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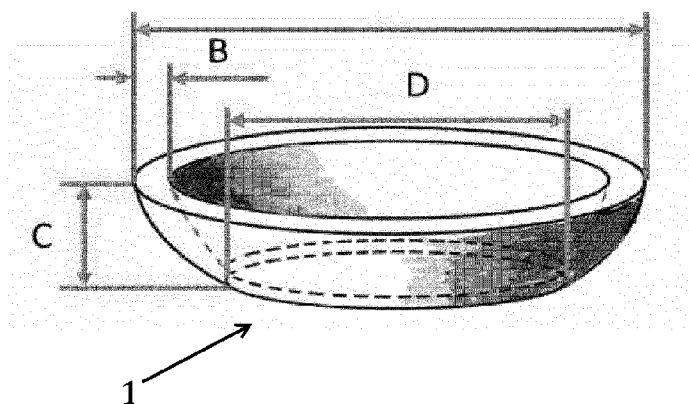
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(54) Title: METHOD OF MAKING A TOBACCO CUT FILLER WITH TOBACCO DUST TABLETS

Fig. 1



(57) Abstract: A method of making a tobacco cut filler comprises providing tobacco dust and tobacco particles having an average particle size from about (0.01) millimetres to about (1.5) millimetres and compressing the tobacco dust in a die to form a tobacco dust tablet (1) having an equivalent tablet diameter from about (1) millimetre to about (6) millimetres. The tobacco dust tablet is ejected from the die. The ejected tobacco dust tablet is blended with at least one other tobacco material to prepare a tobacco cut filler comprising at least (1) percent by weight of tobacco dust tablet.

METHOD OF MAKING A TOBACCO CUT FILLER WITH TOBACCO DUST TABLETS

The present invention relates to a method of making a tobacco cut filler for a smoking article. The invention further relates to a tobacco cut filler for a smoking article and smoking
5 articles comprising the tobacco cut filler.

During normal tobacco processing operations, such as stemming, aging, blending, cutting, drying, cooling and screening of tobacco material, tobacco dust and tobacco particles are produced. Methods are known for recovering tobacco dust and tobacco particles which would otherwise go to waste, so that their useful tobacco content may be reclaimed. By way of example,
10 it is known to recycle tobacco dust and tobacco particles in a cast leaf process for the production of reconstituted tobacco sheets. Reconstituted tobacco sheets obtained by one such process may be cut to produce a tobacco filler material suitable for cigarettes and other smoking articles.

These methods typically require dedicated equipment, often at a different locations and operating independently of the cigarette making facility. Further, these processes generally
15 consume a significant amount of energy. For example, these processes require large scale dryers for the evaporation of the water content of the slurry from which the reconstituted tobacco sheet is cast.

For these reasons, the known methods may be not always be optimised in terms of overall production costs, process efficiency, or logistics. Further, it would generally be desirable to
20 improve the filling power of the product recovered from tobacco dust.

Thus, it would be desirable to provide a method of making a tobacco cut filler for a smoking article whereby tobacco dust and tobacco particles recovered during the normal processing of tobacco material are more easily integrated into the process for manufacturing smoking articles.

According to a first aspect of the present invention, there is provided a method of making
25 a tobacco cut filler. According to the method, tobacco dust or tobacco particles having an average particle size from about 0.01 millimetres to about 1.5 millimetres are collected and compressed in a die to form a tobacco dust tablet having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres. The formed dust tablet is then ejected from the die. Further, the ejected tobacco dust tablet is blended with at least one other tobacco material into a tobacco cut filler
30 comprising at least 1 percent by weight of the tobacco dust tablet.

According to a another aspect of the present invention, there is provided a tobacco cut filler for a smoking article comprising at least 1 percent by weight of tobacco dust tablets having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres.

According to a another aspect of the present invention, there is provided a smoking article
35 comprising a rod of tobacco cut filler comprising at least 1 percent by weight of tobacco dust tablet having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres.

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It will be appreciated that any features described with reference to one aspect of the present invention are equally applicable to any other aspect of the invention.

By the term "tobacco dust", reference is made throughout the specification to fragments of the tobacco plant, particularly of the tobacco lamina, stems and stalk, having an average size of less than about 0.6 millimetres. The average size of the tobacco dust and particles may be measured by means of sieve size analyses.

