

Description

This invention relates to a smoking article according to the first part of claim 1 relating to the prior art of DE-U-1 892 093 in which the smoking material can be tobacco or any other suitable material.

The composition of the cigarette smoke aerosol is complex, containing many compounds in the particulate and vapour phases. It is possible to classify the compounds contained within the particulate phase into two fractions, these are the involatile and semivolatile fractions.

The semivolatile fraction can be defined as consisting of all of those compounds which evaporate from a chemically inert substrate heated to a temperature of 200 °C.

Many of the compounds which have been identified as contributors to the taste and flavour of cigarette smoke are contained within the semivolatile fraction. Also it is found experimentally that approximately 50% of the total particulate matter of cigarette smoke is semivolatile.

It is an object of the present invention to deliver to the smoker an enhanced concentration of semivolatile compounds in the smoke and a reduced concentration of involatiles, thus maintaining taste and flavour at lower total particulate matter yields.

According to the present invention a smoking article comprises a rod of smoking material and a filter portion, said filter portion including means for collecting particulate matter in the smoke from the rod of smoking material in a collection zone arranged in the upstream end of the filter portion, and means for heating said collection zone to release the semivolatile compounds of the smoke whilst allowing the involatile compounds to be retained in the filter.

Preferably the rod of smoking material includes a longitudinally extending passage to feed hot gases from the tip of the article when lit to the said collection zone. In one preferred embodiment the collection zone is provided by an impervious transversely extending member on which the particulate matter is deposited by the smoke from the smoking material.

The transversely extending member can be provided by a disc the centre portion of which provides said collection zone and which is surrounded by an exit opening or openings.

Preferably the disc is provided in a chamber into which smoke from the smoking material is delivered and into which the longitudinally extending passage feeds hot gases to the collection zone.

If desired means may be included for accelerating the hot gases from the passage into the collection zone.

In another embodiment the collection zone can be provided in a high retention filter element.

With this arrangement the high retention filter element can be spaced away from the end of the smoking material rod to form a chamber adjacent the collection zone and into which smoke from the smoking material is delivered and into which the longitudinally extending passage feeds hot gases to the collection zone.

A secondary filter element can be provided which is located at the mouth piece end of the article.

Preferably the passage in the rod of smoking material is formed by a low porosity/permeability tube.

The invention can be performed in various ways but two embodiments will now be described by way of example and with reference to the accompanying drawings in which :

Figure 1 is a cross-sectional side elevation of a smoking article according to the present invention;

Figure 2 is a cross-sectional view on the line II-II in Figure 1;

Figure 3 is a cross-sectional view on the line III-III of Figure 1;

Figure 4 is a cross-sectional view on the line IV-IV of Figure 1; and,

Figure 5 is a cross-sectional side elevation of another construction according to the invention.

As shown in Figures 1 to 4 the smoking article according to the invention comprises a rod 1 of smoking material, for example tobacco, carried in a paper outer wrapper 2. The rod is provided with a longitudinally extending passage 3 formed by a tube of low porosity/permeability material 4 which may be made from paper or reconstituted tobacco sheet. The tube may have a diameter typically in the range of 0.5 to 5 mm. Also located within the paper wrapper 2 is a filter 5 at the mouth piece end and an impervious transversely extending member in the form of an impaction disc made of material which is temperature stable. Examples of the materials from which the disc may be constructed include metals, for example aluminium, ceramics or plastics such as nylon, polyethylene, polypropylene or cellulose acetate. Preferably the disc has a low thermal heat capacity and it may also have a low thermal conductivity, for example when constructed from a ceramic or from Nylon 66. This disc 6 has a central impaction surface 7 which is surrounded by circumferential holes 8 typically of 1 mm diameter.

Between the inner end 9 of the tobacco rod 1 and the surface of the disc 6 a chamber 10 is formed in which is located a second disc 11 which can also be made from a material selected from the examples given for the disc 6, and this may be the same as, or different from, that used in the

construction of the disc 6 in a particular construction. One or more (three are shown) small diameter holes 12 are provided in the disc 11 and these may typically be of 0.1 - 1 mm diameter and preferably 0.4 - 1 mm diameter. These holes act as acceleration nozzles in the manner to be described.

When the article is smoked and the end 13 is lit smoke passes into the chamber 10 and through the nozzles 12, the action of passing through the nozzles 12 increases the velocity of the smoke and assists in the impaction of the smoke against the impaction surface 7 on the disc 6. This causes particulate matter to be deposited in the area 7 and to act as a collection zone.

