained to flow radially through the wall of the tube from one of the said spaces into the other. The filter tube may be closed at one end by a disc with channels at its periphery communicating with the space between the filter tube and the wrapper, while the space between the filter tube and the wrapper is closed at the other end by a disc having a central hole communicating with the space within the tube.

9 Claims, 4 Drawing Figures

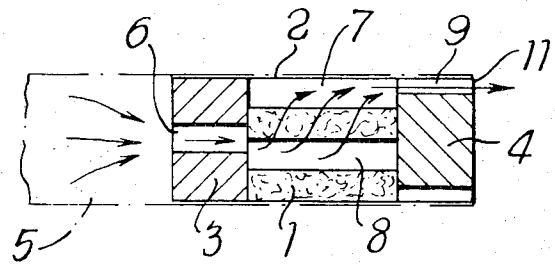


FIG.1

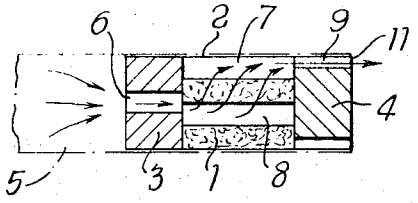
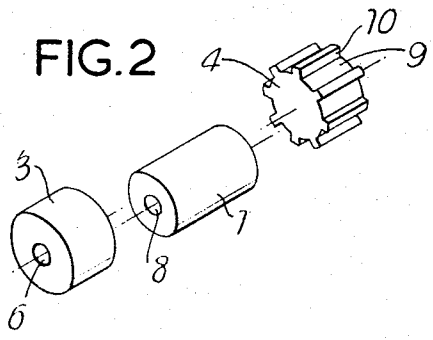


FIG.2



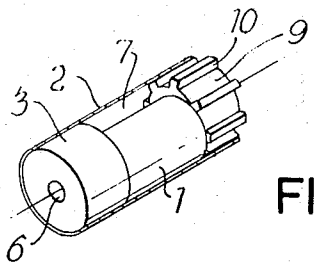


FIG.3

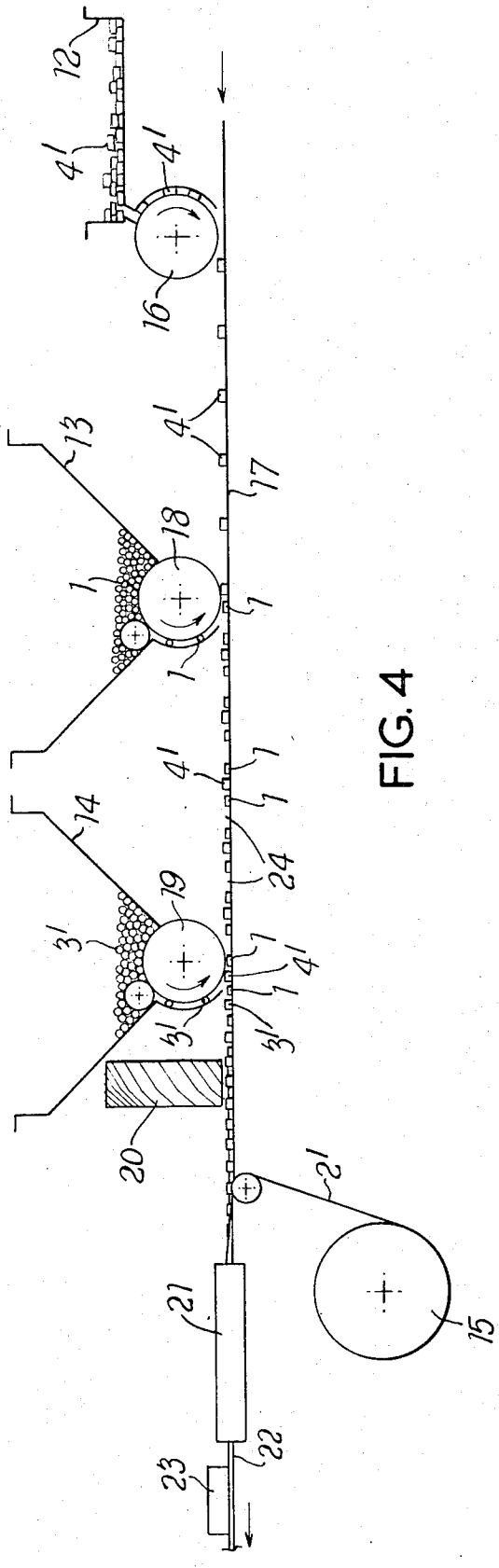


FIG. 4

METHOD OF MAKING TOBACCO SMOKE FILTERS

This is a division, of application Ser. No. 245,357, filed Apr. 19, 1972, and now abandoned.

