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(54) METHOD FOR PRODUCING A TUBULAR TOBACCO PRODUCT, TUBULAR TOBACCO PRODUCT, AEROSOL-FORMING STICK, AEROSOL-GENERATING DEVICE

(57) The invention relates to a method for producing a tubular tobacco product (16) and a tubular tobacco product (16) and an aerosol-forming stick (100) and an aerosol-generating device (110).

It is provided that a method for producing a tubular tobacco product (16) comprising at least one hollow bore comprises the following steps: providing at least one mold device adapted to form a tubular product (16) with a hollow bore extending along the longitudinal axis of the tubular tobacco product (16), casting slurry reconstituted tobacco composition into the at least one mold device, removing the tubular tobacco product (16) from the at least one mold device. Furthermore, a tubular tobacco product (16) is provided, wherein said tubular tobacco product (16) is manufactured according to the presented method. Also provided is an aerosol-forming stick (100) for use in an aerosol-generating device (110), wherein the aerosol-forming stick (100) comprises the tubular tobacco product (16). Finally, the aerosol-generating device (110) itself is provided.

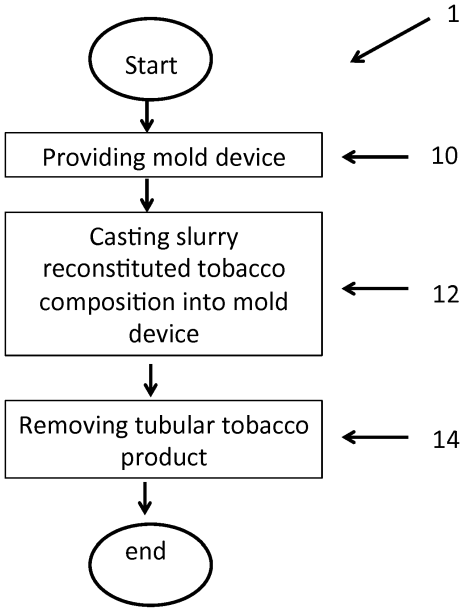

FIG. 1

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Description

Background of the invention

[0001] The invention relates to a method for producing a tubular tobacco product and a tubular tobacco product and an aerosol-forming stick and an aerosol-generating device.

[0002] In the field of tobacco containing products exists a variety of different approaches for producing a final product. Final products known from the state of the art therefore vary in the design and functionality and are often different in comparison to conventional cigarettes. Conventional cigarettes comprise a rod made of tobacco material (tobacco rod) with a wrapping made usually of cigarette paper. On the end of the tobacco rod usually a cylindrical filter (in the form of a plug) made of e. g. cellulose acetate with a wrapping made of filter paper (in the form of a plug wrap) is placed. In addition, the filter and an edging area of the tobacco rod is wrapped by wrapping made of a special paper, for example of a tipping paper. Commonly, the tobacco material is made of natural leaf tobacco. The material can be pre-treated or further processed for example by conditioning, stemming/stripping, drying, mixing, saucing, flavouring by spraying on flavouring substances and cutting. While producing final products from tobacco so called byproducts are generated from previous processes such as the threshing line. The by-product generated from previous processes such as the threshing line, primary production and make & pack, can be collected and used in the manufacture of a tobacco sheet very similar to that of natural leaves of tobacco. The sheet is then cut into strips for ease of blending with other tobacco types. In general, the tobacco based components may include the leaf lamina, cut and rolled stem, reconstituted sheet and expanded tobacco. The tobaccos stored in bales are broken up, cut into specific dimensions, and combined with other blend components such as casing and top dressing, and adjustment of the moisture content. American blend cigarettes contain the four types of tobacco mentioned above plus reconstituted or homogenized sheet tobacco. This is made from tobacco dust, fines and particles, and leaf ribs and stems. Reconstituted tobacco or homogenized sheet tobacco is a paper-like sheet approaching the thickness of tobacco laminae. It is made from tobacco dust, fines, and particles, and from ribs and stems. Various additives may be incorporated. In the past, most of these "tobacco byproducts" were wasted.

[0003] Considering the economics of the production of tobacco products, the usage of reconstituted tobacco can be regarded as favorable. In addition, the acceptance from the customer side is increasing as well. Especially as new treatment procedures and composition have been introduced to the market over the past years. Therefore, one can say that reconstituted tobacco is already an important material in the tobacco industry and the significance will increase in the near future. Different types of reconstituted tobacco is so far known. Three examples of reconstituted tobacco are paper-making recon, slurry recon and cast recon. Slurry recon can also be denoted or named as a slurry reconstituted tobacco composition. Such composition can comprise for example at least reconstituted tobacco and water or in addition further ingredients can be added during the mixing procedure. Currently, there is no immediate solution in using the slurry recon itself directly in the production process. Associated with this present situation the current known machineries (in the case of slurry recon) are unable to operate long enough runs due to clogging for example from high amount of glycerol.

[0004] The following documents represent some known solutions and can be seen as examples for the state of the art in this field.