Hot gases from the burning tip pass down the passage 3, are accelerated through the holes 12 and impact on the surface 7 thus heating the collection zone and deposited particulate matter sufficiently to cause the release of the semivolatile compounds which pass radially outwardly with the smoke and through the openings 8 into the filter 5 and to the smoker. Some of the semivolatile compounds may be released as they enter the collection zone before impaction due to the heat in the collection zone.

The impaction surface provided by the surface 7 is located typically 2 mm from the nozzles 12. In the embodiment shown the passage 3 is located coaxially with the smoking material rod 1 but it could be displaced to one side if desired.

In the second embodiment as shown in Figure 5 the same reference numerals are used to indicate similar parts as in Figures 1 to 4. In this construction the means for collecting particulate matter in the smoke from the rod of smoking material is provided by a high retention filter element 15. The element 15 is spaced away from the end 9 of the smoking material rod and the filter 15 is located in a chamber 10 in place of the disc 11. The disc 6 is also dispensed with. In this arrangement smoke from the rod 1 impinges on the front surface 16 of the filter 15 and the filter retains a fraction of the total particulate matter over the first few (ten) mm of filter material. This is indicated by reference numeral 17. This retained total particulate matter is again heated by hot air or smoke drawn down the passage 3 as in the previous embodiment. The second filter element 5 can be spaced away from the filter element 15 as shown or it may abut it. Once again the action of the hot air or smoke heats the deposited particulate matter and releases the semivolatile fractions which are then drawn through the filter 5.

The second filter element 5 may have an inclusion of activated carbon to reduce the concentration of some of the vapour components in the smoke aerosol.

If desired ventilation air may be introduced through the wrapper 5 into the filter 17 through openings 18 to confine the aerosol and the hot air/smoke stream to the central part of the filter.

Similarly in the construction shown in Figure 1 ventilation air may be introduced through the wrapper 5 through openings 19 to aerodynamically focus the aerosol onto the disc 6 to improve the efficiency of the filter.

If desired ventilation air may also be used to cool the evaporated semivolatiles to facilitate recondensation before delivery to the smoker, for example through openings 20.

Claims

1. A smoking article comprising a rod of smoking material (1) and a filter portion (5), said filter portion including means (6) for collecting particulate matter in the smoke from the rod of smoking material in a collection zone arranged in the upstream end of the filter portion, characterized by means for heating (3) said collection zone to release the semivolatile compounds of the smoke whilst allowing the involatile compounds to be retained in the filter.
2. A smoking article as claimed in claim 1 in which said rod of smoking material includes a longitudinally extending passage to feed hot gases from the tip of the article when lit to the said collection zone.
3. A smoking article as claimed in claim 2 in which said collection zone is provided by an impervious transversely extending member on which the particulate matter is deposited by the smoke from the smoking material.
4. A smoking article as claimed in claim 3 in which said transversely extending member is provided by a disc the centre portion of which provides said collection zone and which is surrounded by an exit opening or openings.
5. A smoking article as claimed in claim 4 in which said disc is provided in a chamber into which smoke from the smoking material is delivered and into which the longitudinally extending passage feeds hot gases to the collection zone.
6. A smoking article as claimed in claims 2 to 5 including means for accelerating the hot gases from the passage into the collection zone.
7. A smoking article as claimed in claim 6 including means for accelerating the hot gases from

construction of the disc 6 in a particular construction. One or more (three are shown) small diameter holes 12 are provided in the disc 11 and these may typically be of 0.1 - 1 mm diameter and preferably 0.4 - 1 mm diameter. These holes act as acceleration nozzles in the manner to be described.

When the article is smoked and the end 13 is lit smoke passes into the chamber 10 and through the nozzles 12, the action of passing through the nozzles 12 increases the velocity of the smoke and assists in the impaction of the smoke against the impaction surface 7 on the disc 6. This causes particulate matter to be deposited in the area 7 and to act as a collection zone.

Hot gases from the burning tip pass down the passage 3, are accelerated through the holes 12 and impact on the surface 7 thus heating the collection zone and deposited particulate matter sufficiently to cause the release of the semivolatile compounds which pass radially outwardly with the smoke and through the openings 8 into the filter 5 and to the smoker. Some of the semivolatile compounds may be released as they enter the collection zone before impaction due to the heat in the collection zone.

The impaction surface provided by the surface 7 is located typically 2 mm from the nozzles 12. In the embodiment shown the passage 3 is located coaxially with the smoking material rod 1 but it could be displaced to one side if desired.