This invention concerns improvements relating to tobacco-smoke filters, particularly but not exclusively cigarette filters, and seeks to provide a kind of filter by which high filtration efficiency can be readily obtained by simple means.

According to the invention, a tobacco-smoke filter comprises a porous filter tube, of paper or like smoke-pervious material, extending eccentrically and substantially longitudinally within an outer tubular wrapper, spaced within the tube and between it and the wrapper being closed at opposite ends so that smoke entering the filter at one end is constrained to flow radially through the porous tube from one of the said spaces into the other before leaving the filter.

In a preferred embodiment of the invention, the space within the filter tube is closed at one end by a disc with peripheral channels communicating with the space between the filter tube and the wrapper, while the space between the said tube and wrapper is closed at the other end by a disc having an opening communicating with the space within the tube.

One manner in which the invention can be carried into effect will now be more fully described with reference to the accompanying drawings, in which:

FIG. 1 is a longitudinal section through a filter,

FIG. 2 is an exploded perspective view of three internal components thereof,

FIG. 3 a perspective view showing the three components assembled in a wrapper, of which a part is shown broken away, and

FIG. 4 a diagrammatic representation of apparatus for assembling the filter.

The cigarette filter shown in FIG. 1 comprises a tube 1 of smoke-pervious tobacco-smoke filtering paper disposed eccentrically within and adherent along a longitudinal line upon a cylindrical wrapper 2, of larger diameter, made of substantially smoke-impervious material, suitably cigarette-wrapping paper or a plastics material. It is located in abutting relationship between substantially smoke-impervious closure elements 3, 4 also disposed within, and peripherally adherent to, the wrapper 2. The element 3, preferably that which will adjoin the tobacco section (indicated at 5) of the cigarette, takes the form of a disc with a central hole 6. The disc 3 completely closes the adjacent end of the crescent-shaped space 7 between the wrapper 2 and the filter tube 1. The bore 6, however, overlaps the space 8 inside the tube 1, permitting smoke from the tobacco section 5 freely to enter that space. The element 4 also takes the form of a disc, but with longitudinal grooves 9 or corrugations formed by ribs 10 spaced around its periphery. The disc 4 completely closes the adjacent end of the space 8 in the filter tube 1, but grooves 9 afford communication between the crescent-shaped space 7 and the end of the filter remote from the tobacco section 5. Thus smoke filtered by being drawn through the wall of the tube 1 from the space 8 into the space 7 can pass through channels formed by the grooves 9 and bounded on the outside by the wrapper 2 and thence at 11 into the smoker's mouth, as indicated by the arrows in FIG. 1. The discs 3, 4 may suitably be made of compressed paper or paper board or of a smoke-impervious plastics material capable of being readily cut, for example a polyethylene, polypropylene or polyvinyl-chloride material.

Purely by way of example, in a filter approximately 20 mm long, the filter tube 1 may be 10 mm long with a wall thickness of 2 mm and an internal diameter of 2 mm and each of the discs 5 mm long and 8 mm in diameter, the diameter of the bore 6 being about 2 mm and the depth of the grooves 9 less than 2 mm, preferably about 1 mm.

It is an advantage of such filters that they can be produced in a fast continuous process requiring only tried conventional apparatus components identical with or similar to components already used for multiple-filter assembly in the cigarette industry. Apparatus suitable for the purpose is shown diagrammatically in FIG. 4. In this apparatus, disc sections 4', of double the length of a disc 4, are supplied from a known vibratory-bowl feeder 12, filter tubes 1 from a hopper 13, disc sections 3', of double the length of a disc 3, from a hopper 14 and a paper strip 2', from which the wrapper 2 is produced, from a reel 15. The hoppers 13, 14 may be substantially standard filter-plug hoppers.

From the feeder 12, the disc sections 4' are delivered by a metering wheel 16 and deposited, with even spacing, lengthwise on a perforated continuously advancing endless suction band 17 of conventional type. From the hopper 13, the filter tubes 1 are delivered by a metering wheel 18 and placed upon the band 17 one in advance of and one behind each disc section 4'. The filter tubes 1, brought down by the wheel 18 in a position transverse in relation to the band 17, are transferred to the band by a turntable (not shown) which is associated with the wheel 18 in known manner, so that the tubes are deposited lengthwise of the band. From the hopper 14, the disc sections 3' are delivered by a metering wheel 19, likewise provided with a turntable, and are placed lengthwise of the band 17 in gaps 24 left between consecutive filter tubes 1. The repeating series of components, 3', 1, 4', 1, 3', 1, 4'---, thus produced is brought into closely abutting relationship by a helical closing-up drum 20 of known type.