The expression "other tobacco material" is used throughout the specification to refer to a tobacco material other than the "tobacco dust and tobacco particles" as identified above and which can be used for the production of a tobacco cut filler. By way of example, in some embodiments, by "other tobacco material" reference may be made to tobacco lamina material, tobacco stem material, tobacco stalk material or combinations thereof.

The term "tobacco rod" is used throughout this specification to refer to a tobacco-containing substrate that is adapted to be combusted to form smoke or heated to form an aerosol.

The term "smoking article" is used throughout this specification to refer to an article wherein a tobacco-containing substrate is combusted to form smoke or heated to form an aerosol. Smoking articles in which a tobacco-containing substrate is heated rather than combusted are known in the art. In heated smoking articles, an aerosol is generated by heating an aerosol generating substrate, such as tobacco. Known heated smoking articles include, for example, smoking articles in which an aerosol is generated by electrical heating or by the transfer of heat from a combustible fuel element or heat source to an aerosol forming substrate. During smoking, volatile compounds are released from the aerosol forming substrate by heat transfer from the heat source and entrained in air drawn through the smoking article. As the released compounds cool they condense to form an aerosol. Also known are smoking articles in which a nicotine-containing aerosol is generated from a tobacco material, tobacco extract or other nicotine source, without combustion and in some cases without heating, for example through a chemical reaction.

The term "compressive load" is used throughout the specification to indicate a measure of the force by which the tobacco dust and tobacco particles are pressed inside a die. In more detail, the tablet press is a high-speed mechanical device that substantially squeezes the tobacco dust and particles, optionally mixed with one or more of a binder, lubricant, excipient, into the required tablet shape with high precision. The die, which is typically made of hardened steel, has a disc shape and a hole cut through its centre. The tobacco dust and particles are compressed in the centre of the die by two hardened steel punches that fit into the hole from the top and bottom of the die. The shape of the hole and punches shall substantially determine the shape of the tablet. Thus, in practice, by "compressive load", reference is made to a measure of the force exerted on the die and punches to form a tablet.

By the term "bulk density", reference is made throughout this specification to the ratio of the weight of a tablet to the volume of the tablet, including the voids between the tablets when in

a container with a predefined volume. In general, the “bulk density” will be lower than the volumetric mass density (simply called “density”) corresponding to the ratio of the weight of a volume equivalent to the tablet volume that were completely filled with tobacco dust to the tablet volume.

5 According to the present invention, the tobacco dust and tobacco particles produced during normal processing of tobacco material may be recovered and subjected to a simple and inexpensive process that can be conveniently carried out at the same facility where smoking articles are manufactured in a cost-effective manner. This is advantageous from a logistics standpoint. Further, because the recovered tobacco dust and tobacco particles do not need to
10 undergo preliminary conditioning treatments, nor do they need to be dried, the overall energy consumption associated with the process is limited. By selecting the geometry of the die, the compressive load and other operating parameters characterising the tablet forming step, the characteristics of the tobacco dust tablets obtained by the method according to the invention may be tailored to the subsequent use, for example, as a component of a tobacco cut filler for a
15 smoking article. In particular, the filling power may be improved with respect to that of conventional products formed from recovered tobacco dust.

In methods according to the present invention, tobacco dust is provided and compressed in a die to form a tobacco dust tablet having a predetermined shape. The tobacco dust tablet may be formed into any suitable shape. Axially symmetric shapes, such as for example
20 cylindrical, disc-shaped, hemispherical, cup-shaped, ring-shaped and disc-shaped. Axially symmetric shapes are preferred because usually, the tooling is easier to form. However, tobacco dust tablets according to the invention may alternatively be formed into other shapes such as triangular, rhomboidal, rectangular, square, star, chevron, letter, icon, logo.

In practice, the thickness of a tablet is determined by the amount of tobacco dust and
25 particles subjected to compression and by the position of the punches in relation to each other during compression. The shorter the distance between the punches, the smaller the thickness. Further, the size and shape of a tablet is determined by the size and shape of the die and punches used for forming the tablet.

Throughout this specification, the term “thickness of a tablet” is used to define the maximal
30 distance between opposite faces of a tablet as measured along the direction defined by the axis of application of the compressive load once the formed tablet is removed from the die. According to the invention, the thickness of the tablet may vary along the cross section of the tablet. The variation of thickness may be linear or follow any other suitable curve.

