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(54) **Multi-segment filter tube**

(57) The present invention relates to a filter tube, the filter tube comprising an empty paper tube and a filter attached to the empty paper tube, wherein the filter comprises a first filter segment, a second filter segment and a third filter segment, wherein the first filter segment is located at the mouth end of the filter tube, the second

filter segment is located upstream of the second filter segment and the third filter segment is located upstream of the second filter segment. The invention further concerns a method of making such a filter tube. The filter tube is suitable for make-your-own cigarettes.

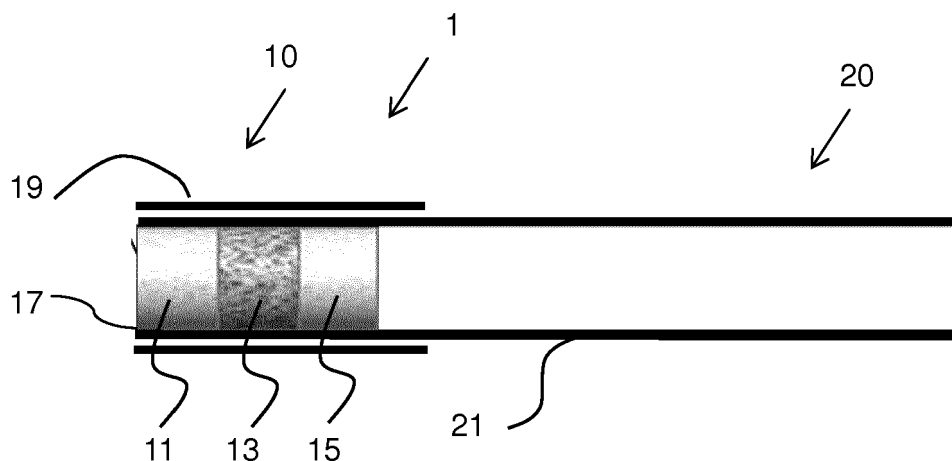


Fig. 1

## Description

[0001] The present invention relates to a multi-segment filter tube and a method of manufacturing such a multi-segment filter tube. Such filter tubes are particularly useful for the self-manufacture of smoking articles, as for example, cigarettes.

[0002] It is known to make so called "roll-your-own" and "make-your-own" smoking articles. These smoking articles are made using loose, fine-cut tobacco that the consumer rolls into a sheet of paper or inserts into a tube of paper, typically with the aid of a making device. Also, it is known to provide "filter tubes" for the self-manufacture of smoking articles that already provide a filter plug attached at the end of a tube of paper. This allows the self-manufacture of filter cigarettes. It is further known to create filter tubes with charcoal dispersed within the filter plug.

[0003] Typically, these filter tubes are sold in batches in cartons. However, with today's construction of these filter tubes, charcoal can dislodge from the plug and spread within the container during transportation of the filter tubes and later become visible to the consumer. This may be regarded by some consumers as unattractive.

[0004] There is therefore a need for filter tubes that have increased functionality. At the same time, there is a need for filter tubes that can be easily transported without degradation.

[0005] According to the invention there is provided a filter tube comprising an empty paper tube and a filter attached to the empty paper tube. The filter comprises a first filter segment, a second filter segment and a third filter segment. The first filter segment is located at the mouth end of the filter tube, the second filter segment is located upstream of the first filter segment and the third filter segment is located upstream of the second filter segment.

[0006] According to the invention it is therefore possible to place one filter segment between two other filter segments. This is particularly useful where the first filter segment and the third filter segment are preferably white cellulose acetate tow filter segments. Thus, the filter tube will not only have a white mouth end, but also the part of the filter that abuts the tobacco in the finished cigarette, once the filter tube is filled, will be white. This advantageously overcomes a problem specific to make-your-own filter tubes that are packed and transported without containing any tobacco. The filter tube construction according to the invention has the further advantage that material that may otherwise dislodge from the second filter segment cannot exit the empty paper tube thanks to the presence of the third filter segment.

[0007] The terms "upstream" and "downstream" are used throughout the specification to refer to a relative location of the parts of the filter tube in respect to the gas flow drawn through the filter towards the mouth end of the filter tube. Accordingly, a first element of the filter tube

or the finished cigarette is upstream from a second element if it is more distant from the mouth end than the first element.