Beyond this drum 20, the said series of abutting components is advanced on the band 17 through an enrobing section 21 in which the components become wrapped in the band 2'. The band 2' is coated with heat-activatable adhesive upon what becomes its inside surface. The wrapped assembly 22 next advances under a heating section 23 in which the adhesive is activated to seal the components 3', 1, 4' within the wrapper band 2' and secure them in their abutting relationship. The sections 21 and 23 may be enrobing and heating sections of known kind employed for the same purpose in the assembly of multiple filters. Finally, the assembly is cut into lengths in known manner. For example, with the dimensions referred to above, it may be cut into 80 mm lengths providing 4 individual filters, the cuts being made at the mid-length of every other double-length disc section, 3' or 4'. In well known manner, these lengths are further cut, at the mid-lengths of the disc sections 3' and 4', to produce individual filters (FIG. 1) on a filter-tip cigarette making machine in which the said filters are also connected to the cigarettes.

Advantageously the filter tubes 1 are produced by being cut from continuously produced tubing made from paper strip with a longitudinal butt-joint rather than an overlapping joint. The disc section 3' and 4'

may be cut from continuous rods of plastics material extruded with the hole **6** and grooves **9** respectively. The rods may be cut initially into multiple-length sections, say 60 mm long, which are thereafter cut to the double-length, 10 mm, of the sections **3'**, **4'** respectively.

I claim:

1. A method of producing a radial-flow tobacco-smoke filter, which filter comprises a porous filter tube extending eccentrically and substantially longitudinally within an outer tubular wrapper whereby a crescent-shaped space is defined between said filter tube and said outer wrapper, a first closure element disposed at one end of the filter tube closing the crescent-shaped space between said filter tube and said outer wrapper, said first closure having an opening therein communicating with the interior of the filter tube, and a second closure element disposed at the opposite end of said filter tube sealing the filter tube, said method comprising the steps of:

A. depositing at least one first closure element and at least one second closure element, which closure elements have substantially equal exterior diameters, and at least one filter tube having an exterior diameter less than that of said closure elements upon a moving band, so that a filter tube is disposed between first and second closure elements and eccentric to the axes of said closure elements;

B. bringing said filter tube and said first and second closure elements into abutting relationship, and

C. enrobing said filter tube and said closure elements, with said filter tube eccentric to the axes of said closure elements, in a strip of wrapper material.

2. The method of claim **1,** in which the interior surface of said wrapper material is coated with a heat-activatable adhesive, including the step of heating the enrobed filter tube and closure elements to seal them in said wrapper material.

3. The method of claim **1** in which said tobacco-smoke filter is produced in the form of a continuous rod comprising a plurality of filter tubes and a plurality of first and second closure elements enrobed within a continuous strip of wrapper material.

4. The method of claim **3** which includes the step of cutting said rod into sections, each of which sections includes two filter tubes having closure elements at both ends.

5. A method of producing a radial-flow tobacco-smoke filter comprising:

A. depositing, at spaced intervals, on a moving band, first disk sections;

B. depositing two filter tubes having exterior diameters less said first disk sections on said moving band between each, and eccentric to the axes, of said first disk sections with a space interval between the two filter tubes;

C. depositing a second disk section having an exterior diameter substantially the same as said first disk sections on said moving band in each said interval between the two filter tubes;

D. bringing said filter tubes and said first and second disk sections into abutting relationship; and

E. enrobing the abutting filter tubes and first and second disk sections, with said filter tube eccentric to the axes of said first and second disk sections, in a strip of wrapper.

6. The method of claim **5,** in which the interior surface of said wrapper material is coated with a heat-activatable adhesive, including the step of heating said enrobed filter tubes and first and second disk sections to secure said filter tubes and said first and second disk sections in abutting relationship and seal them in said wrapper.

7. The method of claim **5** which includes the step of cutting the enrobed filter tubes and first and second disk sections into units comprising two filter tubes having a disk section at each end.

8. The method of claim **5** in which each filter tube has a smaller diameter than said disk sections and in which each first disk section is of a substantially smoke-impervious material having an opening therein, said opening being located so that when said disk section is abutted against a filter tube said opening overlaps with the bore of said filter tube but does not overlap with the outside surface of said filter tube, said disk closing the adjacent end of the crescent-shaped space formed between said filter tube and said wrapper.

9. The method of claim **8** in which each second disk section is of a substantially smoke-impervious material having longitudinal grooves formed by ribs around the periphery of said second disk, said second disk section, when abutted against a filter tube, closing the adjacent end of the bore of said filter tube, said grooves communicating with the adjacent end of the crescent-shaped space formed between said filter tube and said wrapper.

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