In the second embodiment as shown in Figure 5 the same reference numerals are used to indicate similar parts as in Figures 1 to 4. In this construction the means for collecting particulate matter in the smoke from the rod of smoking material is provided by a high retention filter element 15. The element 15 is spaced away from the end 9 of the smoking material rod and the filter 15 is located in a chamber 10 in place of the disc 11. The disc 6 is also dispensed with. In this arrangement smoke from the rod 1 impinges on the front surface 16 of the filter 15 and the filter retains a fraction of the total particulate matter over the first few (ten) mm of filter material. This is indicated by reference numeral 17. This retained total particulate matter is again heated by hot air or smoke drawn down the passage 3 as in the previous embodiment. The second filter element 5 can be spaced away from the filter element 15 as shown or it may abut it. Once again the action of the hot air or smoke heats the deposited particulate matter and releases the semivolatile fractions which are then drawn through the filter 5.

The second filter element 5 may have an inclusion of activated carbon to reduce the concentration of some of the vapour components in the smoke aerosol.

If desired ventilation air may be introduced through the wrapper 5 into the filter 17 through openings 18 to confine the aerosol and the hot air/smoke stream to the central part of the filter.

Similarly in the construction shown in Figure 1 ventilation air may be introduced through the wrapper 5 through openings 19 to aerodynamically focus the aerosol onto the disc 6 to improve the efficiency of the filter.

If desired ventilation air may also be used to cool the evaporated semivolatiles to facilitate recondensation before delivery to the smoker, for example through openings 20.

Claims

1. A smoking article comprising a rod of smoking material (1) and a filter portion (5), said filter portion including means (6) for collecting particulate matter in the smoke from the rod of smoking material in a collection zone arranged in the upstream end of the filter portion, characterized by means for heating (3) said collection zone to release the semivolatile compounds of the smoke whilst allowing the involatile compounds to be retained in the filter.
2. A smoking article as claimed in claim 1 in which said rod of smoking material includes a longitudinally extending passage to feed hot gases from the tip of the article when lit to the said collection zone.
3. A smoking article as claimed in claim 2 in which said collection zone is provided by an impervious transversely extending member on which the particulate matter is deposited by the smoke from the smoking material.
4. A smoking article as claimed in claim 3 in which said transversely extending member is provided by a disc the centre portion of which provides said collection zone and which is surrounded by an exit opening or openings.
5. A smoking article as claimed in claim 4 in which said disc is provided in a chamber into which smoke from the smoking material is delivered and into which the longitudinally extending passage feeds hot gases to the collection zone.
6. A smoking article as claimed in claims 2 to 5 including means for accelerating the hot gases from the passage into the collection zone.
7. A smoking article as claimed in claim 6 including means for accelerating the hot gases from



the passage and the smoke into the collection zone.

8. A smoking article as claimed in claims 6 and claim 7 in which the means for accelerating the hot gases or hot gases and smoke includes a disc of impervious material having one or more holes within the range of 0.1 to 1.0 mm diameter.
9. A smoking article as claimed in claim 2 in which said collection zone is provided in a high retention filter element.
10. A smoking article as claimed in claim 9 in which said high retention filter element is spaced away from the end of the smoking material rod to form a chamber adjacent the collection zone and into which smoke from the smoking material is delivered and into which the longitudinally extending passage feeds hot gases to the collection zone.
11. A smoking article as claimed in claims 1 to 10 in which a secondary filter element is located at the mouth piece end of the article.
12. A smoking article as claimed in claims 2 to 9 in which said passage in the rod of smoking material is formed by a low porosity/permeability tube.

Patentansprüche

1. Rauchartikel umfassend eine Stange eines Rauchmaterials (1) und einen Filterabschnitt bzw. -teil (5), wobei der genannte Filterabschnitt Mittel (6) zum Sammeln von Teilchenmaterial im Rauch aus der Stange eines Rauchmaterials in einer im stromaufwärtigen Ende des Filterabschnitts angeordneten Sammelzone enthält, dadurch gekennzeichnet, daß Mittel (3) zum Erhitzen der genannten Sammelzone angeordnet sind, um die halbflüchtigen Verbindungen des Rauchs freizusetzen, während die nicht flüchtigen Verbindungen im Filter zurückgehalten werden.
2. Rauchartikel nach Anspruch 1, worin die genannte Stange Rauchmaterial einen sich in Längsrichtung erstreckenden Durchgang aufweist, um heiße Gase von der Spitze des angezündeten Artikels zum genannten Sammelbereich zu befördern.
3. Rauchartikel nach Anspruch 2, worin die genannte Sammelzone durch ein undurchlässiges, sich quer erstreckendes Element gebildet

wird, auf dem das Teilchenmaterial durch den Rauch aus dem Rauchmaterial abgelagert wird.