[0008] Preferably, the second filter segment comprises at least a first filter component and a second filter component, wherein the first filter component is a filtration material. The filtration material may be, for example, cellulose acetate tow. Alternatively, the filtration material may be crimped paper or other suitable filtration materials known in the manufacturing of cigarette filters.

[0009] Preferably, the second filter component is one of a particulate material, a liquid, a thread or a capsule. The particulate material may be for example carbon or plant material like plant leaves or compressed beads of plant material. The plant material may be, for example based on tobacco, mint or clove. The liquid may be, for example, a flavourant such as menthol. The thread may be a paper yarn or cotton thread that is disposed within the filtration material of the second segment. The thread may, for example, be used as a carrier material for a flavourant such as menthol or for decorative purposes. The capsule may be, for example, a breakable capsule or a matrix material that is adapted to release flavour into the mainstream smoke either when broken, squeezed, or over time. Many combinations of the above are also possible.

[0010] Preferably, the particulate material comprises activated charcoal particles. While filter tubes with activated charcoal particles in filters are generally known, the filter tube construction according to the invention is particularly beneficial in the context of the use of activated charcoal particles. In fact, as mentioned above, the charcoal is advantageously prevented from dislodging from the second filter segment into a surrounding container during transportation.

[0011] Preferably, the carbon loading of the second segment is between about 2 mg/mm and about 7 mg/mm, more preferably between about 3 mg/mm and about 5 mg/mm, most preferably, about 4 mg/mm. The carbon loading further depends on the diameter of the filter segment.

[0012] Preferably, the second segment has a diameter between about 4 mm and about 10 mm, more preferably between about 6 mm and about 9 mm, most preferably about 8 mm.

[0013] Preferably, the second segment has a length between about 4 mm and about 17 mm, more preferably between about 4 mm and about 6 mm and most preferably about 5 mm. Overall, it is preferred that the combined filter has a combined length of all segments within the filter of about 15 mm or about 25 mm. However, combined filters with a length of between about 10 mm and about 30 mm are also possible.

[0014] Preferably, the filter comprises at least one layer of plug wrap, wherein the plug wrap joins at least two segments together. Alternatively, the filter may comprise multiple layers of plug wrap, for example two layers of plug wrap, wherein each segment is wrapped individually

in plug wrap and all segments are joined by an additional layer of plug wrap. Alternatively, the individual segments may comprise no individual plug wrap. In that case, one entire layer of plug wrap may be sufficient to keep all segments together. Still alternatively, two segments may be assembled by a first layer of plug wrap and the third segment may be joined to the said two segments by a further layer of plug wrap. This depends largely on the assembly method of the filter.

**[0015]** Preferably, the filter tube further comprises a tipping paper circumscribing the paper tube. In some embodiments, the tipping paper may comprise ventilation holes. In some embodiments, the tipping paper may comprise a transparent section in order to render at least one of the underlying filter segments, preferably the second filter segment, at least partially visible.

**[0016]** In some embodiments of the filter tube according to the invention the filter comprises a fourth segment located between the first segment and the third segment. Preferably, the fourth filter segment comprises at least a first filter component and a second filter component, wherein the first filter component is a filtration material. The filtration material may be, for example, cellulose acetate tow. Alternatively, the filtration material may be crimped paper or other suitable filtration materials known in the manufacturing of cigarette filters. Preferably, the second filter component is one of a particulate material, a liquid, a thread or a capsule. The particulate material may be for example carbon or plant material like plant leaves or compressed beads of plant material. The plant material may be, for example, based on tobacco, mint or clove. The liquid may be, for example, a flavourant such as menthol. The thread may be a paper yarn or cotton thread that is disposed within the filtration material of the second segment. The thread may, for example be used as a carrier material for a flavourant such as menthol or used for decorative purposes. The capsule may be, for example, a breakable capsule or a matrix material that is adapted to release flavour into the mainstream smoke either when broken, squeezed, or over time. Many combinations of the above are also possible. The fourth segment may be similar or different from the second segment. For example, where the second segment comprises particulate material such as charcoal, the fourth segment may comprise a flavoured thread or a capsule. Again, many different combinations of different filter segments are conceivable in such embodiments. Further still, the filter may comprise a fifth filter segment. The fifth filter segment may be placed between the second filter segment and the fourth filter segment and may be either a simple cellulose acetate filter plug, or may be a more complicated filter segment as described above. Both fourth and fifth filter segments may also be a non-cuttable object, like for example, a flow restrictor.