Prior art

[0005] The document GB 2 078 087 A discloses smoking articles containing tobacco and method of making such. The smoking article comprises a coherent mass of combustible tobacco-containing material having at least one passage extending through it between two spaced openings in the surface of the mass, the tobacco mass having such porosity as to support combustion when ignited and such density and porosity as to substantially occlude gas flow there through. The article preferably has at least one air-permeable plug of readily ignitable material blocking the passage at one or both ends. The tobacco-containing mass may include non-tobacco filler particles, such as carbon or clays, and the plug may contain a flavorant.

The articles may be made by shaping a mixture of combustible tobacco material with a volatile liquid, for example a mixture of water and ethanol, under pressure into a discrete coherent mass, preferably by extrusion, forming a passage through the mass, and drying the mass to a porosity and density such as to substantially occlude gas flow there through but to support combustion when ignited. However, this disclosure does not disclose a method for producing a tubular tobacco product which comprises the steps of providing at least one mold device adapted to form a tubular product with a hollow bore extending along the longitudinal axis of the tubular tobacco product, casting slurry reconstituted tobacco composition into the at least one mold device, and removing the tubular tobacco product from the at least one mold device. In addition, neither an aerosol-forming stick nor an aerosol-generating device according to the present invention is disclosed.

[0006] The document WO 1996/ 03060 discloses a hollow smokeable article. This cigarette-like smokeable article

comprises a hollow rod for directing smoke and air from the lit end of the article to a filter located at the mouth end of the article. The rod is formed of tobacco material and/or other cellulosic or pyrolized bone material, together with a binder and preferably an organic or inorganic salt. The materials are mixed in an aqueous or mixed aqueous/nonaqueous solution and then cast, extruded, or molded into the hollow rod shape. The rod is either surrounded by leaf tobacco and wrapped in cigarette paper, or is wrapped directly with cigarette paper, and combined with a filter to form the smokeable article. Due to the hollow passage through the rod, the article burns in an inverted fire cone shape, which heat treats the mainstream smoke and also reduces the amount of sidestream smoke produced. However, this disclosure does not disclose a method for producing a tubular tobacco product which comprises the steps of providing at least one mold device adapted to form a tubular product with a hollow bore extending along the longitudinal axis of the tubular tobacco product, casting slurry reconstituted tobacco composition into the at least one mold device, and removing the tubular tobacco product from the at least one mold device. In addition, neither an aerosol-forming stick nor an aerosol-generating device according to the present invention is disclosed.

[0007] The document US 4,981,522 discloses a thermally releasable flavour source for smoking articles. This flavour source to be used as a thermally releasable flavourant for smoking articles does not combust tobacco. The material includes tobacco particles, an aerosol precursor that forms an aerosol upon exposure to heat, and a filler material that absorbs and radiates heat to minimize the likelihood that the flavour material will ignite. The material is mixed in an extruder, extruded through a die, and cut into pellets having a substantially uniform shape. The pellets are loaded into a chamber for inclusion in a smoking article as a flavour generator. However, this disclosure does not disclose a method for producing a tubular tobacco product which comprises the steps of providing at least one mold device adapted to form a tubular product with a hollow bore extending along the longitudinal axis of the tubular tobacco product, casting slurry reconstituted tobacco composition into the at least one mold device, and removing the tubular tobacco product from the at least one mold device. In addition, neither an aerosol-forming stick nor an aerosol-generating device according to the present invention is disclosed.

[0008] There is a desire for a steady improvement in the cost structure associated with the production in the field of tobacco containing products. Therefore using reconstituted tobacco in the production of tobacco products can be seen as an interesting research field for the tobacco industry.

[0009] It is therefore an object of the presented invention to provide a method for producing a tobacco product which provides an improved cost structure regarding the production costs and which will emphasize the usage of reconstituted tobacco. In addition, it is an object of the presented invention to provide an aerosol-forming stick and an aerosol-generating device which support the aforementioned objects.

[0010] In a preferred embodiment of the invention it is provided that a method for producing a tubular tobacco product comprising at least one hollow bore comprises the following steps: providing at least one mold device adapted to form a tubular product with a hollow bore extending along the longitudinal axis of the tubular tobacco product, casting slurry reconstituted tobacco composition into the at least one mold device and removing the tubular tobacco product from the at least one mold device. In this way, a direct use of slurry recon can be performed, so that a cost-effective production of final products is possible. Instead of producing an intermediate product of the slurry recon, within the presented method a direct product can be provided which for example could be used in a heating stick (for example in an aerosol-forming stick) and further in an aerosol-generating device. In other words, a direct product can be manufactured using the presented method which is ready to be used for example as heat sticks or which can be produced in form of sticks for it to be only wrapped by cigarette paper and filter. By using the presented method, threshing can be avoided and therefore additionally cost can be saved.