Further, the term “cross-sectional dimension” is used herein to describe a dimension of
35 the tablet measured in a plane substantially perpendicular to the axis of application of the compressive load. In practice, the cross-sectional dimension of the tablet shall substantially correspond to the inner cross-sectional dimension of the die. Mathematically, the term cross-

sectional dimension as used throughout the specification corresponds to the diameter of the smallest possible circle that completely encompasses the cross-section of the tablet. It shall be understood that the term "cross-section of the tablet" is used herein to describe the cross-section of the tablet in a plane substantially perpendicular to the axis of application of the compressive load.

Preferably, in methods according to the present invention, the tobacco dust and tobacco particles are compressed to form a tablet having an equivalent tablet diameter from about 2 millimetres to about 5 millimetres.

Preferably, in methods according to the present invention, tobacco dust and particles are compressed to form a tablet having a thickness of less than about 6 millimetres, preferably less than about 4 millimetres, even more preferably less than about 2 millimetres. In addition, or as an alternative, in methods according to the present invention, tobacco dust and particles are compressed to form a tablet having a thickness of at least about 0.02 millimetres, preferably at least about 0.1 millimetres, even more preferably at least about 0.5 millimetres. By way of example, in methods according to the present invention, tobacco dust and particles may be compressed to form a tablet having a thickness of from about 0.02 millimetres to about 6 millimetres, more preferably from about 0.1 millimetres to about 4 millimetres.

Preferably, in methods according to the present invention, tobacco dust and particles are compressed to form a tablet having a cross-sectional dimension of less than about 6 millimetres, preferably less than 5 millimetres, even more preferably less than about 3 millimetres. In addition, or as an alternative, in methods according to the present invention, tobacco dust and particles are compressed to form a tablet having a cross-sectional dimension of at least about 1 millimetre, preferably at least about 1.5 millimetres, even more preferably at least about 2 millimetres. By way of example, in methods according to the present invention, tobacco dust and particles may be compressed to form a tablet having a cross sectional dimension of from about 1 millimetre to about 6 millimetres, preferably from 2 millimetres to 5 millimetres.

Preferably, in methods according to the present invention, tobacco dust and particles are compressed to form a tablet having a thickness-to-cross-sectional-dimension ratio of less than 1, preferably less than about 0.5, even more preferably less than 0.3. In addition, or as an alternative, tobacco dust and particles are compressed to form a tablet having a thickness-to-cross-sectional-dimension ratio of at least about 0.02, preferably at least about 0.1, even more preferably at least about 0.2. By way of example, in methods according to the present invention, tobacco dust and particles may be compressed to form a tablet having a thickness-to-cross-sectional-dimension ratio from about 0.02 to about 1, preferably from 0.1 to about 0.5. Advantageously, tablets with this size fit well into longitudinal extending articles, such as tobacco rods.

Other characteristics of a tablet, such as density, porosity and hardness shall generally depend on how the tobacco dust and tobacco particles are compressed. Thus, the compressive load, the number of applications of each compressive load as well as the duration of the application may all may impact features of the tablet such as density and porosity, hardness, and so forth.

Preferably, in the step of forming the tobacco dust tablets, the tobacco dust is compressed to a bulk density of at least 25 kilograms per cubic metre, more preferably to a bulk density of at least 40 kilograms per cubic metre. Additionally, or as an alternative, in the step of forming the tobacco dust tablets, the tobacco dust is preferably compressed to a bulk density less than about 80 kilograms per cubic metre, more preferably to a bulk density less than about 70 kilograms per cubic metre. In some preferred embodiments, in the step of forming the tobacco dust tablets, the tobacco dust is preferably compressed to a bulk density from about 40 kilograms per cubic metre to about 70 kilograms per cubic metre. It is advantageous to compress the tobacco dust to a bulk density within these ranges, since this approximates the values of bulk density found with natural tobacco. Accordingly, it is easier to use the tablet material obtainable by methods according with the present invention in combination with natural tobacco for the manufacture of smoking articles.

In preferred embodiments of the method, the compressing step is performed at least twice.

In some embodiments, prior to being compressed, the tobacco dust may be mixed with a binder or lubricant or excipient or combinations thereof.

Preferably, the tobacco dust tablet comprises at least 50 percent by weight of tobacco dust. More preferably, the tobacco dust tablet comprises at least 60 percent by weight of tobacco dust. Even more preferably, the tobacco dust comprises at least 70 percent by weight by tobacco dust. In some embodiments, the tobacco dust tablet may consist entirely of tobacco dust.

Tablets obtainable by methods according to the invention find application in the manufacture of a tobacco cut filler for smoking articles. In more detail, a tobacco cut filler may be prepared that comprises at least 1 percent by weight of tobacco dust tablet material having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres.