**[0017]** According to a second aspect of the invention, the invention is directed to a smoking article that is made in combination with a filter tube as has been described already above.

**[0018]** According to a third aspect of the invention, the invention is directed to a method of manufacturing a filter tube, for example a filter tube according to the invention as has been described above. According to the invention, this method of making a filter tube comprises the steps of providing a first filter segment and providing a second filter segment. The method further comprises the step of forming a multi-segment filter with three, four or five segments, wherein the forming step comprises combining the first filter segment and the second filter segment. Further, the method comprises the step of wrapping the filter with cigarette paper, thereby creating a paper tube.

**[0019]** In some embodiments, the method may further comprise the step of covering the multi-segment filter with a tipping paper.

**[0020]** Preferably, the forming step comprises alternately combining first filter segment and second filter segments into a stream of adjacent filter segments. Alternatively, or in addition, a third, fourth and fifth filter segment may be combined into a stream of alternating filter segments.

**[0021]** Preferably, the forming step further comprises wrapping the stream of adjacent filter segments into a plug wrap. With this method, a high speed construction of an endless filter rod with two or more alternating filter segments can be manufactured that can benefit from existing high speed filter maker machinery as used today in the manufacture of cigarette filters.

**[0022]** Where only two alternating filter segment types are used, the method according to the invention further comprises the step of severing at least some of the first filter segments such that third filter segments are created. In particular, it is advantageous to create and combine double-length first filter segments, for example made from cellulose acetate tow, that are interlaced with the second filter segments. After wrapping the first filter segments and second filter segments, the double-length first filter segment may then be cut into a single-length first filter segment and a single length third filter segment. Indeed, this cutting is advantageously performed in two steps such that in a first step double-, triple- or quadruple-length filter rods are formed, which are then subsequently cut into smaller pieces. Double-length filter rods can then be wrapped into cigarette paper, thus creating an empty paper tube on either side of the double filter, which then can be cut in a final step to create two filter tubes.

**[0023]** Alternatively, the forming step comprises attaching the first segment to the second segment using plug wrap in a first step and attaching the third segment to the two previously combined segments in a second step.

**[0024]** Preferably, the step of providing the second filter segment comprises providing a second filter segment with at least a first filter component and a second filter component, wherein the second filter component is one of a particulate material, a liquid, a thread or a capsule.

**[0025]** It will be appreciated that any features described with reference to one aspect of the present in-

vention are equally applicable to any other aspect of the invention. Further advantageous characteristics of the invention will become apparent from the following description of embodiments of the invention with the aid of the attached figures in which:

Fig. 1 is a schematic sectional view of a filter tube according to one embodiment of the invention; and Fig. 2 is a schematic sectional view of a filter rod for forming the filter of a filter tube according to one embodiment of the invention.

**[0026]** In Fig. 1 a filter tube 1 according one embodiment of the invention is shown. The filter tube comprises a filter 10 and an empty paper tube 20. The empty paper tube 20 is made from a cigarette paper 21 that is wrapped around the filter 10 and extends to one side. The empty paper tube is suitable for housing a column of tobacco fine cut. The filter tube 1 further comprises tipping paper 19 that is wound around the cigarette paper in the area of the filter 10. The filter 10 comprises a first filter segment 11, a second filter segment 13 and a third filter segment 15. The filter segments are held together by a plug wrap 17. Further layers of plug wrap (not shown) may be used to hold segments 11, 13, 15 together or to maintain the form of the individual segments 11, 13, 15. The first segment 11 and the third segment 15 are cellulose acetate tow filter segments, for example with a length of about 5 mm each. The second filter segment 13 is a segment comprising cellulose acetate tow and activated charcoal. The loading of charcoal is about 5 mg/mm. The diameter of the filter tube is about 8 mm. The length of the second segment 13 is about 5 mm, such that the entire filter 10 has an overall length of about 15 mm. However, in some embodiments, the length of the second segment 13 is about 15 mm, such that the entire filter 10 has a length of about 25 mm.