4. Rauchartikel nach Anspruch 3, worin das genannte sich quer erstreckende Element durch eine Scheibe gebildet wird, deren Mittelabschnitt den genannten Sammelbereich bildet und die von einer oder mehreren Ausgangsöffnungen umgeben ist.
5. Rauchartikel nach Anspruch 4, worin die genannte Scheibe in einer Kammer angeordnet ist, in die der Rauch aus dem Rauchmaterial gelangt und in die der sich in Längsrichtung erstreckende Durchgang die heißen Gase zur Sammelzone leitet.
6. Rauchartikel nach Anspruch 2 bis 5, umfassend Mittel zum Beschleunigen der heißen Gase aus dem Durchgang in den Sammelbereich.
7. Rauchartikel nach Anspruch 6, umfassend Mittel zum Beschleunigen der heißen Gase aus dem Durchgang und des Rauchs in die Sammelzone.
8. Rauchartikel nach Anspruch 6 und Anspruch 7, worin das Mittel zum Beschleunigen der heißen Gase oder der heißen Gase und des Rauchs eine Scheibe eines undurchlässigen Materials mit einem oder mehreren Löchern im Bereich von 0,1 bis 1,0 mm Durchmesser enthält.
9. Rauchartikel nach Anspruch 2, worin die genannte Sammelzone in einem hochretentiven Filterelement angeordnet ist.
10. Rauchartikel nach Anspruch 9, worin das genannte hochretentive Filterelement vom Ende der Rauchmaterialstange beabstandet ist, um eine zur Sammelzone angrenzende Kammer zu bilden und in die Rauch aus dem Rauchmaterial zugeführt wird und in die der sich in Längsrichtung erstreckende Durchgang heiße Gase zur Sammelzone leitet.
11. Rauchartikel nach Anspruch 1 bis 10, worin ein sekundäres Filterelement am Mundstückende des Artikels angeordnet ist.
12. Rauchartikel nach Anspruch 2 bis 9, worin der genannte Durchgang in der Stange eines Rauchmaterials durch ein Rohr niedriger Porosität/Durchlässigkeit gebildet wird.



Revendications

1. Article à fumer comprenant une tige de matériau à fumer (1) et une portion formant filtre (5), ladite portion formant filtre comprenant un moyen (6) pour collecter la matière particulaire dans la fumée de la tige en matériau à fumer dans une zone de collection agencée dans l'extrémité amont de la portion formant filtre, caractérisé par un moyen pour chauffer (3) ladite zone de collection afin de libérer les composés semi-volatils de la fumée tout en permettant la rétention des composés non-volatils dans le filtre.
2. Article à fumer selon la revendication 1, dans lequel ladite tige en matériau à fumer comprend un passage s'étendant longitudinalement pour amener des gaz chauds de la pointe de l'article lorsqu'il est allumé à ladite zone de collection.
3. Article à fumer selon la revendication 2, dans lequel ladite zone de collection est réalisée par un élément imperméable s'étendant transversalement, sur lequel la matière particulaire est déposée par la fumée du matériau à fumer.
4. Article à fumer selon la revendication 3, dans lequel ledit élément s'étendant transversalement est réalisé par un disque dont la partie centrale constitue ladite zone de collection et qui est entourée par une ou des ouvertures de sortie.
5. Article à fumer selon la revendication 4, dans lequel ledit disque est prévu dans une chambre dans laquelle la fumée du matériau à fumer est transmise et dans laquelle le passage s'étendant longitudinalement amène des gaz chauds à la zone de collection.
6. Article à fumer selon les revendications 2 à 5, comprenant un moyen pour accélérer les gaz chauds du passage dans la zone de collection.
7. Article à fumer selon la revendication 6, comprenant un moyen pour accélérer les gaz chauds du passage et la fumée dans la zone de collection.
8. Article à fumer selon la revendication 6 et la revendication 7, dans lequel le moyen pour accélérer les gaz chauds ou les gaz chauds et la fumée comprend un disque en matériau imperméable présentant un ou plusieurs trous d'un diamètre dans la plage comprise entre 0,1 et 1,0 mm.
9. Article à fumer selon la revendication 2, dans lequel ladite zone de collection est réalisée dans un élément filtrant de rétention élevée.
10. Article à fumer selon la revendication 9, dans lequel ledit élément filtrant à rétention élevée est espacé de l'extrémité de la tige en matériau à fumer pour former une chambre adjacente à la zone de collection et dans laquelle la fumée du matériau à fumer est transmise et dans laquelle le passage s'étendant longitudinalement amène les gaz chauds vers la zone de collection.
11. Article à fumer selon les revendications 1 à 10, dans lequel un deuxième élément filtrant est localisé à l'extrémité formant embout de l'article.
12. Article à fumer selon les revendications 2 à 9, dans lequel ledit passage dans la tige du matériau à fumer est formé par un tube de porosité/perméabilité réduite.