Preferably, in a tobacco cut filler according to the present invention, the tobacco dust tablet material has an equivalent tablet diameter from about 2 millimetres to about 5 millimetres.

To this purpose, tobacco dust tablet material is blended during the smoking article manufacturing process with at least one other tobacco material, such as tobacco lamina, tobacco stems, tobacco stalks, reconstituted tobacco material, expanded or defibrillated tobacco material, and so forth.

Preferably, the tobacco cut filler comprises at least 5 percent by weight of tobacco dust tablet material having an equivalent tablet from about 1 millimetre to about 6 millimetres, preferably having an equivalent tablet from about 2 millimetres to about 5 millimetres. Even more preferably, the tobacco cut filler comprises at least 10 percent by weight of tobacco dust tablet

material having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres, preferably having an equivalent tablet from about 2 millimetres to about 5 millimetres.

A tobacco cut filler comprising tobacco dust tablet material according to the invention finds application in the manufacture of a tobacco rod for a smoking article. By way of example, a smoking article according to the invention comprises a tobacco rod circumscribed by a paper wrapper and a mouthpiece attached to one end of the tobacco rod, for example by means of tipping paper. The tobacco rod comprises tobacco cut filler comprising at least 1 percent by weight of tobacco dust tablet material having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres. Preferably, in a tobacco rod according to the present invention the tobacco dust tablet material has an equivalent tablet diameter from about 2 millimetres to about 5 millimetres. Preferably, the tobacco rod comprises tobacco cut filler comprising at least 5 percent by weight of tobacco dust tablet material having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres, preferably from about 2 millimetres to about 5 millimetres.

The invention will be further described, by way of example only, with reference to the accompanying drawings in which:

Figures 1, 2, 3 and 4 are schematic perspective views of tobacco dust tablets 1 formed according to methods of the present invention. In more detail, different embodiments of tobacco dust tablets 1 are shown that have different shapes, including cup-shaped (Figure 1), ring-shaped (Figure 2), dome-shaped (Figure 3) and disc-shaped (Figure 4).

In a first embodiment, the tobacco dust tablets 1 of Figures 1-4 are formed from a mixture comprising about 100 percent by weight of tobacco dust and tobacco particles having an average size of between 0.2 millimetres and 0.4 millimetres. The mixture is compressed in dies by punches exerting on the mixture a substantially uniaxial load.

In a second embodiment, the tobacco dust tablets 1 of Figures 1-4 are formed from a mixture comprising 95 percent by weight of tobacco dust and tobacco particles having an average size of between 0.2 millimetres and 0.3 millimetres and 5 percent by weight of guar gum as a binder. The mixture is compressed in dies by punches exerting on the mixture a substantially uniaxial load.

In the drawings of Figures 1-4, letters A to D are used to identify certain geometrical parameters of tablets 1, such as the outer diameter (A) or the thickness (B in Figures 2 and 4). In the following, values for the various geometrical parameters measured for the tobacco dust tablets of Figures 1-4 are provided:

Figure 1

A = 4 millimetres; B = 0.15 millimetres; C = 2 millimetres; and D = 2 millimetres.

Figure 2

A = 3 millimetres; B = 0.2 millimetres; and D = 1 millimetres.

Figure 3

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A = 2.5 millimetres; B = 0.2 millimetres; C = 2 millimetres.

Figure 4

A = 5 millimetres; and B = 0.15 millimetres.

CLAIMS

1. A method of making a tobacco cut filler, comprising:
providing tobacco dust particles having an average particle size from about 0.01
5 millimetres to about 1.5 millimetres;
compressing the tobacco dust in a die to form a tobacco dust tablet having an equivalent
tablet diameter from about 1 millimetre to about 6 millimetres,
ejecting the tobacco dust tablet from the die; and
blending the ejected tobacco dust tablet with at least one other tobacco material to prepare
10 a tobacco cut filler comprising at least 1 percent by weight of tobacco dust tablet.
2. A method according to claim 1, wherein, in the step of forming the tobacco dust tablets,
the tobacco dust is compressed to form a tablet having an equivalent tablet diameter from about
2 millimetres to about 5 millimetres.
15
3. A method according to claim 1 or 2, wherein, in the step of forming the tobacco dust
tablets, the tobacco dust is compressed to form a tablet having a thickness of from about 0.02
millimetres to about 6 millimetres.
- 20 4. A method according to any one of claims 1 to 3, wherein, in the step of forming the tobacco
dust tablets, the tobacco dust is compressed to form a tablet having a cross sectional dimension
of from about 1 millimetre to about 6 millimetres.
5. A method according to any one of the preceding claims, wherein, in the step of forming
25 the tobacco dust tablets, the tobacco dust is compressed to form a tablet having a thickness-to-
cross-sectional-dimension ratio from about 0.02 to about 1.
6. A method according to any one of the preceding claims, wherein the compressing step is
performed at least twice.
30
7. A method according to any one of the preceding claims, further comprising, prior to the
compressing step, the step of mixing the collected tobacco dust with a binder or lubricant or
excipient or combinations thereof.
- 35 8. A method according to any one of the preceding claims, wherein the tobacco dust tablet
comprises at least 50 percent by weight of tobacco dust.