Preferably, the method of the invention further comprises the additional step of drying the slurry reconstituted tobacco composition after casting and prior to removing the tubular tobacco product from the at least one mold device. Typically, drying is performed at a temperature of between 0°C to 130°C, preferably at a temperature between room temperature and 130°C, wherein room temperature denotes a temperature of not more than 25°C and in particular a temperature that is within the range of 18°C and 25°C. Said drying step can be performed in molds which have the form of long tubes, whereby the output would be recon rods instead of flakes or cut rag. The presented method of the invention allows the production of products which are 100% made of recon tobacco and therefore an economic production is provided. For example, the method can be applied in a supplier facility.

[0011] In another preferred embodiment of the invention it is provided that a tubular tobacco product comprises at least one hollow bore (extending along the longitudinal axis of the tubular tobacco product), wherein said tubular tobacco product is manufactured according to a method of the invention. The aforementioned advantages apply in the same way as far as transferable for the presented product.

[0012] In another preferred embodiment of the invention an aerosol-forming stick for use in an aerosol-generating device is provided. The aerosol-forming stick comprises the tubular tobacco product of the invention, preferably the aerosol-forming stick further comprises a filter section and optionally an aerosol-cooling element between the tubular tobacco product and the filter section. The aforementioned advantages apply in the same way as far as transferable for the presented product.

[0013] In another preferred embodiment of the invention it is provided that an aerosol-generating device comprises a receiving section for receiving the aerosol-forming stick of the invention and a heating section that is capable of heating the tubular tobacco product of said aerosol-forming stick when fully inserted into the receiving section. The aerosol-generating device further comprises an aerosol-forming stick of the invention fully inserted, wherein at least one of the heating section and the receiving section of the aerosol-generating device are designed to engage with an inner and/or outer cross-sectional shape of the tubular tobacco product. The aforementioned advantages apply in the same way as far as transferable for the presented product.

[0014] Further preferred embodiments of the invention will become apparent from the remaining features mentioned below and in the dependent claims.

[0015] In a further preferred embodiment of the invention, it is provided that the at least one mold device comprises one or more than one central mandrel for forming one or more than one hollow bore into the tubular tobacco product. In this way it is possible to create or produce products which comprise one or more than one hollow bore (hole/holes) which provide an improved aeration during the usage of the product itself. As this step is combined with the aforementioned steps during the usage of the method at the same time, an even better economic performance can be achieved.

[0016] In a further preferred embodiment of the invention, it is provided that the at least one mold device is designed such that a tubular tobacco product is formed with a diameter of from 1,5 to 20 mm, preferably from 4 to 15 mm, even more preferably from 5 to 12 mm. Depending on the desired site of use, a product can thus be provided with the presented method, which accordingly has a precisely fitting size in order to be used at the desired site of use. Such a site of use could be, for example, a stick or a device according to the presented invention. In addition, the advantages mentioned above can thus be implemented even better as the presented measurements provide an easier way of processing the raw material (slurry recon or in general reconstituted tobacco).

[0017] In a further preferred embodiment of the invention, it is provided that the at least one mold device is designed such that the at least one hollow bore has a diameter of from 1 to 18,5 mm, preferably from 2,5 to 15 mm, even more preferably from 3 to 12 mm. Thus, depending on the diameter, a desired rate of heating from within the product to be produced by the process can be specifically provided. This makes it easier to deliver a product to the consumers which comprises certain desired properties so that a consumer friendly product can be produced with the present method. In addition, the advantages mentioned above can thus be implemented even better as the presented measurements provide an easier way of processing the raw material (slurry recon or in general reconstituted tobacco).

[0018] In a further preferred embodiment of the invention, it is provided that the at least one mold device and the at least one mandrel are designed such that the tubular tobacco product has an average wall thickness of from 0,25 to 10 mm, preferably from 0,5 to 9,5 mm, even more preferably from 0,5 to 2 mm. The presented wall thicknesses make sure that the product made with the presented method comprises a sufficient stability during the usage phase so that a consumer friendly product can be provided.

[0019] In a further preferred embodiment of the invention, it is provided that the at least one mold device and/or the at least one mandrel are designed such that a cross section of the tubular tobacco product has a circular, oval, starlike, regular or irregular polygonal, rectangular, square or trapezoid shape or combinations thereof, wherein inner and outer shape can be the same or different. Depending on the design can be determined accordingly that the product specially produced by the method can only be used in suitable places, which then each have a matching structure to the respective design similar to a key-lock principle. Such suitable places could be for example a stick or a device according to the presented invention. Therefore, the method allows in a cost efficient manner the production of products which are consumer friendly as the design itself helps the consumer during the usage phase to be orientated in a very simply and easy to adopt manner.

[0020] In a further preferred embodiment of the invention, it is provided that the method further comprises the additional step: cutting the molded tubular tobacco product to a pre-defined length. The selected length can be easily chosen depending on the desired purpose. The method can therefore be used in such a way so that different products can be produced at the same time without a big effort concerning the needed equipment.

[0021] In a further preferred embodiment of the invention, it is provided that the slurry reconstituted tobacco composition to be cast in step b) comprises

10 to 90%	particulate tobacco material (e.g. grinded tobacco, tobacco dust);
5 to 30%	binder material (e.g. starch or guar gum);
0 to 40%	aerosol former (e.g. glycerol or propylene glycol); and
0 to 15%	water;

based on the total weight of the tobacco composition.