## Claims

1. A filter tube comprising an empty paper tube and a filter attached to the empty paper tube, wherein the filter comprises a first filter segment, a second filter segment and a third filter segment, wherein the first filter segment is located at the mouth end of the filter tube, the second filter segment is located upstream of the first filter segment and the third filter segment is located upstream of the second filter segment.
2. A filter tube according to claim 1, wherein the second filter segment comprises at least a first filter component and a second filter component, wherein the first filter component is a filtration material.
3. A filter tube according to claim 2, wherein the second filter component is one of a particulate material, a liquid, a thread or a capsule.
4. A filter tube according to claim 3, wherein the particulate material comprises activated charcoal particles.
5. A filter tube according to claim 4, wherein the carbon loading of the second segment is between about 2 mg/mm and about 7 mg/mm, preferably between about 4 mg/mm and about 6 mg/mm, most preferably, about 5 mg/mm.
6. A filter tube according to at least one of the previous claims, wherein the second segment has a diameter between about 4 mm and about 10 mm, preferably between about 6 mm and about 9 mm, most preferably of about 8 mm.
7. A filter tube according to at least one of the previous claims, wherein the second segment has a length between about 4 mm and about 17 mm, preferably between about 4 mm and about 6 mm, most preferably of about 5 mm.
8. A filter tube according to at least one of the previous claims, wherein the filter comprises at least one layer of plug wrap, wherein the plug wrap joins at least two segments to one another, and wherein the filter tube further comprises a tipping paper that joins the filter to the paper tube.
9. A filter tube according to at least one of the previous claims, wherein the filter comprises a fourth segment located between the first segment and the third segment.
10. A smoking article comprising a tobacco rod and a filter tube, wherein the filter tube is a filter tube according to at least one of claims 1 to 9.
11. A method of making a filter tube comprising the steps of
  - providing a first filter segment;
  - providing a second filter segment;
  - forming a multi-segment filter with three, four or five segments, wherein the forming step comprises combining the first filter segment and the second filter segment;
  - wrapping the filter with cigarette paper, thereby creating an empty paper tube.
12. A method according to claim 11, wherein the forming step comprises alternately combining first filter segment and second filter segments into a stream of adjacent filter segments.
13. A method according to claim 12, wherein the forming step further comprises wrapping the stream of adjacent filter segments into plug wrap.

14. A method according to claim 12 or 13, wherein the forming step further comprises severing at least some of the first filter segments such that third filter segments are created.

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15. A method according to any of claims 11 to 14, wherein providing the second filter segment comprises providing a second filter segment with at least a first filter component and a second filter component, wherein the second filter component is one of a particulate material, a liquid, a thread or a capsule.

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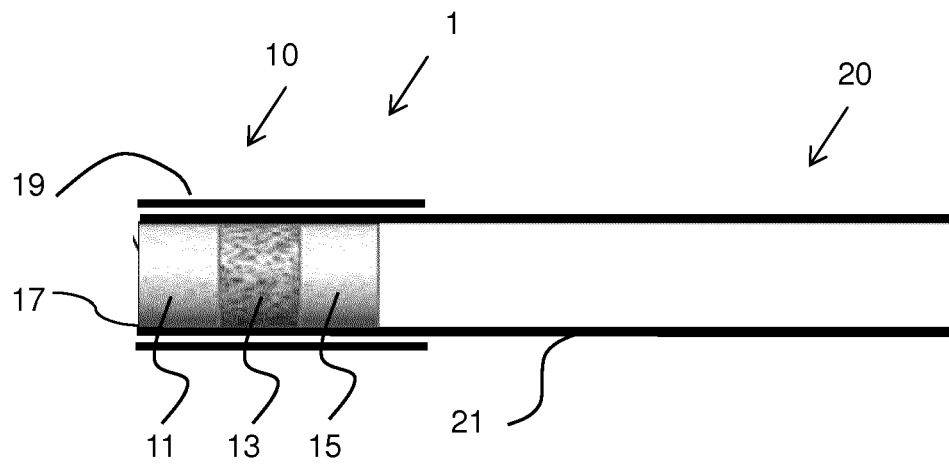


Fig. 1

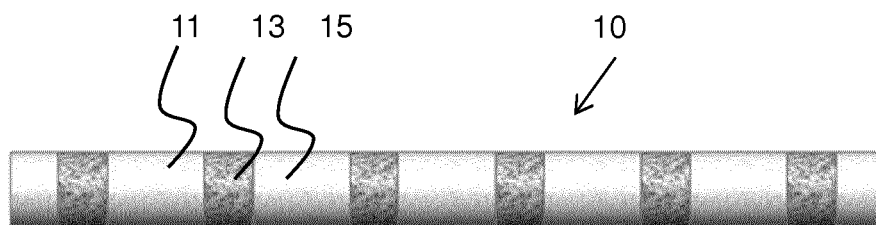


Fig. 2



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