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9. A tobacco cut filler for a smoking article comprising at least 1 percent by weight of tobacco dust tablets having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres.

10. A tobacco cut filler according to claim 9, wherein the tobacco dust tablets have an
5 equivalent tablet diameter from about 2 millimetres to about 5 millimetres.

11. A tobacco cut filler according to claim 9 or 10, comprising at least about 5 percent by weight of the tobacco dust tablet material.

10 12. A smoking article comprising a rod of tobacco cut filler comprising at least 1 percent by weight of tobacco dust tablets having an equivalent tablet diameter from about 1 millimetre to about 6 millimetres.

13. A smoking article according to claim 12, wherein the tobacco dust tablets have an
15 equivalent tablet diameter from about 2 millimetres to about 5 millimetres.

14. A smoking article according to claim 12 or 13, comprising at least about 5 percent by weight of the tobacco dust tablets.

Fig. 1

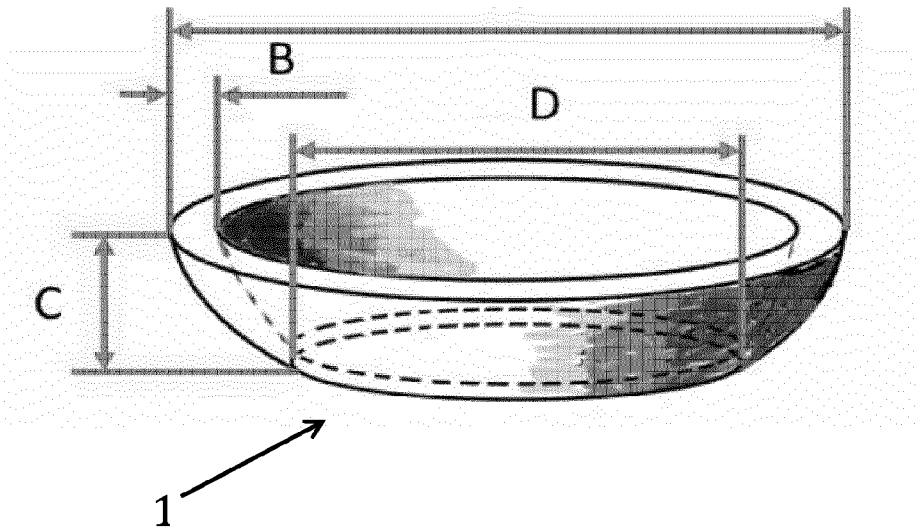
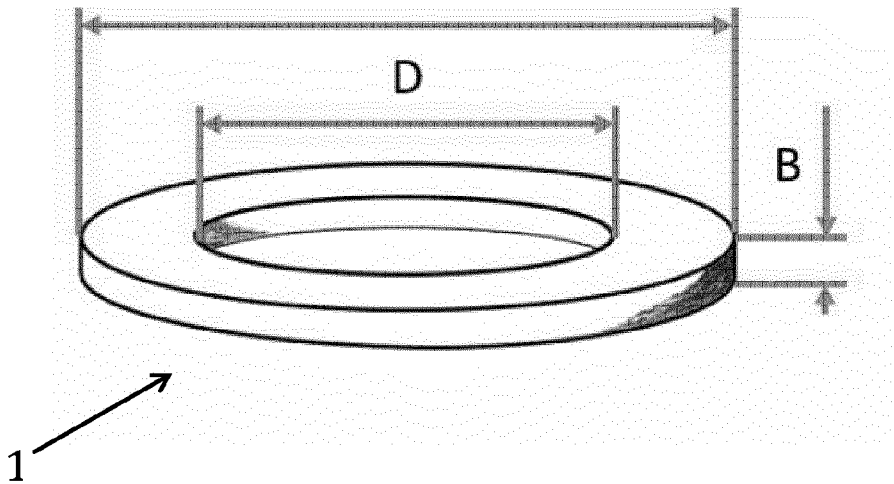