The presented composition and its various embodiments are particularly suitable to be used in the presented method while providing at the same time properties which can be seen as positive regarding the aspects of a consumer friendly

product itself.

[0022] Finally, in a further preferred embodiment of the invention, it is provided that the slurry reconstituted tobacco composition to be cast in step b) comprises:

50 to 80%	particulate tobacco material (e.g. grinded tobacco, tobacco dust);
8 to 15%	wood pulp;
0 to 7,8%	guar gum;
10 to 25%	aerosol former (e.g. glycerol or propylene glycol);
0,5 to 10%	water; and
0 to 10%	flavors and/or other ingredients;

based on the total weight of the tobacco composition.

The presented composition and its various embodiments are particularly suitable to be used in the presented method while providing at the same time properties which can be seen as positive regarding the aspects of a consumer friendly product itself.

[0023] The various embodiments of the invention mentioned in this application are, unless otherwise stated in the individual case, advantageously combinable with each other.

Description of the figures

[0024] The invention will be explained below in embodiments with reference to the accompanying drawings. In these drawings,

FIG. 1 is a process diagram of the presented method;

FIG. 2 is a cut view illustrating a tubular tobacco product produced with the presented method;

FIG. 3 is a cut view illustrating another tubular tobacco product produced with the presented method;

FIG. 4 is a cut view illustrating another tubular tobacco product produced with the presented method;

FIG. 5 shows schematic representations of an aerosol-forming stick and an aerosol-generating device.

[0025] FIG. 1 is a process diagram 1 of the presented method. In the first step 10 of the method at least one mold device adapted to form a tubular tobacco product 16 with a hollow bore extending along the longitudinal axis of the tubular tobacco product is provided. In the second step 12 slurry reconstituted tobacco composition is casted into the at least one mold device. And in the third step 14 the tubular tobacco product is removed from the at least one mold device.

[0026] FIG. 2 is a cut view illustrating a tubular tobacco product 16 produced with the presented method. The tubular tobacco product 16 has the form of a rod 18 and is substantially in a cylindrical shape. The tubular tobacco product 16 has a long side 20 which is only partially illustrated in the FIG. 2. Furthermore, one broadside 22 of the tubular tobacco product 16 is shown. This broadside 22 comprises a cross section area 24 wherein two hollow structures 26 in the middle area of the cross section area 24 are shown. The two hollow structures 26 have respectively substantially round cross sections and are positioned along the same line of a diameter of the cross section of the broadside 22. The sizes and geometries presented are only shown as examples and any variations are conceivable. Furthermore, instead of a cylindrical shape and the round cross sections any shape mentioned above or even combinations of these shapes or even any other suitable shapes can be applied, wherein any size can be applied so that the advantages mentioned above can be achieved.

[0027] FIG. 3 is a cut view illustrating a tubular tobacco product 16 produced with the presented method. The tubular tobacco product 16 has the form of a rod 18 and is substantially in a cylindrical shape. The tubular tobacco product 16 has a long side 20 which is only partially illustrated in the FIG. 3. Furthermore, one broadside 22 of the tubular tobacco product 16 is shown. This broadside 22 comprises a cross section area 24 wherein four hollow structures 26A,B in the middle area of the cross section area 24 are shown. The four hollow structures 26A,B have respectively substantially round cross sections and are positioned along the same line of a diameter of the cross section of the broadside 22. The two outside hollow structures 26A have a bigger cross section than the two inside hollow structures 26B. The sizes and geometries presented are only shown as examples and any variations are conceivable. Furthermore, instead of a cylindrical shape and the round cross sections any shape mentioned above or even combinations of these shapes or even any other suitable shapes can be applied, wherein any size can be applied so that the advantages mentioned

above can be achieved. Especially the different hollow structures 26A,B can comprise the same shape or different shapes, wherein any suitable size can be applied so that the aforementioned advantages of the invention can be achieved.

[0028] FIG. 4 is a view illustrating a tubular tobacco product 16 produced with the presented method. The tubular tobacco product 16 has the form of a rod 18 and is substantially in a cylindrical shape. The tubular tobacco product 16 has a long side 20 which is only partially illustrated in the FIG. 3. Furthermore, one broadside 22 of the tubular tobacco product 16 is shown. This broadside 22 comprises a cross section area 24 wherein three hollow structures 26 in the middle area of the cross section area 24 are shown. The three hollow structures 26 have respectively substantially round cross sections and are positioned in a substantially equal distance to each other so that they illustrate the vertices of an imaginary isosceles triangle. The sizes and geometries presented are only shown as examples and any variations are conceivable. Furthermore, instead of a cylindrical shape and the round cross sections any shape mentioned above or even combinations of these shapes or even any other suitable shapes can be applied, wherein any size can be applied so that the advantages mentioned above can be achieved. Especially the different hollow structures 26A,B can comprise the same shape or different shapes, wherein any suitable size can be applied so that the aforementioned advantages of the invention can be achieved.

[0029] FIG. 5 shows a schematic representations of an aerosol-forming stick 100 and an aerosol-generating device 110.

List of reference numbers

[0030]

1	process diagram
10	first step
12	second step
14	third step
16	tubular tobacco product
18	rod
20	long side
22	broadside
24	cross section area
26	hollow structure
26A	hollow structure
26B	hollow structure
100	aerosol-forming stick
110	aerosol-generating device

Claims

1. Method for producing a tubular tobacco product (16) comprising at least one hollow bore, the method comprising the steps of:

   a) providing at least one mold device adapted to form a tubular product (16) with a hollow bore extending along the longitudinal axis of the tubular tobacco product (16);
   b) casting slurry reconstituted tobacco composition into the at least one mold device; and
   c) removing the tubular tobacco product (16) from the at least one mold device.

2. The method of claim 1, wherein the at least one mold device comprises one or more than one central mandrel for forming one or more than one hollow bore into the tubular tobacco product (16).

3. The method of one of the preceding claims, wherein the at least one mold device is designed such that a tubular tobacco product (16) is formed with a diameter of from 1,5 to 20 mm, preferably from 4 to 15 mm, even more preferably from 5 to 12 mm.

4. The method of one of the preceding claims, wherein the at least one mold device is designed such that the at least one hollow bore has a diameter of from 1 to 18,5 mm, preferably from 2,5 to 15 mm, even more preferably from 3 to 12 mm.

5. The method of one of the preceding claims, wherein the at least one mold device and the at least one mandrel are

designed such that the tubular tobacco product (16) has an average wall thickness of from 0,25 to 10 mm, preferably from 0,5 to 9,5 mm, even more preferably from 0,5 to 2 mm.

6. The method of one of the preceding claims, wherein the at least one mold device and/or the at least one mandrel are designed such that a cross section of the tubular tobacco product (16) has a circular, oval, starlike, regular or irregular polygonal, rectangular, square or trapezoid shape or combinations thereof, wherein inner and outer shape can be the same or different.

7. The method of one of the preceding claims, wherein the method further comprises the additional step of:

d) cutting the molded tubular tobacco product (16) to a pre-defined length.

8. The method of one of the preceding claims, wherein the method further comprises the additional step of drying the slurry reconstituted tobacco composition after casting of step b) and prior to removing the tubular tobacco product (16) from the at least one mold device in step c).

9. The method of one of the preceding claims, wherein the slurry reconstituted tobacco composition to be cast in step b) comprises:

10 to 90%	particulate tobacco material (e.g. grinded tobacco, tobacco dust);
5 to 30%	binder material (e.g. starch or guar gum);
0 to 40%	aerosol former (e.g. glycerol or propylene glycol); and
0 to 15%	water;

based on the total weight of the tobacco composition.

10. The method of one of the preceding claims, wherein the slurry reconstituted tobacco composition to be cast in step b) comprises:

50 to 80%	particulate tobacco material (e.g. grinded tobacco, tobacco dust);
8 to 15%	wood pulp;
0 to 7,8%	guar gum;
10 to 25%	aerosol former (e.g. glycerol or propylene glycol);
0,5 to 10%	water; and
0 to 10%	flavors and/or other ingredients;

based on the total weight of the tobacco composition.

11. Tubular tobacco product (16) comprising at least one hollow bore (extending along the longitudinal axis of the tubular tobacco product (16)), wherein said tubular tobacco product (16) is manufactured according to a method of one of claims 1 to 10.

12. Aerosol-forming stick (100) for use in an aerosol-generating device (110), the aerosol-forming stick (100) comprising the tubular tobacco product (16) of claim 11; preferably the aerosol-forming stick (100) further comprises a filter section and optionally an aerosol-cooling element between the tubular tobacco product (16) and the filter section.

13. Aerosol-generating device (110) comprising a receiving section for receiving the aerosol-forming stick of claim 12 and a heating section that is capable of heating the tubular tobacco product (16) of said aerosol-forming stick (100) when fully inserted into the receiving section, the aerosol-generating device (110) further comprising an aerosol-forming stick (100) of claim 12 fully inserted, wherein at least one of the heating section and the receiving section of the aerosol-generating device (110) are designed to engage with an inner and/or outer cross-sectional shape of the tubular tobacco product (16).

14. Aerosol-generating device of claim 13, wherein at least one of the inner and outer cross sectional shape of the tubular tobacco product (16) of the aerosol-forming stick (100) is not circular, and preferably is oval, starlike, regular or irregular polygonal, rectangular, square or of trapezoid shape or combinations thereof, wherein inner and outer

cross sectional shape can be the same or different.