Fig. 2



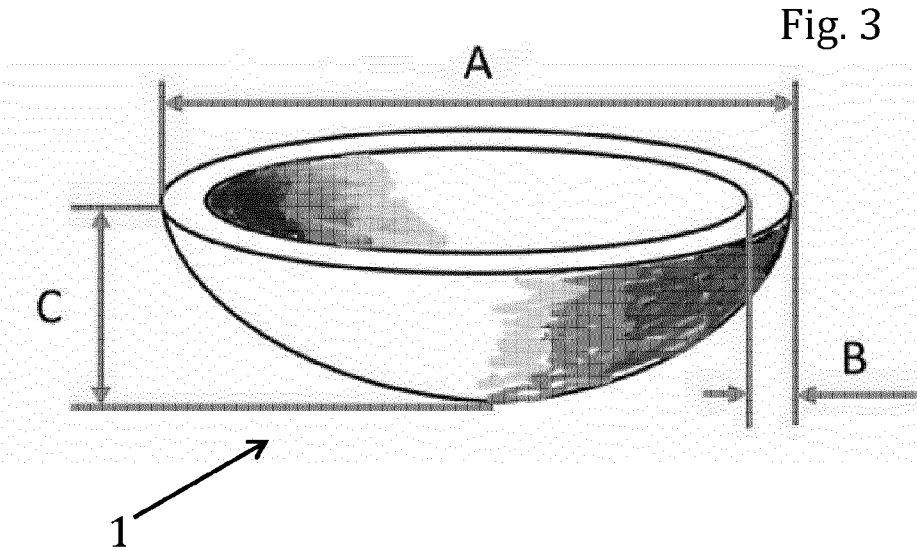
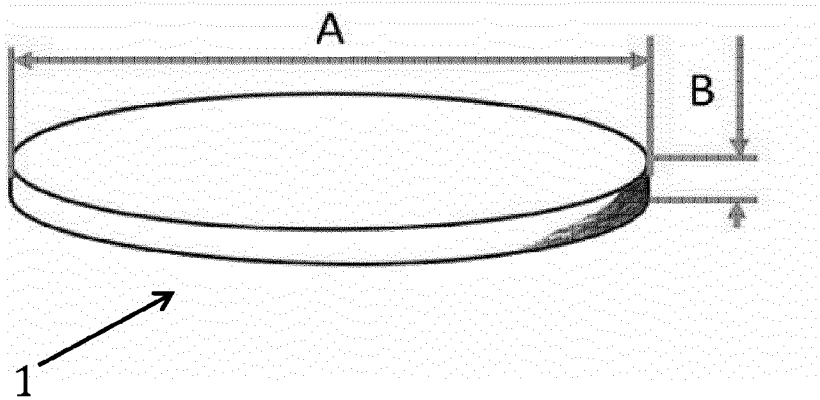


Fig.4



INTERNATIONAL SEARCH REPORT

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/098187 A1 (GRIERSON GORDON R [GB] ET AL) 12 May 2005 (2005-05-12)	9-14
A	paragraph [0017] - paragraph [0050] -----	1-8
A	US 235 886 A (ISAAC LINDSLEY) 28 December 1880 (1880-12-28) page 1, line 92 - page 2, line 61 -----	1-14
A	CN 102 972 860 A (JILIN TOBACCO IND CO LTD) 20 March 2013 (2013-03-20) see automatic translation into English -----	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005098187	A1	12-05-2005	AT 361002 T 15-05-2007
		AU 2002358221	A1 15-07-2003
		BR 0215208	A 26-10-2004
		CA 2469917	A1 10-07-2003
		CN 1617680	A 18-05-2005
		EP 1460908	A1 29-09-2004
		JP 2005512585	A 12-05-2005
		KR 20040068292	A 30-07-2004
		MX PA04006160	A 01-11-2004
		RU 2293502	C2 20-02-2007
		US 2005098187	A1 12-05-2005
		WO 03055337	A1 10-07-2003
		ZA 200405835	A 21-10-2005

US 235886	A	28-12-1880	NONE

CN 102972860	A	20-03-2013	NONE