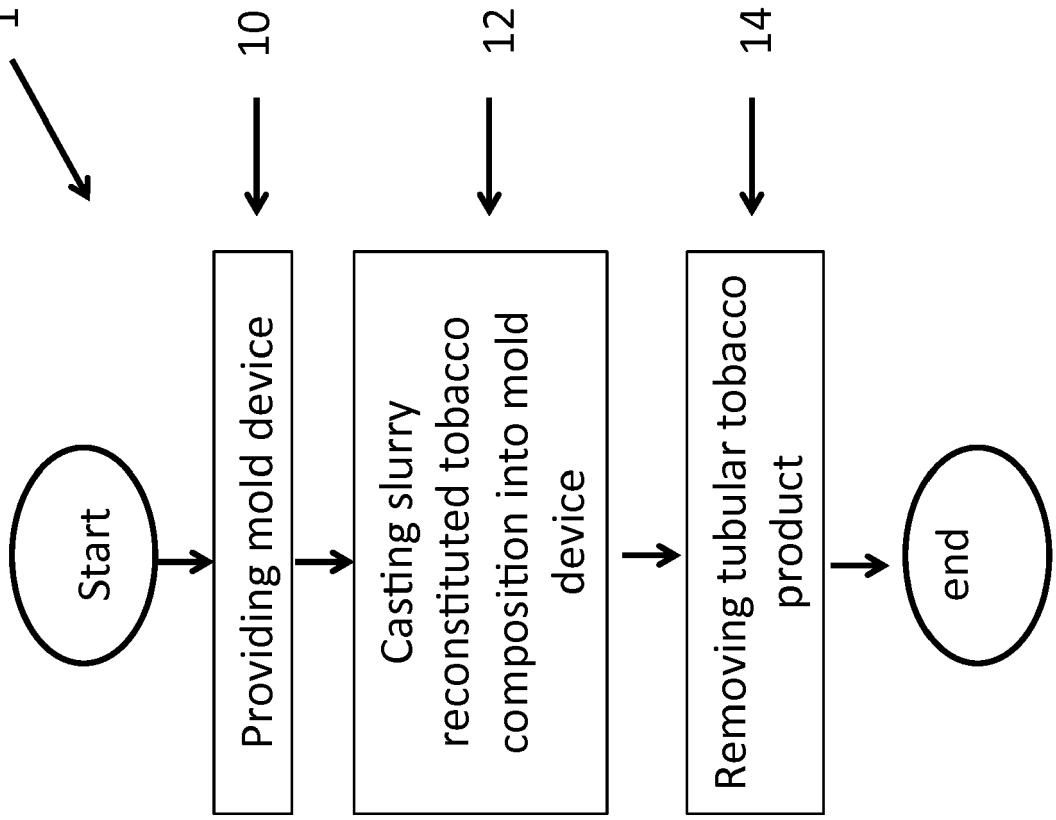

1
10
12
14
Start
Providing mold device
Casting slurry reconstituted tobacco composition into mold device
Removing tubular tobacco product
end

FIG. 1

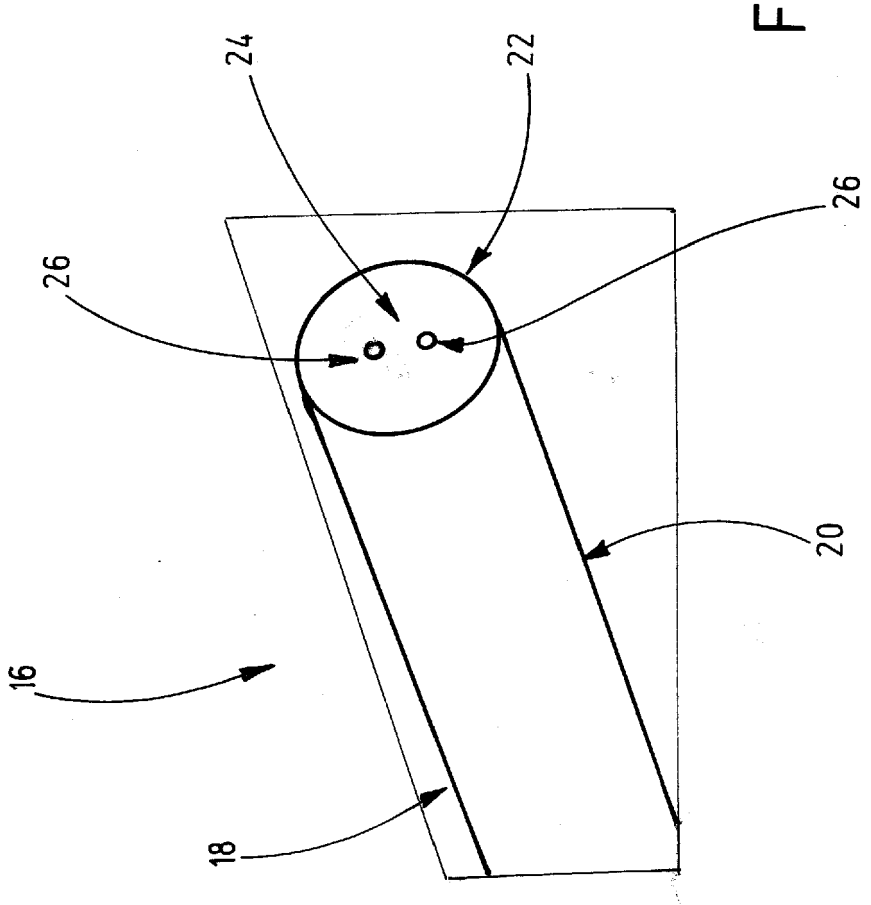


Fig.2

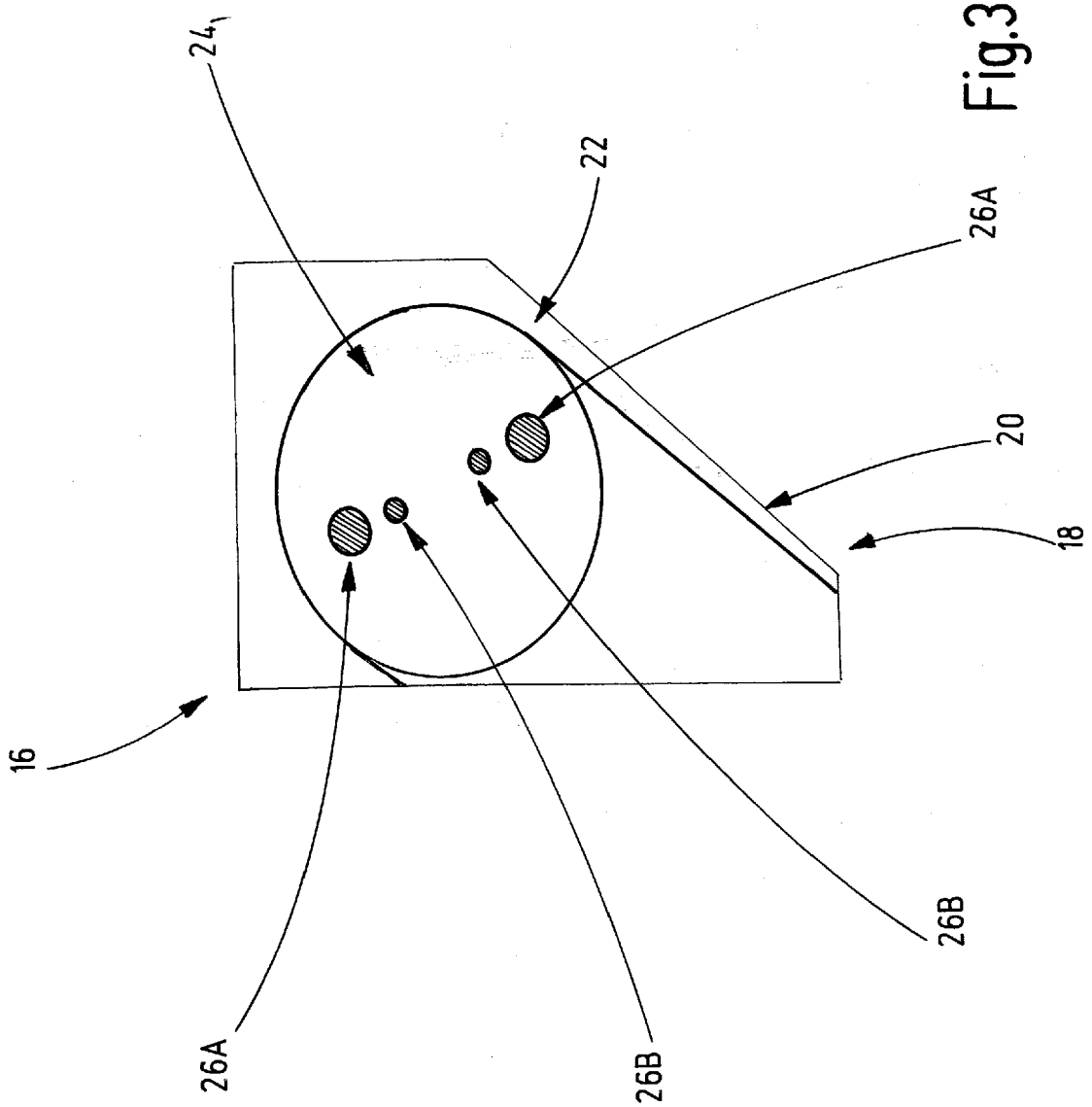


Fig.3

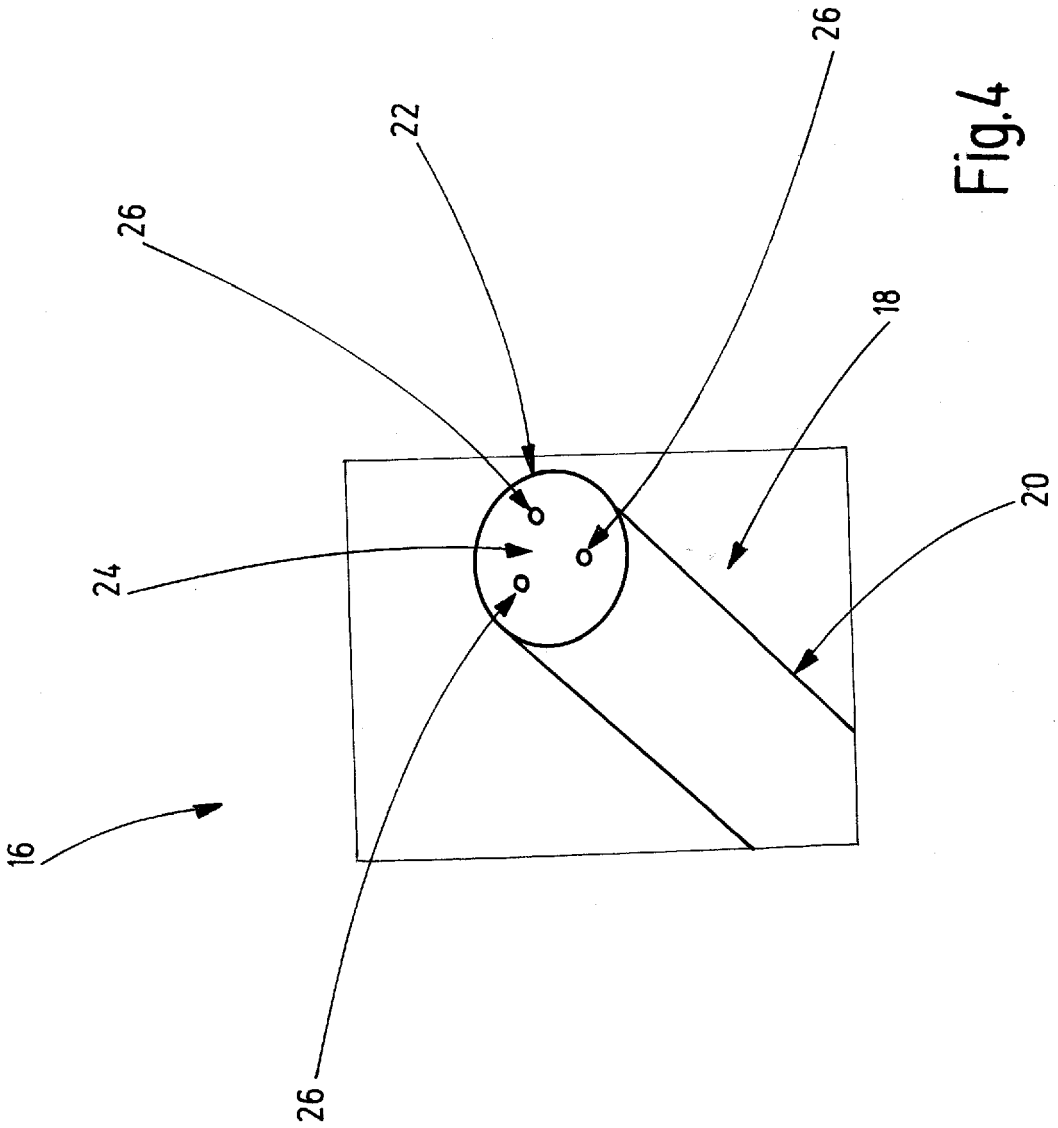
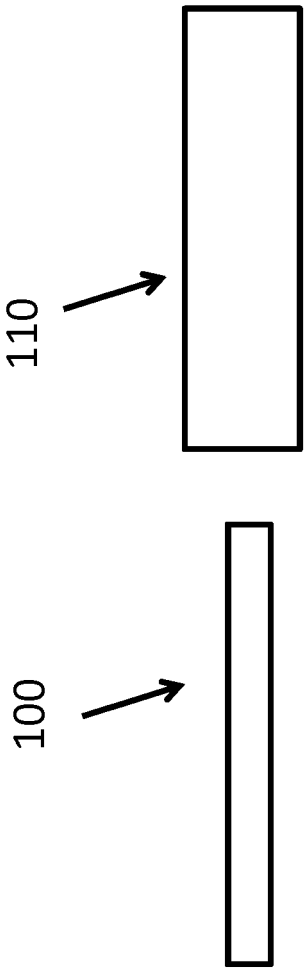


Fig.4

FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 18 19 6318

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 108 142 979 A (SHENZHEN RUIHONGBANG TECH CO LTD) 12 June 2018 (2018-06-12) * figures 3, 4 * * paragraphs [0087], [0108] - [0112] *	1-14	INV. A24B3/14
X	CN 104 366 687 B (CHINA TOBACCO YUNNAN NEW MATERIAL TECHNOLOGY CO LTD) 16 March 2016 (2016-03-16) * figure 1 * * paragraph [0021] *	1-14	
A	US 235 886 A (ISAAC LINDSLEY [US]) 28 December 1880 (1880-12-28) * figure 4 * * page 1, lines 52-55 * * page 2, lines 75-87 *	1-14	

TECHNICAL FIELDS SEARCHED (IPC)

A24B
D21J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 March 2019	Kirchmayr, Katrin

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 19 6318

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11-03-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 108142979 A	12-06-2018	NONE	
CN 104366687 B	16-03-2016	NONE	
US 235886 A	28-12-1880	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

- GB 2078087 A **[0005]**
- WO 199603060 A **[0006]**
- US 4981522 A **[0007]**